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SULPHURIC ACID IN VINEGAR.

BY J. C. THRESH.

The detection of free sulphuric acid in the presence of sulphates, other salts, acetic acid, and extractive, is a matter of considerable difficulty; and as for estimating the proportion of this adulterant, no method yet published will indicate it even approximately.

The conflicting results obtained by analysts of repute, while examining the same sample of vinegar, show the necessity for some process being devised which shall both detect and estimate this acid with some degree of accuracy. For this purpose I undertook the following experiments, and am tempted to believe that the result is the discovery of an easily applied method which will detect with certainty less than ·01 per cent. of free mineral acid, and will estimate it accurately. Most of these experiments were made with a sample of vinegar that contained in each 100 c.c. ·120 SO_3 and ·0725 Cl. By no test could I detect any trace of free sulphuric acid, and I therefore concluded that the sample was genuine, and this conclusion was fully verified by the results of the experiments detailed below.

My first trials were with the ordinary process of obtaining the vinegar extract, treating with strong alcohol, adding water, boiling off the alcohol, and estimating the H_2SO_4 in the solution thus obtained. It is needless detailing the results, as they were far from approximate, and when less than ·10 per cent. of sulphuric acid was present scarcely a trace of it could be detected in the alcoholic solution.

My next attempt was to render the calcium oxalate test, recently proposed by M. Strohl, more delicate and, if possible, to render it quantitative. In the latter object I have so far failed, but I think that the following modification of the process will detect ·10 per cent. of sulphuric acid, and can be readily applied by anyone with very little trouble. Take two beakers or flasks, and place in each 2ozs. of the vinegar to be examined; to one add 5 or 6 drops of liquor ammoniæ, and then to both 10 drops of the solution of ammonium oxalate (B.P. appendix). The one to which the ammonia was added will become distinctly turbid; the other, if it contains more than ·100 per cent. of H_2SO_4, will remain perfectly clear; with ·070 per cent. it will be turbid, but only slightly so when compared with the other.

My next experiments were made to discover if sulphuric acid would decompose its equivalent of sodium or other chloride present or added to vinegar, so that if the amount of Cl in a sample of vinegar were known, the amount of H_2SO_4 present in it could be determined by the loss of Cl, which would or should result from the evaporation of the vinegar and ignition of the residue. The following table gives the results obtained. The vinegar employed contained ·0725 Cl in each 100 c.c., as determined gravimetrically from the vinegar itself. The Cl in the ash estimated volumetrically corresponded to ·0720 Cl. Since one molecule of H_2SO_4, or 98 parts, will decompose a chloride with liberation of 2 molecules of HCl containing 1 molecule or 71 parts of Cl (Cl_2), the amount of H_2SO_4 represented by the loss of Cl is readily calculated.

Experiments 2 and 4 clearly prove that sulphuric acid in dilute solution is incapable of decomposing sodium chloride, and that when concentrated by evaporation the presence of organic matter prevents in part this decomposition taking place. Experiments 5 to 10 were conducted as follows:—100 cubic centimetres of vinegar were placed in a platinum dish on the water-bath, a known quantity of standard H_2SO_4 solution (containing ·049 H_2SO_4 in each c.c.) was added from an accurately graduated burette, and then by means of a pipette a certain quantity of a standard solution of barium chloride, each c.c. of which contained ·005 of chlorine (made by dissolving 34·134 $BaCl_2$ in water to 1 litre, and titrating a portion with standard silver solution to determine if correct). The whole was then evaporated to dryness, the residue thoroughly charred, and successive portions of water boiled in the dish until all soluble matter was removed. Finally, this filtered solution was titrated with silver solution (each c.c. of which represented ·00355 Cl), neutral potassium chromate being used as indicator. The results thus obtained are somewhat too high, since the $BaSO_4$ carries down with it some chloride which is not afterwards recovered by washing.

In an experiment with vinegar to which $BaCl_2$ had been added, and the $BaSO_4$ filtered out previous to evaporation, the loss of Cl represented ·0838 H_2SO_4, whereas only ·0612 had been added. Experiments 11 to 13 were made with 50 c.c. of vinegar, 20 c.c. of the $BaCl_2$ solution being added. The residue was ignited gently for some time, until it could be readily detached from the dish. It was then rubbed to fine powder in a mortar, transferred to a beaker and boiled with about 150 c.c. of water for ten minutes. A little pure $NaHCO_3$ was added to the solution (previous to ebullition) till the reaction was faintly alkaline, to remove excess of barium, and in the hope that it would decompose the chlorides carried down by the $BaSO_4$. The results, as will be seen, are highly satisfactory.

Amount of H_2SO_4 added to 100 c.c. of the vinegar.	Amount of Cl added to the 100 c.c.	Total Cl present before evaporation.	Cl found in the char.	Loss.	Amount of H_2SO_4 calculated from loss of Cl.	Error.
1. none	none	·0725	·072	none	none	none.
2. ·098	none	·0725	·062	·0105	·0145	·0835 deficient.
3. ·098	·187 as NaCl	·2595	·2250	·0345	·0476	·0504 „
4. ·098	do.	do.	·2165	·0430	·0592	·0388 „
5. ·196	·250 as $BaCl_2$	·3225	·1620	·1605	·2200	·024 excessive.
6. ·098	·100 „	·1725	·1030	·0695	·096	·002 deficient.
7. ·245	·250 „	·3225	·1225	·2000	·276	·031 excessive.
8. „	„ „	„	·1320	·1905	·262	·017 „
9. ·049	·100 „	·1725	·1290	·0435	·060	·011 „
10. ·294	·250 „	·3225	·1205	·2020	·278	·016 deficient.
11. none	·100 „	·1725	·1700	·0025	·003	·003 excessive.
12. ·196	·200 „	·2725	·1270	·1455	·200	·004 „
13. ·196	·200 „	·2725	·1280	·1445	·199	·003 „
14. (Another sample of vinegar) none	·200 „	·240	·1620	·0780	·1076	supposed correct.
15. ·050	·200 „	·240	·1240	·1160	·1600	·002 excessive.

In experiments 14 and 15, a different vinegar was employed. It contained in each 100 c.c., ·040 Cl, and ·112 SO_3, but although the SO_3 was less than that contained in the other vinegar, the calcium oxalate test showed that most of it was in the free state. My analysis performed as in 11—13, showed the presence of ·1076 of free sulphuric acid (H_2SO_4) in the 100 c.c., and this was confirmed by experiment 15.

The result of the analyses of the sulphates in the two vinegars would stand thus:—

	1st Vinegar.	2nd Vinegar.
Free H_2SO_4 per gallon .	none . . .	73·36
Combined ditto „ .	103 grains . .	23·24
Total	103 grains.	96·60.

The test for free sulphuric acid in vinegar given in the B.P., would have condemned both these alike, since it does not distinguish between the sulphates and the free acids.

Buxton, June 23, 1875.

THE ADMINISTRATION OF PHOSPHORUS.[*]

BY C. MÉHU.

The author states that during the past ten years his attention has been devoted to the different modes of administering phosphorus. The problem he has striven to resolve has been the obtaining of pharmaceutical preparations having a constant richness in phosphorus, and capable of indefinite preservation. In the present paper he passes in review the numerous methods which, during the past few years, have been suggested in France, England, and the United States, for the administration of free phosphorus, and as the results of his earlier researches upon the subject have been adopted as the basis of the phosphorated oil of the British Pharmacopœia, the opinions of so competent a critic will, without doubt, be of interest to the readers of this Journal.

The first preparation referred to is the phosphoretted resin, containing 4 per cent. of phosphorus, proposed by Mr. Gerrard[†] at an evening meeting of the Pharmaceutical Society of Great Britain. The preparation of this resin Dr. Méhu considers to be extremely dangerous, and nearly impracticable in the vessels usually available in a pharmacy, it being necessary to agitate during some time a vessel heated to 200° C., containing phosphorus and resin in a state of fusion. He states, also, that during the operation a portion of the phosphorus passes into the amorphous insoluble state. Dr. Méhu is of opinion, moreover, that phosphoretted resin is unsuited to most pharmaceutical uses for the following reasons:—The resin is supersaturated with phosphorus at a high temperature, and in cooling the active element separates into solid fragments—fine they may be, but still solid. It being necessary to pulverize the resin before it can be used, the air oxidizes this divided phosphorus much more easily in the time taken up by this operation than in the few moments phosphorated oil is exposed whilst being added to a mixture. The direct pulverization of ordinary phosphorus for incorporation with a pill mass is not more defective, and gives as good results. Moreover, phosphoretted resin has been observed by Dr. Pile[*] to become red under the influence of light; this is what might have been expected, by reason of the incomplete solution of the phosphorus. The preparations of phosphorus, which are solid at ordinary temperatures, appear all to have a similar tendency. When made into an emulsion, phosphoretted resin rapidly deposits at the bottom of the bottle, and the deposit becomes red; the preparation, in consequence of the great density of the phosphorus (=1·8), cannot long preserve its homogeneity. Submitted to the action of alcohol, phosphoretted resin abandons nearly all its phosphorus as a fine powder; scarcely anything but the resin dissolving, unless the proportion of alcohol be very considerable.

Dr. Méhu considers that for similar reasons the use of solid phosphorus ought to be proscribed from pharmacy. A vigorous shaking of a mixture containing solid phosphorus well divided can only diminish the dangerous inconveniences attending its use, but never totally remove them. Non-saturated solutions, in his opinion, alone present the phosphorus in an extreme state of division, and allow of a certain and regular administration. It should always be remembered that phosphorus does not fuse below 44·2° C., that is, at a temperature above that of the human body, and that only as much can be absorbed as is dissolved. The experiments of Réveil and Personne have proved that large pieces of phosphorus can be swallowed with impunity by dogs.

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[*] Abstract of a paper in the *Répertoire de Pharmacie*, vol. iii., p. 321.

[†] *Pharm. Journ*, [3]., vol. iv., p. 441.

[*] *Pharm. Journ.* [3], vol. iv., p. 880.

To avoid the inconvenience in preparing phosphoretted resin, Mr. Abraham* has proposed to substitute balsam of tolu for the resin. But as this preparation is no more soluble in the stomach or fusible at the temperature of the human body than Mr. Gerrard's, Dr. Méhu does not consider it presents any marked practical advantage over phosphoretted resin.

Phosphoretted wax, melting at about 68° C., is, in Dr. Méhu's opinion, not more advantageous; since, although it is more easily made into pills than the preceding preparations, these pills pass through the digestive organs without modification or sensible loss of weight.

With respect to the use of amorphous phosphorus, as suggested by Mr. Postans,† the author remarks that the action of amorphous phosphorus, *free from all trace of crystallizable phosphorus*, is much disputed. If it were not excluded through inertness, red phosphorus could be manipulated in the pilular form as well as any other powder upon which the air exercises no sensible action.

Mr. J. Williams has proposed the use of a solution of twelve grains of phosphorus in nine fluid ounces of glycerine and nine fluid ounces of alcohol;‡ the solution would consequently contain one-twelfth of a grain of phosphorus to the fluid drachm. By dissolving the phosphorus in the glycerine, moderately heated, and then adding the alcohol heated to the same temperature, Mr. Williams obtains a solution which is free from the strong acidity always present in an alcoholic solution necessarily prepared at a much higher temperature, and due to the conversion of the phosphorus into oxygen compounds. But Dr. Méhu points out that as, according to Mr. Williams's own admission, this solution of phosphorus in alcohol and glycerine deposits after a time a part of its phosphorus, it has the fault common to all supersaturated solutions, such as the two per cent. phosphorated oil of the Codex, namely, that it cannot be kept of uniform strength, its richness in phosphorus varying with time and temperature. The alcohol has a tendency to evaporate and the glycerine to absorb atmospheric moisture, and these two effects hasten the precipitation of the phosphorus. Further, the addition of this solution to an aqueous liquid causes the immediate precipitation of the solid phosphorus.

Referring to Mr. Williams' plan of estimating the phosphorus in solution by means of a solution of bichloride of mercury, Dr. Méhu remarks that the property possessed by phosphorus of converting this salt into protochloride of mercury, is also enjoyed by hypophosphorous acid and other oxidized products of phosphorus.

The author states that Dr. Routh has proposed phosphoretted spermaceti as a preparation suitable for the administration of phosphorus, but without publishing any experience to justify his recommendation. Dr. Méhu finds that it is easy to dissolve in spermaceti, melted at about 70° C., two per cent. of its weight of phosphorus, and that the solution agitated during cooling in a hermetically closed flask forms a fairly homogeneous preparation; but it reddens with extreme facility when exposed to the action even of diffused light. During the winter months the effect is very perceptible after a few hours. Even when containing only one per cent. of phosphorus, phosphoretted spermaceti is rapidly coloured by light. Moreover, this preparation has the disadvantage of other solid preparations, that it is necessary to pulverize it before it is used; neither does it melt at the temperature of the body. The author, therefore, considers that it presents no advantages over the resin and other solid preparations.

Dr. Routh has also indicated neat's-foot oil as a good solvent of phosphorus,* but he has omitted to specify its particular advantages, probably, Dr. Méhu thinks, because he is not acquainted with any. But Dr. Méhu states that in his experiments he has found that animal oil gives only mediocre results. Further commercial neat's-foot oil is so variable a product that it cannot prudently be used for a preparation the constant composition of which is indispensable.

In the preparation of phosphorated cod-liver oil, Dr. Méhu does not recommend the direct solution of the phosphorus in the cod liver oil by the aid of heat; but that a sufficient quantity of oil of almonds, containing 1 per cent. of phosphorus, be added to the cod liver oil to bring it up to the richness in phosphorus required.

Phosphorated ether is open to the serious objection that by its too rapid volatilization free solid phosphorus is deposited. Further, whilst it is difficult to obtain ether free from water and alcohol, its solvent power with respect to phosphorus will vary with the proportions of each of those bodies present. On the other hand, phosphorated ether will not mix with water; introduced into an emulsion or draught it quickly deposits solid phosphorus, and a similar deposit of solid phosphorus is to be feared when phosphorated ether is introduced into the stomach in capsules.

With respect to the so-called solution of chlorophosphide of arsenic, obtained by allowing hydrochloric acid to react upon phosphorus and arsenic in a fine state of division,† Dr. Méhu says that such a mixture is neither a solution of free phosphorus nor of chlorophosphide of arsenic, but a hydrochloric solution of variable composition containing oxygen products of arsenic and phosphorus. This preparation is, in his opinion, unworthy of any attention.

Phosphide of zinc, Dr. Méhu thinks, cannot be considered a medicament presenting free phosphorus to the system.

Dr. Méhu shares the opinion of Mr. Martindale,‡ that the previous heating of oil of almonds to 300° F. is not a precaution absolutely necessary in the preparation of phosphorated oil of good quality; but he adds that his recommendation of this preliminary heating had for its object the rendering of the preparation unalterable by light. That it has this effect he has proved by the preservation of flasks of oil containing 1 per cent. of phosphorus, exposed to the light during seven years, without manifesting the slightest turbidity or depositing a trace of red phosphorus. At the Pharmaceutical Congress in St. Petersburg he exhibited, for comparison, phosphorated oil unaltered which had been prepared six years with previously heated oil of almonds, and some prepared with the same kind of oil not previously heated. The phosphorus in the latter was almost entirely precipitated in the state of red phosphorus, although the solution, like the former, had been kept in a vessel sealed at the lamp.

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* *Pharm. Journ.* [3], vol. iv., p. 549.

† *Pharm. Journ.* [3], vol. v., p. 363.

‡ *Pharm. Journ.* [3], vol. v., p. 210.

* *Pharm. Journ.* [3], vol. iv., p. 965.

† *Pharm. Journ.* [3], vol. iv., p. 965.

‡ *Pharm. Journ.* [3], vol. iv., p. 902.

Mr. Ashburton Thompson has stated* that the phosphorated oil is an unsatisfactory preparation, because when exposed to the air the phosphorus which it contains readily oxidizes. Dr. Méhu points out that this oxidation, which is common to all preparations containing free phosphorus, may be prevented by the addition of a few drops of ether. The same result may be attained by the use of a small quantity of oil of turpentine, but such an addition may be objectionable, since oil of turpentine acts as an antidote to phosphorus. Dr. Méhu states that he has kept phosphorated oil to which a very small quantity of ether has been added, for months, in bottles opened every day, without the oil undergoing any sensible alteration.

Dr. Méhu supplements his criticisms by some details as to what he has found to be the best mode of preparing phosphorated oil. Pure oil of sweet almonds, slightly coloured, limpid, free from admixture with oil from plum and peach kernels sometimes present in commercial oil, is the oil he prefers to use. This oil is heated in a porcelain capsule. At a temperature near 150° C. it is very perceptibly decolorized, and this decoloration is more marked as the temperature rises, but it is not entirely persistent after cooling. The decoloration is a sign of the good quality of the oil; for the red-tinted oils, extracted from the seeds of various species of Rosaceæ, are very slightly decolorized. The colour is injurious to the appearance of the product, although not to the solvent or keeping properties of the oil. The oil after being raised to a temperature of from 200° to 250° C., is left to cool partially, and then filtered still hot through paper. The vessel into which it is received should be scrupulously dry and clean. This oil will dissolve about one eightieth of its weight of phosphorus, but it is recommended not to dissolve more than 1 per cent., so as to avoid all danger of supersaturation. A ground-stoppered flask is then filled to nine-tenths of its capacity with the oil, and 1 per cent. of its weight of phosphorus added. The phosphorus, cut under water and weighed after drying with a fine linen cloth, should be perfectly transparent and free from either red or white phosphorus. The flask is placed up to the neck in a boiling water-bath; and when sufficiently heated it is closed, and after the temperature has risen to about 70° or 80° C. the bottle is well agitated until the solution of the phosphorus is complete. Dr. Méhu does not operate upon more than a kilogram of oil at a time, so that the agitation may not be too difficult. When the flask has cooled, if it be opened in the dark, the oil presents a beautiful phosphorescence and emits luminous vapours. A few drops of ether poured upon the stopper at the moment of opening the bottle suffices to prevent this oxidation and the phosphorescence.

Most fixed oils dissolve nearly one-eightieth of their weight of phosphorus; castor oil however dissolves only one part in one hundred and twenty at ordinary temperature. Experiment has shown that with arsenious acid the results are different, castor oil dissolving three parts in a thousand, whilst oil of almonds dissolves scarcely one part. Dr. Méhu's experiments have shown also that the essential oils which contain no oxygen, alone prevent the phosphorescence of phosphorated oil; oxygenated essential oils do not possess that power.

The pharmaceutical form which, in Dr. Méhu's opinion, lends itself best to the continued administration of phosphorated oil is that of capsules containing one milligram. He also gives the following formula for an emulsion:—

Phosphorated Oil (1 per cent.) . .	0·10 gram.
Syrup of Gum	30·00 „
Distilled Peppermint Water . .	30·00 „

Pour the 30 grams of syrup of gum into a bottle of 60 grams capacity, and by slightly shaking cause it to moisten the entire interior of the bottle. Introduce the phosphorated oil (as many decigrams as the emulsion should contain milligrams of phosphorus), shake well and pour in the peppermint water. The bottle should be shaken, before administering a dose, to render the emulsion perfectly homogeneous.

SYRUP OF FERROUS IODIDE.*

BY MAX TSCHIRNER.

The *American Journal of Pharmacy* for the year 1860, p. 171, has a paper on liquor ferri iodidi, and the tests of iodine by F. F. Mayer, which induced me to take up the subject, and I submit the following experiments made by me and the conclusions arrived at.

When iodine, iron and water are brought in contact, a small part of the iodine decomposing water, forms hydriodic acid, which, by a surplus of iron, is decomposed again to ferrous iodide and hydrogen. The quantity of ferric oxide formed, corresponds with the hydriodic acid, and it is only by taking equivalent proportions of iodine and iron that HI will escape. The fresh solution of ferrous iodide, even when shaken with pulverized iron, turns blue litmus paper red, not indicating free HI, but merely the characteristic reaction of the iron group.

My researches on this subject were made in the following way:—10 grams of dry iodine, 2·2 grams of iron filings, and 50 grams of water were put into a flask, connected by a bent glass tube with a receiver containing a small quantity of water; the flask was exposed to a gentle heat until all the iodine was combined. The water in the receiver was found to contain HI equal to 0·025 gram of iodine. In the flask remained a brown liquid, yielding, by filtering, a greenish solution of ferrous iodide, and leaving on the filter ferric oxide. The solution was tested and found to contain 9·975 grams of iodide. The process repeated with a surplus of iron gave no HI, but by titre the full amount of iodine taken.

A third experiment was made by heating 10 grams of iodine, 5 grams of iron filings, and 20 grams of water in the same apparatus; the remaining surplus of iron, well washed, was dissolved in diluted sulphuric acid, passing a slow stream of carbon dioxide in the meantime through the flask. The solution of ferrous and ferric sulphate, tested volumetrically with potassium permanganate, gave the quantity of ferric oxide, and this the equivalent HI, which was generated and decomposed again during the process equal to 0·075 gram.

My volumetric tests were made by heating 10 to 15 c.c. of the liquid ferrous iodide with 4 to 5 grams of dry ferric chloride. The iodine evolved was led in a solution of potassium iodide, and this was tested with a volumetric solution of sodium hyposulphite. The liquid in the flask containing the iron salts was immediately diluted with cold distilled water and tested with a volumetric solution of potassium permanganate. As 1 equivalent of ferric chloride and 1 of iron form 3 equivalents of ferrous chloride, only one-third of the iron found was contained in the liquid ferrous iodide.

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* *Pharm. Journ.* [3], vol. iv., p. 965.

* From the *American Journal of Pharmacy*.

These results differ entirely from Mr. Mayer's experiments, as he could not find, in a single instance, the liquid ferrous iodide to contain the full amount of iron corresponding to the quantity of iodine employed. The deficiency is only explainable by the impurities of the iodine, especially its moisture, but where allowance is made for these, the amount of iron in the liquid will correspond equivalently with the iodine employed.

Further, says Mr. Mayer, that the officinal liquor ferri iodidi contains free hydriodic acid, and the quantity of iron in solution is not sufficient to bind all iodine.

This conclusion differs from my experiments. The aqueous solution of ferrous iodide is very liable to decomposition. Ferric oxide is precipitated and free iodine is held in solution. This is only effected by the formation of HI, which again is decomposed into hydrogen and iodine, and naturally the amount of iron will decrease in the liquid as the process goes on.

The existence of a ferric iodide is very doubtful. Ferrous iodide dissolves free iodine, but the solution gives only the reactions of a ferrous salt and of free iodine. Freshly-precipitated ferric oxide dissolved in HI yields by heating only iodine and ferrous iodide.* The aqueous solution evaporated in a glass retort in a water-bath to syrupy consistence gives, on cooling, a greenish-black, solid ferrous iodide, which, dissolved again, contains free iodine; even when passing a stream of carbon dioxide over the evaporating solution, I could not succeed in getting a greenish solution from the salt. As most of the dry ferrous iodide of commerce is decomposed, I would recommend every apothecary to prepare it himself at a minute's notice, by pulverizing iodine with the aid of a few drops of alcohol, and adding pulverized iron in slight excess, the chemical heat evaporates the few drops of alcohol and leaves a hard black ferrous iodide.

Samples of syrup, obtained from different retail stores in San Francisco, showed a variation of from 10 to 46 grains of iodine to the fluidounce. In some cases a syrup of standard strength had evidently not been aimed at, but in some the deficiency might be explained by the moisture of the iodine and the carelessness of the operator. I would recommend the following way of making the syrup:—

Test first your resublimed iodine for water by heating a weighed quantity of it in a watch-glass until fumes of iodine commence to escape, then cover it with another watch-glass exactly fitting the first, and drive the iodine into this by increasing the heat; the difference in weight gives the amount of water.

After this preliminary proceeding, put into a glass-stoppered bottle the full quantity of iodine, a surplus of iron, best in the shape of small French nails or fine wire, water sufficient to make, with double the weight of sugar, the exact volume of syrup. Expose the bottle to a gentle heat until the iodine is combined, filter when cold, and make the syrup by gently heating the solution with the sugar. If time is given, the heating is unnecessary, as an occasional shaking of the bottle is sufficient to bring on the chemical combination between the iodine and the iron.

The quantity of sugar of the officinal formula is insufficient; the syrup will keep better when thicker, though even then it is liable to the same decomposition, but slower than the aqueous solution. As a preventive, Mr. Mayer recommends sodium hyposulphite; this is surely of all known remedies the best, but he decomposes it by iodine, and so converts it into sodium iodide and sodium tetrathionate. A solution of ferrous iodide, prepared by his formula, separated ferric oxide in twenty-four hours. But when a small quantity of sodium hyposulphite was added to the fresh syrup, it kept its greenish colour well for months.

Experiments which I made with a browned syrup to restore the colour by iodine and heat, as found by Mr. Mayer, were not successful, though some iodine escaped with the vapours. A dark syrup exposed to the rays of the sun turned greenish by the conversion of the free iodine into hydriodic acid.

TOUGHENED GLASS.

The following preliminary account of some observations on the optical and mechanical properties of De la Bastie's "toughened" glass, has been furnished to *Nature* by Mr. Henry Pocklington:—

Immediately after the publication of M. De la Bastie's specification I prepared specimens of the glass and submitted them to careful optical examination by polarized light. Perhaps the best experiments are those made by means of short cylinders and small cubes and parallelopipeds carefully "hardened." A small cube with half-inch sides thus prepared has its sides ground plane and polished. The operation of polishing may be dispensed with if a small microscopical thin cover be cemented on the ground surface with Canada balsam. The cube is then mounted between strips of blackened cork, and examined in the usual way by means of Nicol's prisms, glass plates, or other appropriate polariscope. The beautiful chromatic phenomena thus brought out at once indicate that amongst the causes which operate to produce the hardness of glass, powerful compression of the interior by the contracting exterior must be one. The phenomena are, in fact, essentially those of compressed glass, and the curves of colour, or black and yellow, seen when the glass is examined by white or monochromatic light, indicate successive curves of tension and balanced, or no-tension. In a carefully prepared glass rod of half-inch length these curves are rings traversed by a well-marked black cross. In an oval the rings assume the character of those seen in biaxial crystals. When plates are examined, the light being transmitted from back to front, they appear to act essentially as bi-refracting plates, but with crosses and bands somewhat irregularly distributed, and capable of being referred to the angles of the plates or to centres of unequal heating.

My experiments on the mechanical properties of the glass have chiefly been confined to testing its hardness and the possibility of grinding it. So far as I have gone at present I make it to be nearly twice as hard as ordinary glass, which it scratches with ease. It can be cut with a good file well moistened with turpentine, and can be ground on a stone with sand, without fracturing, if great care be taken and the glass be well prepared. One piece, which manifested, when under the polariscope, evidences of ill-balanced tension, the neutral line lying near one surface, submitted to transverse grooving, but disintegrated on being ground on one surface as soon as the outer surface had been ground away to near the neutral line. There appears to be an easily reached limit beyond which the surfaces must not be unequally removed, but as my friend Mr. Thos. Fairley, F.R.S.E., has been good enough to show me, there is practically no limit beyond which *both* surfaces may not be *simultaneously* removed. This result, foretold by me from polariscopical analysis, Mr. Fairley has kindly shown by dissolving the opposing surfaces away by hydrofluoric acid. The least hard portions dissolved much more readily than the thoroughly hardened, and the etched surfaces show wavy lines closely following the tension lines shown by the polariscope. There is further, this remarkable feature, that the inner portion of the glass proves to be essentially common glass, which fractures in the ordinary way. Further experiments are necessary for the complete elucidation of the subject, and are in progress, but the preceding may be useful to fellow-workers on the subject.

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* According to Mohr (1858), a mixture of ferric chloride and iodide of potassium imparts, after some time, merely a faint blue colour to starch paste, and solution of ferrous sulphate will dissolve notable quantities of iodine, before the iodine and starch reaction occurs. Ferric hydrate, ether and iodine yield, according to Nickles (1865), a red solution, which is precipitated blue by ferridcyanide of potassium, and we may add, that syrup of ferrous iodide will indicate the presence of a ferric salt by sulphocyanide of potassium, before ferric oxide is deposited. These facts appear to us to demonstrate the existence of ferric iodide, although a portion of the iodine is held in a loose combination.—EDITOR AMER. JOURN. PHAR.

THE ADULTERATIONS AND IMPURITIES OF TARTARIC AND CITRIC ACIDS.*

BY ALFRED H. ALLEN.

Although the nature of the ordinary impurities contained in these acids is well known, and most books on analysis profess to give methods for their detection, I have found some of the processes very unreliable, and others to require special precautions not always observed. In the following paper I have collected various data, and give the results of my experience, with the hope that they may be found of value.

The principal accidental impurities of tartaric and citric acids are salts of potassium and calcium, together with iron, lead, and copper derived from the vessels used for the evaporation or crystallization of the acid liquids. The presence of all these impurities is indicated by the proportion of ash left on igniting the specimen.

A number of samples of commercial tartaric and citric acids recently examined gave an amount of ash varying from 0·05 to 0·25 per cent.

The ignition is readily effected in a porcelain crucible over a Bunsen burner. Platinum vessels should be avoided, lest lead should be present; 5 or 10 grms. should be taken for the ignition. When the proportion of ash is small, it is of no interest to examine it further except for poisonous metals. Very sensible quantities of lead and copper are sometimes present. Of course their existence will be readily indicated on dissolving the ash in a few drops of nitric acid, diluting largely, and passing sulphuretted hydrogen.

A very fair approximate estimation of the lead or copper present may be obtained by placing the solution of the ash in a tall glass cylinder, and comparing the depth of tint produced by sulphuretted hydrogen with the tint obtained by treating an equal bulk of a very weak standard solution of lead or copper in a similar manner. The plan is identical with that recommended by Wanklyn for estimating the lead in water, except that sulphuretted hydrogen is substituted for ammonium sulphide. Experience has shown this to be necessary, owing to the frequent presence of iron, which, of course, gives a dark colour in an alkaline solution. I lay some little stress on this well-known fact, as I have recently examined some samples of aerated water which gave a deep brown coloration with ammonium sulphide, apparently indicating the presence of poisonous quantities of lead, but which further inquiry proved to be merely due to a considerable quantity of iron.

I prefer to examine the *ash* for poisonous metals instead of using the original sample of acid. The presence of copper is indicated on treatment of the ash with nitric acid in the crucible by the production of a blue colour.

Of course the presence of poisonous metals in tartaric and citric acids is always accidental, but as they are occasionally present in dangerous amount, it behoves the manufacturers to take every precaution to avoid their introduction, as the product containing them must be regarded as adulterated.

Many samples of citric acid contain free sulphuric acid, which may be known by the highly deliquescent character of the crystals. In testing citric acid for sulphates with chloride of barium, it is desirable to acidify rather strongly with hydrochloric acid.

The most common adulterant of citric acid, and almost the only substance purposely mixed with it, is tartaric acid, which is frequently found in the powdered samples sold in the shops. Many plans of detecting tartaric acid in admixture with citric acid have been proposed, but some seem to have been tried merely on the separate acids, and not on mixtures containing a comparatively small proportion of tartaric acid.

The ordinary method described in the text-books, of precipitating the tartaric acid from a cold neutral solution by addition of calcium chloride, I have found far from delicate, 10 per cent. of tartaric acid in a sample escaping certain detection.

Messrs. Chapman and Smith found that a citrate, when boiled with a very alkaline solution of potassium permanganate (such as is used for the estimation of albumenoid ammonia), merely gave a green solution of alkaline manganate; but tartrate, when similarly treated, caused a precipitation of brown manganese dioxide. I have been unable to verify these results, having failed to find any decided difference in the behaviour of the two acids.

Another proposed method of detecting this adulterant is to add excess of precipitated ferric hydrate to the aqueous solution of the sample, and to raise the liquid slowly to the boiling-point. The undissolved portion is allowed to settle, and the clear liquid is decanted off and evaporated to a syrup at a steam-heat. If tartaric acid is present, even in very small proportion, it is said to cause the deposition of a pulverulent precipitate of ferric tartrate, while the liquid obtained from pure citric acid remains clear. I have been unable to detect moderate percentages of tartaric acid by this test.

The best test for detecting an admixture of tartaric acid is the well-known one of a salt of potassium. It is remarkable how very few of the ordinary works on analysis make any mention of the precautions necessary for the successful detection of tartrates or potassium by their mutual reaction. If aqueous tartaric acid be added to a strong solution of the chloride or nitrate of potassium, a precipitate of the acid tartrate will often occur, but its formation is greatly impeded by the mineral acid set free.

This may be proved by filtering off the liquid and treating it with a strong solution of sodium acetate, when a copious additional precipitation takes place, owing to the replacement of the free hydrochloric or nitric acid by acetic acid, and the insolubility of the acid potassium tartrate in the latter. Of course, the same object is attained by using excess of acetate of potassium as the precipitant instead of the nitrate or chloride. The precipitation is greatly promoted by stirring, the precipitation forming well-defined and characteristic streaks in the track of the glass rod. Of course the liquid must be quite cold. The delicacy of the reaction is greatly increased by the addition of alcohol.

A recognition of this fact suggested the possibility of rendering the test quantitative and delicate by using alcoholic instead of aqueous solutions of the sample and reagent. Tartaric and citric acids are both soluble in absolute alcohol, but the potassium salts are insoluble. Acid tartrate of potassium is also practically insoluble in proof spirit, while the citrates of potassium are pretty readily soluble in weak alcohol. In the following experiments I employed a proof spirit made by diluting ordinary methylated spirit with water till it had a density of 920:—

Some pure potassium hydrogen tartrate was prepared, and its solubility in proof spirit at 16° C. proved to be 0·05 per cent., or 1 gram in 2000 c.c. of spirit.

A saturated cold solution of potassium acetate in proof spirit was prepared. 100 c.c. contained about 36 grams of the salt, so that 5 c.c. suffice for the precipitation of nearly 3 grams of tartaric acid.

A series of samples of citric acid were prepared, containing from 5 to 50 per cent. of tartaric acid.

Quantities of 2 grams of each of these adulterated samples were dissolved in 20 c.c. of proof spipit, 5 c.c. of the saturated spirituous solution of potassium acetate was added, and the solution stirred and left overnight. It was then filtered, the precipitate was washed with proof spirit saturated with acid potassium tartrate, and then once with ordinary proof spirit. The precipitate was then washed off the filter with hot water into a light porcelain dish, the water evaporated off at a steam heat, and the dry $K\overline{HT}$ weighed and calculated into tartaric acid.

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* Read at the meeting of the Society of Public Analysts, June 2nd. Reprinted from the *Chemical News*.

It was hoped that, by proceeding in this manner, very accurate estimations of tartaric acid could be made, as there could be no loss except from the slight solubility of the precipitate in the solution, for which a correction could readily be made on the assumption that the citric acid and potassium acetate present had no influence on the solubility of potassium hydrogen tartrate in proof spirit. To my surprise, however, the results obtained, even without the correction for solubility, showed sensibly more tartaric acid than had been actually added to the sample. A fresh series of experiments was made, exactly the same method being employed, except that the 2 grams of the samples were dissolved in 40 c.c. of proof spirit instead of 20 c.c. as before, thus making the volume of the solution 45 c.c. By thus proceeding I obtained the following results, without the correction for solubility, which would make the numbers 1·1 per cent. higher still :—

	Tartaric Acid Added.	Tartaric Acid Found By Precipitation.	 By Alkalinity of Ash.
No. 1 ...	10	10·55	9·70
No. 2 ...	20	20·70	20·40
No. 3 ...	30	33·35	35·50
No. 4 ...	40	43·50	42·25

In this series of experiments, the results were checked by igniting the precipitate and titrating the ash with standard acid. It was found that the carbon left retained alkali tenaciously, and, after dissolving the ash in water, it was necessary to ignite the black residue and then add its ash to the main quantity. In the above cases, the amounts of potassium carbonate found by the titration of the ash correspond to the percentages of tartaric acid shown in the last column of the table.

A convenient plan of estimating the tartartic acid volumetrically is to dissolve the precipitate in hot water and titrate the solution volumetrically. This plan gives results closely according with those obtained by direct weighing when pure tartaric acid is employed.

Another series of experiments was conducted in an exactly similar manner, except that the precipitate was washed with proof spirit which had *not* been previously saturated with acid potassium tartrate. The following results were obtained, no correction being made for solubility of the precipitate in the mother-liquor :—

	Tartaric Acid Added.	Tartaric Acid Found. By Weight of Precipitate.	 Means.	 By Alkalinity of Ash.
	Per cent.			
No. 1 . . .	10	10·00	10·04	10·50
„ 1A . . .	10	10·25		10·10
„ 1B . . .	10	9·88		—
„ 2 . . .	20	20·90	21·30	22·02
„ 2A . . .	20	21·71		—
„ 3 . . .	30	31·50	30·73	31·59
„ 3A . . .	30	29·96		—
„ 4 . . .	40	43·10	43·91	43·57
„ 4A . . .	40	44·71		—

These estimations were very satisfactory when the proportion of tartaric acid did not exceed 20 or 30 per cent., but there was a uniform tendency towards too high a result. The discrepancies observed seemed attributable to—(1) The presence of tartaric acid in the sample of citric acid employed; (2) precipitation of an acid citrate together with the potassium hydrogen tartrate.

Apart from direct experiment having proved the absence of tartaric acid in the original citric acid used, the invalid nature of the first explanation is shown by the fact that the *less* citric acid used the *greater* was the excess of tartaric acid found over that added.

Experiments were then made with the view of ascertaining whether the discrepancy was due to the second cause.

A quantity (2 grams) of the citric acid was treated in exactly the usual manner, and gave no evidence of the presence of tartaric acid. On the following morning the liquid was again stirred, the temperature being only about 8° C., when well-defined streaks were produced in the track of the glass rod, and in a few minutes the liquid became semi-solid from the formation of a crystalline precipitate. Either the sample was largely contaminated with tartaric acid, or the cold had induced the separation of potassium citrate. The latter, as might be expected, proved to be the truth, warming causing the precipitate to disappear gradually, while, on decanting off the alcoholic liquid and adding a moderate quantity of cold water, the precipitate dissolved instantly. The fact deserves special attention, as an ignorance of it might readily lead to a sample of citric acid being condemned as largely adulterated with tartaric acid, when the latter substance was entirely absent.

The above observation naturally gave the clue to the anomalous results already obtained. In the concentrated and highly alcoholic solutions used there was a tendency to the precipitation of potassium citrate along with the tartrate. This tendency seemed capable of correction by treating the washed precipitate with a cold saturated aqueous solution of potassium hydrogen tartrate, which would readily dissolve any precipitated citrate without acting on the acid tartrate. The following experiments show the result of this treatment :—

	Tartaric Acid Added.	Tartaric Acid Found. Precipitate Washed with Proof Spirit.	 Same Precipitate after treatment with Aqueous $K\overline{HT}$ Solution.
	Per cent.	Per cent.	Per cent.
No. 1	20	21·00	20·96
No. 2	40	44·60	38·77

In this case the results obtained from the sample containing 20 per cent. of tartaric acid were almost within the limits of error, while the reduction of the weight of the precipitate in No. 2, by an amount equal to nearly 6 per cent. of tartaric acid, conclusively shows that the previous excess was due to citrate carried down by the tartrate precipitate. If, to the result obtained in No. 2, we add 1·1 per cent., as correction for solubility of the $K\overline{HT}$ in the mother-liquor, we obtain 39·87 per cent. of tartaric acid found, as against 40 per cent. added.

An attempt was next made to obtain a precipitation in an *aqueous* solution, using proof spirit merely for washing the product. Two quantities dissolved in ten times their weight of water gave by this method 35·15 and 16·85 per cent. of tartaric acid respectively, instead of 40 per cent. and 20 per cent. added.

I next made some experiments in which a cold saturated aqueous solution of potassium hydrogen tartrate was used as the solvent of the sample, but the results were unsatisfactory.

The results of the whole of the above experiments have led to the use of the following process, which, while readily detecting 2 or 3 per cent. of tartaric acid, allows of the estimation of larger proportions with very fair accuracy :—

Dissolve 2 grams of the sample to be tested in 45 c.c. of proof spirit, filter from any undissolved calcium or potassium tartrate, add 5 c.c. of a cold saturated solution of potassium acetate in proof spirit, stir, and allow to stand for twelve hours. Filter off the precipitate produced and wash it with proof spirit. Rinse off the precipitate from the filter with a saturated solution of potassium hydrogen tartrate in cold water, digest in the cold for a few hours with occasional stirring, then filter, wash once with proof spirit, rinse off the precipitate into a small porcelain dish with boiling water, evaporate at 100° C., and weigh the acid potassium tartrate obtained. The weight, multiplied by 0·798 (or, roughly, 0·8), gives the quantity of tartaric acid in 2 grams of the sample examined. As a check, the dry precipitate may be ignited and the solution of the ash titrated with standard acid; or the same method (substituting standard alkali for acid) may be applied to the purified precipitate on the filter, so as to avoid the trouble of the subsequent evaporation at a steam heat.

Since the above experiments were made, I have found that a closely analogous method has been described by E. Fleischer; but, by strictly following his directions, I found that a precipitate was obtained containing a considerable admixture of citrate.

If any doubt whatever exists as to the precipitate produced by potassium acetate being really the acid tartrate, its insolubility in cold water will readily settle the question, but positive proof is readily obtained by the silver test, which is extremely delicate when carefully applied, but remarkably liable to failure if the proper conditions are not carefully observed. The following plan of operation gives very good results:—

A small quantity of the precipitate of acid potassium tartrate is washed with a little cold water, and then treated with a slight excess of ammonia. The resultant olution is boiled till neutral, allowed to cool, and then precipitated with *excess* of argentic nitrate. To the liquid containing the precipitate dilute ammonia is added till the precipitate has almost disappeared, when the solution is filtered. On heating the filtrate nearly to boiling for a few minutes, a brilliant mirror of metallic silver is produced on the sides of the tube. Citric acid does not reduce silver under similar circumstances, except on continued boiling.

After the precipitation of the tartaric acid in a solution, by addition of potassium acetate, the citric acid may readily be detected in the filtrate (after evaporating off the alcohol) by applying the ordinary tests.

Muter's 'Chemistry' contains a method of separating tartaric and citric acids by converting them into calcium salts and treating the precipitate with a perfectly neutral solution of cupric chloride, when calcium chloride is produced, together with soluble cupric citrate, while cupric tartarte remains insoluble. I have had no experience of this process, but it looks very promising, especially for the examination of citrates supposed to contain tartrates.

Mr. Wigner has suggested that the power possessed by solutions of tartaric acid of altering the plane of polarization of a transmitted beam of light, would enable an accurate estimation of that acid to be made in the presence of citric acid, which is inactive. The method would evidently give a practised observer very good results in cases in which the adulterant was all *dextro*-tartaric acid, but would fail if the sample contained racemic, lævo-tartaric, or inactive tartaric acid. This objection does not apply to the estimation as a potassium salt.

Oxalic acid is said to be sometimes employed as an adulterant of citric acid. This dangerous admixture would, of course be readily detected by treating the aqueous solution of the sample with excess of ammonia, acidifying with acetic acid, filtering from any precipitated acid ammonium tartrate, and testing the filtrate with calcium sulphate.

In conclusion, I desire to express my thanks to Mr. Wm. Galbraith, who has performed most of the manipulations described.

CONTRIBUTIONS TO THE THEORY OF SOLUBILITY.*

BY ISIDOR WALZ, PH.D.

In the following paper I beg to submit some general remarks on the subject of solution and solubility, and an attempt to trace some relations between the solubility of substances, their specific volume, and chemical constitution.

I. *Nature and Classification of Solutions. Relation of Solution to Chemical Action.*

Until a comparatively recent time the solution of a substance in a liquid was considered as a phenomenon analogous to the fusion of such substance by itself, and the change in temperature by which the former is often attended was also explained by reference to the latter. Lately, however, we find the opinion pretty generally sustained, that solution is the result of the motion of molecules and the action of molecular forces. This is nowhere stated more clearly and emphatically than by Dossios,† who propounded a theory of solutions based on the mechanical theory of heat, the object of which was "to demonstrate the distinction between the forces that come into play in the formation of chemical compounds and in solutions, and to show that the latter is identical with molecular force," and "that only by assuming the action of molecular force in the case of solutions, the attendant phenomena, as well as the thermal effects and the boiling points, may be explained in an unconstrained manner.'

In another direction, also, views have somewhat changed lately, namely, as regards classes of phenomena that should be considered under the head of solution. Formerly the term was confined to the solution of solids in liquids and to the mixture of liquids which only dissolve in each other in certain proportions. The *Handwoerterbuch*, of Liebig, Poggendorff, and Woehler, as late as 1858, recognizes no other cases of solution, and says distinctly (vol. 2, p. 549), "When two liquids mingle in every proportion, we do not call this a solution, but a mixture." It is, therefore, a very great enlargement of the field when, five years later, we find Kopp ‡ grouping together, under the designation of "*chemical* combinations in variable proportions," the solutions of solids in liquids, the mixtures of all liquids, the absorption of gases in liquids, and the combination of solids with solids, as in the case of alloys, and pointing out properties and laws common to them all. It will be noticed that he regards all their combinations as the results of chemical action, a view which has yielded to more mechanical notions at present; and Dossios, in the above-mentioned paper, restricts the term solution to the solution of solids, liquids, and gases in liquids, the resultant being in all cases a liquid. There seems to be no good reason, however, why we should make such a restriction. If we assume that solution is the result of molecular force, that it consists mainly in the penetration of the molecules of one substance into the intramolecular spaces of another,§ and their retention there, we must disregard the physical state of either substance, and study the manifestations of that force under all circumstances, if we would hope to find a clue to its nature, or to some general law. We must not forget that the physical state of a "substance is a fortuitous attribute, not an essential one, such as, for example, its molecular structure. If the average temperature were 100° C. higher or lower than it really is, circumstances in which water, our principal and representative solvent, would be either a gaseous or a solid substance, what would become of the subject of solution if studied under such an arbitrary and restricted definition? What would become of chemistry, if we would take into account only the compounds formed in reactions 'by the wet way?' and reject those 'by the dry way?'" The following general definitions may, therefore, be given: "Solution is the penetration of the molecules of one or more substances into the intramolecular spaces of another substance, and the consequent formation of a homogeneous resultant." "A solution is an homogeneous aggregate of dissimilar molecules, whose attraction for each other is equal to or greater than that of the similar molecules."

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* From the *American Chemist* for February.

† Vierteljahrschrift d. Naturf. Gesell. in Zürich, 1868.

‡ Kopp, 'Theoret. Chemie,' 1863, p. 20, *et seq.*

§ For brevity's sake I shall use the term *solvent* for one of the substances co-operating in the formation of a solution, and the term *solute* for the other.

Under these definitions we have five distinct classes of solutions, viz.:—

1. Of solids in liquids, including the amalgams.
2. Of liquids in liquids, whether miscible in all, or only in limited, proportions.
3. Of gases in liquids, embracing all cases of *absorption* of gases in liquids.
4. Of solids in solids, including the alloys.
5. Of gases in solids, including absorption of gases by porous solids, diffusion of gases through metals, and occlusion of gases by the same.

I have omitted the mixture of gases, because, though their mixture is effected by the penetration of the molecules of one with the intramolecular spaces of another, the molecules are not retained in those spaces by the attraction of the dissimilar atoms, or any other molecular force.

These various classes of solution have many characteristics in common. In all of them we find the solvent generally retaining its physical state, and imposing it, as it were, upon the solute. Whether a liquid dissolves a solid, a liquid, or a gas, the resultant solution is still a liquid; and, in a similar manner, the molecular combination of a solid with a gas or another solid is still a solid. In this respect they differ from chemical compounds whose physical state is entirely unrelated to the physical states of their components.

One of the principal agencies in bringing about solution is diffusion. This is obvious in the solution of gases in liquids and in solids, and of liquids and solids in liquids. The solution of solids in solids is only a special form of solution of solids or liquids in liquids, for their molecular mixture is only accomplished when one or both are in the liquid or molten condition.

Among the characteristic phenomena of solution is the displacement of the boiling point when the resultant is a liquid, or of the melting point when the resultant is a solid. Such displacement takes place in all of the five classes of solution.

The agencies by which solutions may be broken up and their ingredients separated from each other, operate in a similar manner on the various classes whenever the nature of the case admits of their application. These agencies are principally alterations of temperature and molecular or chemical forces of greater intensity than the molecular forces which effected the solution.

1. Heat destroys the solution of solids in liquids, including amalgams, by volatilizing the liquid. The solution of liquids in liquids is broken up and the liquids separated by fractional distillation. By the application of heat gases are expelled from solution in liquids as well as solids. Solutions of solids in solids may be disintegrated by the application of heat, especially when some of the constituents are more volatile than others, as in the processes of cupellation. Cold, which is a change of temperature in the opposite direction, can, in the nature of the case, be applied destructively only to liquid solutions, and generally breaks them up when one of the ingredients solidifies at a lower temperature than the other, *e.g.*, solutions of gases in water, of fats in alcohol or petroleum oils, etc., etc.

2. Among the forces of greater intensity than those concerned in forming solutions, chemical action may be named as that applicable to nearly every class of solutions. Water solutions of solids are destroyed by placing them in a confined space with concentrated sulphuric acid, fused calcium chloride, or other powerful absorbents. Solutions of gases may be broken up in a similar manner, by confining them altogether with chemical absorbents, such as caustic alkalies for carbonic acid, acid for ammonia, etc. The same method is applicable to many cases of solutions of liquids in liquids, and solutions of solids in solids may be attacked with chemicals able to remove and separate the ingredients from each other.

Again, we may vary the pressure under which the solution exists. By creating a vacuum over it we may disintegrate the solutions of gases in solids and liquids, while by increased pressure solids are in a number of instances precipitated from their liquid solvents.

These considerations seem to be sufficiently conclusive to warrant the inclusion of all the phenomena embraced in the five categories, mentioned above, under the general term *solution*, and to support the opinion that they are brought about by the action of the same molecular force or forces.

A very simple relation exists between solution, hydration, and chemical action, according to this view. Let us assume a molecule A of any solvent substance which has penetrated into the space between the molecules of water. The position of A in reference to nH, in which n denotes any number above 1, may be one of the following three, or it may occupy all three in succession:—

1. The molecule A may be situated equidistantly from the molecules H, H, H, etc., and the distance between A and each of the molecules of water may be so great that the molecular attraction is just sufficient to retain A in its position and no more. Such relations are the conditions of solution pure and simple.

2. The mutual attraction of the molecules A and the molecules H, H, H, may be or may become (as, *e.g.*, by heat) so great, that A will be drawn and retained closer to the single molecule H or the molecules nH than it was in the former case, and yet not sufficiently close to enable either kind of molecules to exert a disturbing influence on the internal atomic structure of the other. These are the conditions under which hydrates are formed in aqueous solutions, and of which the crystallizing out of hydrate salts is only a special form.

3. The mutual attraction of the molecules A and the molecules H or nH may be or may become so great, and these molecules may approach each other so closely, that the atomic structure of each is disturbed and broken up, and the atoms composing each may re-arrange themselves so as to form new molecular systems, which are more stable in close proximity to each other than those which they superseded. Under these conditions the molecules of solvent and solute act chemically upon each other.

There are so many substances, which, when dissolved in water, exhibit these phenomena in succession, that it is unnecessary to dwell upon them at length; I would, however, cite a few instances which at first sight appear anomalous. The anhydrous chlorides of arsenic, antimony, silicon, etc., are in reality very soluble substances. They absorb moisture from the atmosphere, deliquesce, and undergo solution and hydration almost simultaneously. When sufficient water has been attracted, they form crystalline hydrates; but if still more water is presented to them, the conditions for chemical action are given, and the corresponding oxides or oxy-chlorides are formed. The chlorides of calcium, magnesium, aluminium, iron, and other metals show the same phenomena under somewhat different conditions, the last stage—chemical reaction—being in their case brought about, *e.g.*, by the application of varying degrees of heat. Thus, while ferric chloride may be "dissociated" into ferric oxide and HCl by simply applying heat to its aqueous solution, a much higher temperature is required to produce a similar reaction in the hydrated chlorides of calcium and magnesium.[*]

Adopting, then, this extended view of solution, by which it is made to include the molecular intermixture of solids also, we obtain the general law, that "*solution is a necessary condition precedent of chemical action*," whether such action is brought about by the wet or by the dry way.

From this simple view of solution, the conclusion naturally follows that *the size of the molecules and intermolecular spaces, in other words, the specific volume of a substance, must have an important influence in determining the solubility of substances*, and I shall endeavour to demonstrate this in the second portion of this paper. Before entering on this part of the subject, a few remarks on solubility and insolubility may be permitted; special reference being had, as throughout, to water, when no other solvent is mentioned.

Strictly speaking, we ought to distinguish a sixth class of solutions, in addition to the five enumerated above, namely, that of liquids in solids. There are many substances which are but little soluble in water, yet able to dissolve a large amount of the latter. The resultant in these cases is frequently, however, neither in the liquid nor in the solid state, but in a pasty or gelatinous intermediate condition. Such substances are, *e.g.*, silica, magnesium oxide, albumen, starch, gelatine, and similar mucilaginous and colloid compounds. In them the cohesion of the similar molecules is so great, that it is not overcome even by a very large number of dissimilar molecules penetrating into their intermolecular spaces. This great internal cohesion of their molecules is also manifested in all of them, by their inability to pass through the pores of a membrane when they are subjected to dialysis. When these substances are brought into contact with water, they increase very largely in volume, by reason of the great amount of it which they absorb and dissolve; at the same time a small quantity of them passes into true aqueous solution. Thus we see that of two substances, A and B, A may be a solvent of B, and B of A, but in a very different degree. Given a small quantity of A and a sufficiently large one of B, B will dissolve all of A; if the conditions are reversed, A will dissolve all of B, and under intermediate conditions two solutions will be formed, one of A in B, and one of B in A,[†] always calling that ingredient to a solution the *solvent* which retains its physical condition, and imposes it, as it were, upon the other.

Solutions of this class, then, are broken up by the same agencies as the others, viz., higher temperature and the action of molecular and chemical forces of greater intensity than those which effected the solution (desiccation, dialysis, etc.). It may be interesting to examine a few cases more closely.

Anhydrous stannic or titanic acid is dissolved by concentrated sulphuric acid to a syrupy mass, *i.e.*, the molecules of sulphuric acid penetrate between those of stannic and titanic acid, and weaken the internal cohesion of their molecular systems to such an extent that the resultant becomes a semi-liquid mass. If water be added to this, the superior attraction of its molecules to those of sulphuric acid comes into play and prevails; the sulphuric acid diffuses from its solution with the acids mentioned into the water, the molecules of stannic or titanic acid are again free to follow their natural attraction to each other; they are precipitated as insoluble powders. As in this case there is no chemical affinity between the sulphuric acid and SnO_2 or TiO_2 to aid the solution, it seems to present the phenomena of solution and precipitation in a very simple form.[*] There is no reason to believe, however, that the process is essentially different when chemical action is possible between solvent, solute, and precipitant, as solution is the condition precedent of chemical action; though the two may be so closely consecutive in time as to appear almost simultaneous, and the striking effects of chemical action overshadow the simpler effects of solution. The solution of alumina in acids, and its precipitation by alkalies, and hundreds of similar cases, may be explained in the same manner as the case first cited, by the principles of molecular mechanics, though the formation of the various salts accompanying these processes belongs to a different order of phenomena.[†]

CARNIVOROUS PLANTS.[‡]

At a recent meeting of the Edinburgh Botanical Society Dr. Balfour read notes of experiments he had been making on *Dionœa muscipula* and allied plants. These experiments painfully confirmed the suspicions entertained by Ellis, Curtis, Hooker, and Darwin that the dionœa is a carnivorous and, it may be added, a most brutal plant. Dr. Balfour classified the facts he had observed in regard to it under the heads of irritability, contraction, secretion, digestion, and absorption. The irritability, it seems, is resident in six delicate hairs, so placed on the surface of the leaf that no insect can avoid touching them in crawling over. Dr. Balfour touched with a needle every other part of the leaf and no response followed; but no sooner was the point applied to one of those hairs than a contraction of the leaf ensued. Chloroform dropped on a hair caused the leaf to close like a winking eye, but water had no such effect. It was only when the object seized was capable of affording nutrition that the contraction continued for any considerable length of time. A piece of wood was soon released, and so was a dried fly; but when a live fly or caterpillar or spider was enclosed the contraction lasted on an average for about three weeks. The leaf at the same time gave out a viscous acid secretion. This appeared to be only the case when an insect was captured, and it was always present on such occasions; but whereas with a fat spider it was abundant, with a shrivelled fly there was very little. The notion that any nourishment was obtained from insects so enclosed has been controverted; but Dr. Balfour pointed significantly to the facts that young plants of dionœa under bell-glasses had been found not to thrive so well as those left free, and that while a piece of beef wrapped in another leaf became putrid, a piece enclosed by the dionœa remained perfectly inodorous, but soon lost its red colour, and was gradually disintegrated more and more till it was reduced to pulp. This statement, showing the greediness and ferocity of the dionœa, created quite a painful sensation among the members of the Botanical Society, and the chairman, while recommending a continuance of the experiments, wisely suggested that they should be completed before the Anti-Vivisection Act comes into operation, since otherwise Dr. Balfour may get into trouble.

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[*] Another very interesting case in point is that of chlorine. Chlorine dissolves in water and forms a hydrate which crystallizes out—$Cl_2,10H_2O$—when the solution is cooled to about 1° C. A solution of chlorine is decomposed even at average temperatures according to the formula $Cl_2+H_2O=2HCl+O$. Bromine behaves in an exactly similar manner.

[†] The case of ether and water, when brought into contact, is somewhat similar.

[*] A very similar case is that of an aqueous solution of cobalt chloride to which alcohol is added. This mixture has a red colour when cold, showing that part of the water, at least, is dissolved in the salt; but on heating, the affinity of water for the alcohol preponderates, and the colour turns to the blue of the *anhydrous* cobalt chloride.

[†] The transition of a substance from the liquid to the solid state in the midst of a liquid, which we call precipitation, is not a sudden but a gradual one; though in many instances the intermediate stages escape our observation, we are able to trace them in numerous others. Thus silica may be separated as a transparent, colourless jelly, as a pasty, flocculent mass, or as a fine white powder. In a similar manner calcium carbonate may be obtained either as a transparent gelatinous, a flocculent, or a crystalline precipitate. Many similar instances readily suggest themselves.

[‡] From the *Pall Mall Gazette*.

The Pharmaceutical Journal.

SATURDAY, JULY 3, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

COMPETITION IN EXAMINATION, AND ITS CONSEQUENCES.

WE have recently had occasion to express the opinion that it is a mischevious plan to place examining bodies in competition with each other for their means of existence, because such an influence is calculated to bring about a prejudicial lowering of the examination standard.

The proceedings of the Medical Council at the late meeting have furnished an apposite illustration of the views we have expressed on this point. The visitors who have been inquiring into the examinations carried on by various medical corporations have reported that in certain respects the examination of the Apothecaries' Hall in Dublin is defective. In the discussion that took place on this subject Sir DOMINIC CORRIGAN observed that he could explain why the examination was imperfect; and the account he gave certainly seemed to justify the doubt he expressed whether the Apothecaries' Hall could do anything to remedy the evil. It appears that the Board of examiners consists of thirteen members, and that in order to become an examiner the main requisite is the possession of one share in the Company. The course adopted in filling up a vacancy in the Board, when one occurs, is, we hope, peculiar. An advertisement is inserted in the Dublin newspapers as follows:—

> APOTHECARIES' HALL.—For Sale. One Share in the Apothecaries' Hall of Ireland. Offers for it will be received by the undersigned to the 31st of March inst. This corporation has lately been paying dividends at the rate of £20 per Share per annum. For particulars, apply to CORNELIUS CARLTON, 12, Eden Quay, Dublin.

According to Sir DOMINIC'S account, Eden Quay is a place famous for auctioneers' shops, general dealers, sellers of tar and tow, and various articles of ship chandlery. He described the appointment of an examiner as "competitive," and that it was carried out by the candidates going to Eden Quay, and offering such sums as they thought would buy a share in the Company. Under such circumstances, it is scarcely to be wondered at that the examination conducted by Apothecaries' Hall was defective, and we can well understand Sir DOMINIC'S doubt as to the ability of the Society of Apothecaries to improve its system of examinations.

Such a disclosure with regard to the conditions under which medical qualifications are granted in Ireland is not unworthy of consideration by pharmacists when it is proposed to establish there an independent body, empowered to confer the title of "pharmaceutical chemist" not only for that country but also for Great Britain. It comes as a timely justification of the views put forward in the letter of a correspondent in last week's Journal, and we doubt not it will lead many to ask whether similar results might not have followed the application of the "reciprocity" principle to the "pharmaceutical chemist."

We have also this week an amusing illustration of the way in which advantage is taken of the existence of a multiplicity of licensing bodies, and of the opportunity thus afforded by impostors or holders of bogus degrees to represent themselves as qualified, when they are nothing of the sort.

A report of the case referred to will be found at page 17. Though it appeared from the evidence given that the "licensed botanist" had not rendered himself liable to a charge of manslaughter, there can be little doubt that he was totally unfit to undertake the medical treatment of disease, and that the title he assumed was intended merely to delude ignorant persons with the belief that he had some kind of medical qualification. At present the legal right to practise medicine is obtainable in so many different ways, that it cannot be expected the less well-informed portion of the community should be able to distinguish between those who possess such qualification and those who are mere impudent quacks.

It is for such reasons that we have deprecated the multiplication of licensing bodies in reference to pharmacy, and have advocated the adoption of some plan by which the granting of pharmaceutical qualifications should be conducted on one uniform system, rather than under the direction of independent bodies, in different parts of the kingdom.

Those who have taken an opposite view appear to have been to a great extent influenced by improperly confounding together the functions of a Pharmaceutical Society, in so far as they relate to the advancement of pharmacy and the education of students, and those duties which relate to the testing of qualification by the examination of candidates for admission to the general pharmaceutical body. We fully recognize the advisability of maintaining local associations for the purpose of promoting most effectually the first-named objects, and we are willing to admit that the management of such local associations cannot be more efficiently provided for than by independent exertions in separate localities.

But as regards the granting of qualifications we maintain that it would be to the advantage both of the public and of pharmacists themselves to make this the business of one body. In carrying out such a plan, it is by no means requisite that the examinations should be conducted at one centre. Experience has shown, in the case of Scotland, that the business of examination may be very well conducted by branch boards acting under the control of the central authority.

We know of no circumstances which would constitute any real difficulty in the way of applying such a system to Ireland, in the same way that it has been satisfactorily applied to Scotland. And as regards the establishment of a local Association or Society for the promotion of pharmaceutical art and education, we are disposed to believe that the realization of this object would be much facilitated by the course we have advocated.

As for the arguments that have been founded upon the supposed desire of the Pharmaceutical Society to derive pecuniary advantage from the extension of its action as a qualifying body to Ireland, they are so destitute of any facts to support them that there is little need to say much about them. Putting aside membership of the Society as a purely optional matter, having no connection with the obtaining of a legal right to carry on the business of pharmacy, the probability is that the extension of the Society's action to Ireland would not result in any pecuniary advantage, but, on the contrary, that it might entail some considerable expense. So far as we are in a position to judge, we should certainly expect that for some years to come the examination fees of Irish candidates for the pharmaceutical qualification would fall far short of the outlay necessary for maintaining an efficient Board of Examiners in Ireland.

But the great danger to pharmacy that is to be apprehended from the establishment of an independent qualifying body in Ireland, on the principle of reciprocity, lies in the possible effect of the temptation "to grow rich by degrees," which has been found so damaging to the character of examinations in the medical profession. The facts we have above referred to on such excellent authority, leave no doubt as to the existence of real grounds for such apprehension, and we trust that their teaching will not be disregarded.

THE DISCOVERER OF THE ANÆSTHETIC PROPERTIES OF CHLOROFORM.

An attempt to relieve the tedium of convalescence from a severe attack of influenza at the close of last year, led Sir Robert Christison to take up the thread of some former inquiries on the subject of anæsthesia, the result being an interesting contribution to the history of the use of chloroform as an anæsthetic. Having heard vague reports that chloroform had been used in the practice of Sir William Lawrence and Mr. Holmes Coote in the summer of 1847, some months before Sir James Simpson's experiments, Sir Robert Christison in 1870 applied to Mr. Holmes Coote for information. In reply, the latter gentleman confirmed the truth of the report, and stated that the substance was introduced to their notice, under the name of "chloric ether," by a Mr. Furnell, who represented it to be a milder anæsthetic than sulphuric ether. It was tried in several cases successfully, and whilst Sir William and he were endeavouring to reduce the amount of spirit and water, so as to condense the preparation, Sir James Simpson made known his important discovery. Sir James Paget also testifies to the use of "chloric ether" at St. Bartholomew's.

Then for a time the inquiry dropped, partly through Mr. Furnell, who is now Surgeon-Major in the Madras Army, and was formerly a student in the School of Pharmacy, Bloomsbury Square, having been erroneously described by Mr. Coote as in the Bengal Army. Sir R. Christison has however succeeded in identifying and communicating with Mr. Furnell, who gives the following curious account of his first acquaintance with chloroform. In 1847 Mr. Furnell was a student at St. Bartholomew's, and was also engaged in "putting in a vein of pharmacy" at John Bell and Co's., to enable him to pass at the College of Surgeons. Whilst at the establishment in Oxford Street, he appears to have developed so extraordinary a propensity for experimenting upon himself with sulphuric ether, which just then was creating a great sensation in London, that Mr. Jacob Bell became alarmed, and gave orders that no more ether should be supplied to him. This led Mr. Furnell to search the store-room to see whether he could discover any ether to which he could help himself. On a back shelf he found a dusty bottle labelled "chloric ether," the contents of which, proving grateful to his sense of smell, were taken upstairs and a portion inhaled from a new instrument he wanted to try. Mr. Furnell found "chloric ether" was sweet and pleasant, and that it soon produced a certain degree of insensibility, but he was struck by the absence of the suffocating irritation and choking sensation produced by sulphuric ether. He therefore took some down to Bartholomew's Hospital and introduced it to the notice of Mr. Holmes Coote, with the result mentioned above.

So far had Mr. Furnell gone on the road to discovery when he was overtaken and outstripped by Sir James Simpson.

THE BRITISH PHARMACOPŒIA.

At the sitting of the General Medical Council on the 25th June, the Pharmacopœia Committee reported that 2097 copies of the reprint of the British Pharmacopœia and 10,000 copies of the "Additions" to the Pharmacopœia had been sold. The Committee, after much consideration, had come to the conclusion that it would not be desirable to issue a new edition of the Pharmacopœia for some time to come. The Committee was reappointed.

THE REGULATION OF PHARMACY IN FRANCE.

A project respecting the regulation of pharmacy in France is stated to be under the consideration of the Council of State, which, if adopted, will seriously affect the interests of existing pharmaciens. It is understood that the programme of the examinations would be slightly raised, and that the certificates of the first and the second class would be suppressed. There would then be only one class of pharmaciens, and the obtaining of a certificate would give the right to practise pharmacy in any part of France.

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

The eighth and last meeting of the session was held May 18th, 1875, Professor Remington in the chair.

Professor Maisch presented a specimen of the bark of *Dicypellium caryophyllatum*, Nees, the South American clove-cinnamon, used in South America as a spice; also, leaves of *Eriodyction glutinosum*, Benth., known in California as mountain balm and of an extremely bitter taste; also *Skunkbush*—the root, leaves, and flowers of a species of *Garrya*, all parts of which have an intensely bitter taste; it is probably *G. elliptica*.

Dr. Miller presented a specimen of commercial beeswax, the greater part of which was dirt, the amount of wax being only sufficient to give a thin coating; also an artificial extract of vanilla from Nashville, Tenn., intended for flavouring purposes, but destitute of the true odour of vanilla, apparently being a combination of benzoin, with some volatile oils; also a commercial oil of sandal wood.

Unusual Doses.

A paper by James Kemble, on "Unusual Doses," was read:—

The author suggested that some symbol letter, word, or mark should designate to the pharmacist that the physician is fully cognizant of what he has written, and wishes it followed out, of course, only to be applied in extraordinary cases. The pharmacist would be at once relieved of all doubt and anxiety, and there would be no need of questioning the applicant about the patient, or putting him off with the idea of a long time being necessary to compound the prescription, and in the meantime seeing the physician to find out his intentions; all of which is calculated to cause doubt and distrust on the part of the applicant and patient. He recommended that whenever an active substance is prescribed in large or unusual doses, the asterisk or check mark be used in connection therewith, and at the bottom the letters "C. C.," signifying *considered* and *correct*.

The discussion of this paper embraced a review of the various methods or checks that have been proposed and are partially in use in the United States and Europe. The recent action of the Richmond Pharmaceutical Association (see before, p. 850) was alluded to.

Mr. A. P. Brown said the Camden Association had adopted the mark Q. R.

On motion, the subject was referred to the quarterly meeting of the College.

Excipients for Phosphorus Pills.

Mr. W. H. Walling read a paper on "Phosphorus Pills":—

At the request of physicians the author had used balsam of tolu, dispensing the pills under water, also coating with mucilage gum arabic and French chalk. He found the balsam very easily handled by triturating it and the phosphorus together under hot water.

After repeated experiments with various substances, however, he adopted the following formula:—

Take of—

Butter of Cacao	gr. 300
Powdered White Castile Soap .	gr. 200
Phosphorus	gr. 25

Melt the butter of cacao in a capsule, transfer to a quinine bottle, add phosphorus and shake vigorously; add the soap and continue agitation, applying some heat, if necessary, until the phosphorus is all taken up. The mass is easily, if rapidly, worked. Make into five hundred pills, containing one-twentieth grain of phosphorus each. Coat with mucilage of gum arabic and French chalk. The pills will stand a dry heat of 110° without running together. Their behaviour under heated water compared with other excipients is as follows:—

No. 1. Pills made according to the foregoing formula; No. 2, and No. 3 by wholesale pill makers; and No. 4, made with balsam of tolu.

All were placed in water at 90° F. and heat gradually raised. In two minutes coating on No. 2 entirely dissolved, but the pill remained hard.

In five minutes No. 1 completely liquefied.

The heat up to 98° at first showed little effect upon No. 3, and none whatever upon No. 4.

In six minutes coating on No. 3 was slowly dissolving. Heat raised to 110°. No. 3 coating dissolved and pill with No. 2 slowly separating, but not softened much. No. 4 soft, but retaining form. After half an hour's digestion Nos. 2 and 3 still undissolved; no change in No. 4. The author considers that these experiments indicate the relative solubility in the stomach of the various excipients used in making these pills.

Dr. C. G. Frowert made several experiments with some of the above pills, the results of which he gave in connection with this paper, as follows:—

Series I.—Experiments with phosphorus pills, combined with the excipient *balsam of tolu*, one-twentieth grain in each pill.

Experiment 1.—Two pills were taken one hour after a hearty meal, by adult male in good health. Examination of fæces ten hours afterwards, revealed the pills as entire as when swallowed, but somewhat softer.

Experiment 2.—Another subject swallowed one pill half an hour after a hearty meal. The pill was recovered eighteen hours afterwards in the fæces—hard, and as a nucleus, about which was gathered fæces one-sixteenth of an inch in thickness.

Series II.—Experiments with phosphorus pills, combined with the excipient *silica*, one-sixtieth grain phosphorus in each pill.

Experiment 1.—Three pills were taken by the same party, and under the same circumstances as in experiment 1 of tolu series.

Examination of fæces eight, twenty, and thirty-two hours thereafter revealed no trace of the pills in that form.

Experiment 2.—Two pills were taken by patient, who was subservient to science in experiment 2, of tolu series, under same condition.

No traces of pills in fæces in three succeeding evacuations.

Series III.—Experiments with pills of phosphorus, combined with the excipient *cacao butter*, one-twentieth grain in each pill.

Experiment 1.—Same subject as in preceding experiments and under same circumstances. Two pills were taken. In half an hour breath heavy with odour of phosphorus.

In fourteen hours fæces were examined; failed to find any vestige of the pills.

Experiment 2.—Patient No. 2 swallowed two pills one hour after hearty meal. Odour detected in breath in quarter of an hour. Could find no traces of the pills in fæces in succeeding discharges.

These experiments were conducted with great care and under favourable circumstances, and, in Dr. Frowert's opinion, go to show the relative value of the excipients, balsam tolu, silica, and cacao butter.

Professor Maisch complimented the coating of Mr. Walling's pills, it being handsome in appearance, pearl-white in colour, and free from the sweet taste of sugar.

Mr. Wm. McIntyre said his impression was, that it was advisable in dispensing phosphorus to have it in a state of solution, and with this view he had given preference to pills made with cacao butter in sufficient quantity to dissolve—they are larger but readily made.

Unguentum Paraffini.

Dr. Miller read the following paper prepared by James L. Lemberger and himself on "Unguentum Paraffini" as probably identical with the nostrum cosmolin, and presented samples of the cerate, ointment, pomade, and the crude and refined oil from which they were made :—

Preparation.—Procure a cylindrical percolator having a height of from ten to twenty times its diameter, and arranged so that it can be maintained at a temperature of about 150° F. by a steam or water-bath. Introduce a diaphragm having about 300 perforations to the square inch, or tie a coarse cloth over the nozzle. Fill the percolator nearly to the top with granulated animal charcoal, then allow the rectified residuum of the Smith's Ferry petroleum, of 30° Beaumé gravity, to percolate through. Reserve as much of the percolate as is nearly free from colour, odour, and taste. Pass the succeeding portions through a second percolator arranged in the same manner, and when this ceases to decolorize and deodorize sufficiently, pour those portions which have already passed through the first and second percolators upon a third one. At every operation reserve those first portions of oil which are very light in colour, and nearly devoid of the petroleum taste and smell. Add 16 parts of this purified oil to one part of best white, hard paraffin, which has been previously melted by means of a water-bath.

Notes on the above process.—The melting point of the paraffin used was 140° F. That having a lower fusing point will probably answer quite as well, if the amount is increased proportionally. The application of direct heat must be carefully avoided in every step of the process. Whenever it becomes necessary to melt the ointment subsequently, this should always be done with the assistance of a water-bath. The colour of the ointment will vary somewhat with the care used in the purification of the oil. By very slow and careful repercolation it may be obtained almost colourless.

It is quite possible that the residuum of other oil wells may be equally appropriate for this purpose, but, of those experimented with, none were found that could be so conveniently purified as that of the Smith's Ferry Well, and the so-called cosmo-lubricating oil. The Smith's Ferry Well is located on the Ohio river, between Pittsburgh and Wellsville, Ohio. We are informed that the crude oil obtained from it varies in gravity from 46° to 48° Beaumé. The German edition of 'Muspratt's Chemistry,' published in 1868, specially mentions this oil on account of its clearness, transparency, and freedom from sulphur, phosphorus and arsenic compounds, to which the penetrating and offensive odour of ordinary crude coal oils is attributed.

The natural Smith's Ferry oil yields from 15 to 20 per centum of residuum, after the benzin and burning oils have been removed by distillation. This residuum is rectified by treatment with from 10 to 15 per centum of sulphuric acid, succeeded by sufficient caustic soda to neutralize it completely. All traces of chemicals are carefully removed by washing the oil three or four times successively with hot water. Its chief consumption is as an engine and cylinder oil, for which purposes it is very important that none of the acid is left adherent to it. The same residuum is also rectified in Elmira, New York, and elsewhere, by means of superheated steam, the process being patented. Provided the chemicals have been properly removed the result is the same. We boiled a portion of our Smith's Ferry residuum for some time in distilled water, which remained entirely neutral to test paper.

In the course of our experiments we tried a number of other substances, such as clay, sodic silicate, glycerine, willow charcoal, etc., for purifying the oil, but none were found at all comparable to animal charcoal. Still, it is really surprising, and, in fact, somewhat discouraging, that so large a proportion of this substance is requisite. On an average two pounds of charcoal and a quart of residuum will yield only about a pint of purified oil, the other pint being retained by the bone-black. On a large scale it will no doubt be advantageous to regain this by percolation with benzin, or perhaps by superheated steam.

In warm summer weather the water-bath can be dispensed with in the percolation of the residuum, as the purified oil melts at 70° F. and congeals at 60°. Paraffin ointment melts at 98° F., while the cerate softens at 80° and melts at 106° F.

Beeswax combines readily with the oil and seems also to have the power of masking the petroleum odour when this has not been completely removed. We therefore suggest the following formula as an elegant substitute for simple cerate :—

Paraffin Cerate. Ceratum Paraffini.

Pure Beeswax	1 part.
Purified Paraffin Oil	9 parts.

Melt the beeswax on a water-bath and add the oil.

Paraffin ointment seems to be peculiarly adapted for use as an application to the hair, as the hydrocarbons composing it are not, like other oils, prone to combine with oxygen. It can be conveniently perfumed with any desirable odour. We present herewith a sample of the following :—

Paraffin Pomade.

Paraffin Ointment.	10 ounces.
Oil of Rose	20 drops.
Oil of Bergamot	30 drops.

Professor Maisch presented a circular from E. Steiger, publisher in New York, calling attention to the contemplated issue of the 'Popular Health Almanac,' a publication designed to benefit the public, and to encourage and assist all high-minded pharmacists and druggists in a legitimate endeavour to check the mischievous spread of the nostrum traffic, and in maintaining and elevating the honourable character of pharmacy. The Professor explained the nature of the contents and spoke of the choice of Dr. Frederick Hoffmann as editor of the same. Members expressed their views of suitable contents and style of the work, all being pleased that the suggestion was assuming shape ; and with a view of expressing the sense of the meeting, a resolution to that effect was unanimously adopted.

Dr. Miller presented balsam of tolu, which had been sent to him for examination ; it was adulterated with resin.

ROYAL INSTITUTION.

The Dissipation of Energy.*

BY THE LORD RAYLEIGH, M.A., F.R.S., M.R.I.

The second law of thermodynamics, and the theory of dissipation founded upon it, has been for some years a favourite subject with mathematical physicists, but has not hitherto received full recognition from engineers and chemists, nor from the scientific public. And yet the question under what circumstances it is possible to obtain work from heat is of the first importance. Merely to know that when work is done by means of heat, a so-called equivalent of heat disappears is a very small part of what it concerns us to recognize.

A heat engine is an apparatus capable of doing work by means of heat supplied to it at a high temperature and abstracted at a lower, and thermodynamics shows that the fraction of the heat supplied capable of conversion into work depends on the limits of temperature between which the machine operates. A non-condensing steam engine is not, properly speaking, a heat engine at all, inasmuch as it requires to be supplied with water as well as heat, but it may be treated correctly as a heat engine giving up heat at 212° Fahr. This is the lower point of temperature. The higher is that at which the water boils in the boiler, perhaps 360° Fahr. The range of temperature available in a non-condensing steam engine is therefore small at best, and the importance of working at a high pressure is very apparent. In a condensing engine the heat may be delivered up at 80° Fahr.

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* Lecture delivered at the Royal Institution of Great Britain, Friday, March 5, 1875.

It is a radical defect in the steam engine that the range of temperature between the furnace and the boiler is not utilized, and it is impossible to raise the temperature in the boiler to any great extent, in consequence of the tremendous pressure that would then be developed. There seems no escape from this difficulty but in the use of some other fluid, such as a hydrocarbon oil, of much higher boiling point. The engine would then consist of two parts—an oil engine taking in heat at a high temperature, and doing work by means of the fall of heat down to the point at which a steam engine becomes available, and secondly, a steam engine receiving the heat given out by the oil engine and working down to the ordinary atmospheric temperature.

Heat engines may be worked backwards, so as by means of work to raise heat from a colder to a hotter body. This is the principle of the air or ether freezing machines now coming into extensive use. In this application a small quantity of work goes a long way, as the range of temperature through which the heat has to be raised is but small.

If the work required for the freezing machine is obtained from a steam engine, the final result of the operation is that a fall of heat in the prime mover is made to produce a rise of heat in the freezing machine, and the question arises whether this operation may be effected without the intervention of mechanical work. The problem here proposed is solved in Carré's freezing apparatus, described in most of the text-books on heat. There are two communicating vessels, A and B, which are used alternately as boiler and condenser. In the first part of the operation aqueous ammonia is heated in A, until the gas is driven off and condensed under considerable pressure in B, which is kept cool with water. Here we have a fall of heat, the absorption taking place at the high temperature and the emission at the lower. In the second part of the operation A is kept cool, and the water in it soon recovers its power of absorbing the ammonia gas, which rapidly distils over. The object to be cooled is placed in contact with B, and heat passes from the colder to the hotter body. Finally the apparatus is restored to its original condition, and therefore satisfies the definition of a heat engine. M. Carré has invented a continuously working machine on this principle, which is said to be very efficient.

Other freezing arrangements depending on solution or chemical action may be brought under the same principle, if the cycle of operations be made complete.

When heat passes from a hotter to a colder body without producing work, or some equivalent effect such as raising other heat from a colder to a hotter body, energy is said to be dissipated, and an opportunity of doing work has been lost never to return. If, on the other hand, the fall of heat is fully utilized, there is no dissipation, as the original condition of things might be restored at pleasure; but in practice the full amount of work can never be obtained, in consequence of friction and the other imperfections of our machines.

The prevention of unnecessary dissipation is the guide to economy of fuel in industrial operations. Of this a good example is afforded by the regenerating furnaces of Mr. Siemens, in which the burnt gases are passed through a passage stacked with fire-bricks, and are not allowed to escape until their temperature is reduced to a very moderate point. After a time the products of combustion are passed into another passage, and the unburnt gaseous fuel and air are introduced through that which has previously been heated. The efficiency of the arrangement depends in great degree on the fact that the cold fuel is brought first into contact with the colder parts of the flue, and does not take heat from the hotter parts until it has itself become hot. In this way the fall of heat is never great, and there is comparatively little dissipation.

The principal difficulty in economy of fuel arises from the fact that the whole fall of heat from the temperature of the furnace is seldom available for one purpose. Thus in the iron smelting furnaces heat below the temperature of melting iron is absolutely useless. But when the spent gases are used for raising steam, the same heat is used over again at another part of its fall. There is no reason why this process should not be carried further. All the heat discharged from non-condensing steam engines, which is more than nine-tenths of the whole, might be used for warming or drying, or other operations in which only low temperature heat is necessary.

The chemical bearings of the theory of dissipation are very important, but have not hitherto received much attention. A chemical transformation is impossible, if its occurrence would involve the opposite of dissipation (for which there is no convenient word); but it is not true, on the other hand, that a transformation which would involve dissipation must necessarily take place. Otherwise the existence of explosives like gunpowder would be impossible. It is often stated that the development of heat is the criterion of the possibility of a proposed transformation, though exceptions to this rule are extremely well-known. It is sufficient to mention the solution of a salt in water. This operation involves dissipation, or it would not occur, and it is not difficult to see how work might have been obtained in the process. The water may be placed under a piston in a cylinder maintained at a rigorously constant temperature, and the piston slowly raised until all the water is evaporated, and its tension reduced to the point at which the salt would begin to absorb it at the temperature in question. After the salt and vapour are in contact the piston is made to descend until the solution is effected. In this process work is gained, since the pressure under the piston during the expansion is greater than at the corresponding stage of the contraction. If the salt is dissolved in the ordinary way energy is dissipated, an opportunity of doing work at the expense of low temperature heat has been missed and will not return.

The difficulty in applying thermodynamical principles to chemistry arises from the fact that chemical transformations cannot generally be supposed to take place in a reversible manner, even although unlimited time be allowed. Some progress has, however, recently been made, and the experiments of Debray on the influence of pressure on the evolution of carbonic anhydride from chalk throw considerable light on the matter. By properly accommodating the pressure and temperature, the constituents of chalk may be separated or recompounded without dissipation, or rather dissipation may theoretically be reduced without limit by making the operation slowly enough.

The possibility of chemical action must often depend on the density of the reacting substances. A mixture of oxygen and hydrogen in the proper proportions may be exploded by an electric spark at the atmospheric pressure, and energy will be dissipated. In this operation the spark itself need not be considered, as a given spark is capable of exploding any quantity of gas. Suppose, now, that previously to explosion the gas is expanded at constant temperature, and then after explosion brought back to the former volume. Since in the combination there is a condensation to two-thirds, the pressure required to compress the aqueous vapour is less than that exercised at the same volume by the uncombined gases, and accordingly work is gained on the whole. Hence the explosion in the expanded state involves less dissipation than in the condensed state, and the amount of the difference may be increased without limit by carrying the expansion far enough. It follows that beyond a certain point of rarity the explosion cannot be made, as it could not then involve any dissipation. But although the tendency to combine diminishes as the gas becomes rarer, the heat developed during the combination remains approximately constant.

It must be remembered that the heat of combination is generally developed at a high temperature, and that therefore work may be done during the cooling of the products of combustion. If, therefore, it is a necessity of the case that the act of combustion should take place at a high temperature, the possibility of explosion will cease at an earlier point of rarefraction than would otherwise have been the case.

It may probably be found that many mixtures which show no tendency to explode under ordinary conditions will become explosive when sufficiently condensed.

Parliamentary and Law Proceedings.

Pharmacy Act (Ireland) Bill.

Petitions.

During the past week two more petitions against this Bill have been presented, one from Barrow-in-Furness, presented by Mr. W. T. McCullagh Torrens, and one from Buckingham.

Registration of Trade Marks.

A Bill intituled an Act to establish a Register of Trade Marks has been introduced into the House of Lords by the Lord Chancellor and read a second time, providing that a register of trade marks and their proprietors shall be established under the superintendence of the Commissioners of Patents, and that from and after the 1st of January, 1877, a person shall not be entitled to institute any proceeding to prevent the infringement of any trade mark required to be registered by the Act, until and unless such trade mark is registered accordingly.

Clause 2 provides that a trade mark must be registered as belonging to particular goods, or classes of goods; and when registered shall be assigned and transmitted only in connection with the goodwill of the business concerned in such goods, and shall be determinable with such goodwill. Subject as aforesaid, registration of a trade mark would be deemed to be equivalent to public use of such mark.

By clause 3 the registration of a person as first proprietor of a trade mark is to be *primâ facie* evidence of his right to the exclusive use of such trade mark, and, after the expiration of five years from the date of such registration, is to be conclusive evidence of his right to the exclusive use of such trade mark, subject to the provisions as to its connection with the goodwill of a business.

By clause 4 every proprietor registered in respect to a trade mark subsequently to the first registered proprietor is, as respects his title to the trade mark, to stand in the same position as the first registered proprietor, with this exception, that his title is to be subject to the adverse claims of any person claiming under or through the first proprietor.

Clause 5 provides that if the name of a person who is not for the time being entitled to the exclusive use of a trade mark is entered on the register of trade marks as a proprietor of such trade mark, or if the registrar refuses to enter on the register as proprietor of a trade mark the name of any person who is for the time being entitled to the exclusive use of such trade mark, or if any mark is registered as a trade mark which is not authorized to be so registered under this Act, the register may be rectified by an order from any of Her Majesty's superior courts of law or equity, or from a judge sitting in chambers. Where several persons claim to be registered as proprietor of the same trade mark, the registrar may refuse to comply with the claims of any of such persons until their rights have been determined by the court.

The court also is to have power to decide any question as to whether a mark is or is not such a trade mark as is required or authorized to be registered under the Act, also any question relating to the right of any person to have his name entered on the register of trade marks, or to have the name of some other person removed from such register, and any other question that it may be necessary to decide for the rectification of the register.

By clause 6, the registrar is not, without the special leave of the court, to register in respect of the same goods, or classes of good, a trade mark identical with one which is already registered with respect to such goods, or classes of goods, or so nearly resembling the same as to be calculated to deceive.

Clause 7 provides that a register office shall be established in such manner as the Lord Chancellor may, with the consent of the Treasury, direct, the officers of which are to be paid out of moneys provided by Parliament; and the Lord Chancellor, with the assent of the Treasury as to fees, is to have power to make, alter, annul, or vary rules as to the registry of trade marks, and as to the classification of goods for the purposes of this Act, and as to the registration of first and subsequent proprietors of trade marks, and as to the fees to be charged for registration, and also annually for the continuance of a trade mark on the register or otherwise, and as to the removal from the register of any trade mark in respect of which an annual fee, if required, is not paid, and as to the persons entitled to inspect the register, and generally for the purpose of carrying the Act into effect. Such rules are to be laid before both Houses of Parliament as soon as practicable after the making of them.

By clause 8, the certificate of the registrar as to any entry is to be evidence of such entry having been made.

By clause 9, for the purposes of this Act, "a trade mark" is defined as some mark, sign, or device either with or without the addition, as part of such trade mark, of letters, words, or combinations of letters and words.

Is Dandelion a Cultivated Root?

On Monday, 21st ult., at the Bury Petty Sessions, two young men, Robert Bridge and John Howarth, were summoned by Mr. Geo. Ormerod for having stolen certain cultivated roots used for the food of beasts and for medicine, to wit, a quantity of dandelion growing in a field at Chamber Hall. Mr. Crossland appeared for the complainant, and Mr. Anderton for the defendants, and the issue raised was whether dandelion is a cultivated root according to the 24th and 25th Vict., cap. 43, sec. 37, under which these proceedings were taken.—Mr. Anderton contended that dandelion was not a cultivated root.—Mr. Crossland said grass was cultivated with manure, and they could not cultivate the grass without cultivating the dandelion at the same time.—Mr. T. Wrigley (presiding magistrate) took it that if the meadow was properly manured, which was stated to be the fact, the dandelion would progress and improve like the other grass. Mr. Dodds (one of the magistrates' clerks) said dandelion was a weed.—Mr. Anderton submitted that dandelion in its wild state was not a "cultivated root" as meant by the Act. The magistrates as classical scholars, would know that the word "cultivated" was derived from the Latin *colo*, to till or manure. To cultivate a root or plant signified a specific preparation, and he held that dandelion, growing promiscuously in a field unprotected and liable to the pasturage of cattle, could not be considered a cultivated plant.—Mr. Wrigley said he and his brother magistrate were quite agreed that dandelion was one of the plants belonging to the proprietor of the meadow, and that the defendants had no business to take it. It was a natural grass (herb), cultivated amongst other grasses, and amongst other grasses it was no doubt valuable.—Mr. Crossland said that for several weeks parties had gone trespassing in this field, damaging the fences, and forking up the dandelion.

Some pounds' worth of damage had been done altogether. —Mr. Wrigley said it was desirable it should be known that people must not take such liberties. The defendants must pay the damage, 7*s*., and a fine of 2*s*. 6*d*. and costs each.—Mr. Anderton asked for a case on a point of law (as to dandelion being a cultivated root), and the Bench granted him one.—*Manchester Courier*; quoted in the *Gardener's Chronicle*.

Extraordinary Evidence by a "Licensed Botanist."

On Monday, June, 21, Dr. E. M. Grace held an inquest at the Crown inn, Marshfield, on the body of George Edwards Woodham, aged 23 years, when the following evidence was adduced:—

Mrs. M. Woodham, wife of the deceased, deposed that her husband had been ill since last August, and that he was attended by Mr. C. A. Bush, surgeon, till within a short time of his death. A person in the town told her of an herbalist named Bigwood, and asked her husband whether he should like to see him. He said he should. The herbalist visited him four times, and supplied four pint bottles of physic and some pills. On Thursday last Woodham was taken much worse, and Mr. Bush was sent for, who pronounced him to be in a sinking condition, and he died next day.

Mr. C. A. Bush, surgeon, deposed that he lived at Marshfield, and had attended the deceased off and on since August last. He formed an opinion then that deceased was suffering from tubercle in the lung, and he was of opinion still that the young man died of consumption. His reason for not giving a certificate of the cause of death was that he had heard that an unqualified person had been attending deceased during the latter part of his illness. This disease requires a stimulating and nourishing treatment, especially in the latter stages, and strong purgatives and any measures of a lowering character would be hurtful, and tend to shorten the life of the patient.

The Coroner then cautioned Bigwood, and told him that possibly he might be committed for trial for manslaughter, and that what he said would be used in evidence against him.

William Bigwood was then sworn. He said: I am a "licensed botanist," residing at Corsham. I was first requested to visit the deceased on May 11th. He was then downstairs sitting in a chair. He asked me if I thought I could do him any good. I told him I thought I might, but it would be like raising the dead from the grave; but the deceased wished me to give him a trial. I then asked him if he was under a doctor. He said "Yes; but the doctor says that he can do no more for me." I told him I would give him a trial, but I did not think that I should raise him, for he had no blood in him. I told him his liver did not throw any blood, and that it was very dry. I thought by his countenance that his liver did not throw any blood, as he looked as sallow as death. I sent him a bottle of medicine next day, which contained seven different sorts of herbs. They were herbs governed by the sun. These herbs strengthen the heart, which I wished to do. I work on a botanist scale of astrology. I send medicine all over the country. I consider that my licence allows me to do so. When I advertise I advertise for fits. I do not advertise for consumption, for I know it is no good. I use a hundred different sorts of herbs. I give medicine for every part of the body where it is afflicted. I use the Government stamp on all bottles of medicine sent out, no matter what are the contents. The medicine I gave him was for the chest, heart, lungs, and liver. I sent him four bottles of medicine and a box of twenty pills, the pills to be taken with the medicine. The pills were made with the same herbs as the mixture, ground into powder with cayenne, hickory-pickry, and rhubarb, which I buy of a chemist in Corsham. I ask for hickory-pickry, for I know no other name for it. I have raised men very near from the grave with that medicine and pills. I have been practising twelve years. I judge all complaints by astronomy. If I have the date of a man's birth, if he lived in London and sent to Corsham to tell me he was bad, I could tell what his complaint was and what to prescribe for him. This I have done many times, and made many cures. The deceased was born January 6, 1852 (I do not know the hour and minute). The sun was in opposition sign with the stomach when he was born—that showed that the sun stood in afflicted sign to the body. The moon rules the liver, and that is where his disease was, and that is what he died from. I never had a patient die that had been taking my medicine since I have been in practice. If they fall worse I tell them they must get a doctor. By watching the movements of the heavens I can tell when to see the danger, and I will not be responsible for the lives without seeking further counsel. I consult Moore's almanac very often, and other almanacs.

The Coroner having addressed the jury, the room was cleared, and on the public being re-admitted, the foreman, in answer to the coroner, said—"We find that the deceased died of natural causes, and the jury wish to give an expression of their feeling as regards the deceased being attended by an unqualified practitioner, a course of which they strongly disapprove."

The Coroner then addressed Bigwood, and said that had it been proved by evidence that any evil effect had resulted from the administration of his drugs, he would have been in a very different position, and nothing would have remained but to send him for trial on a charge of manslaughter. As it was, he strongly advised him to give over his present occupation, as he was not legally entitled to practise, and should he by chance be charged with a second offence of the like character, it would go very hard with him. He hoped that this would be a caution to him for the future.

At the conclusion of the inquiry, Dr. Bush, of Marshfield, and Dr. Bush, of Corsham, intimated to Bigwood that the matter would not rest where it was, and that ulterior proceedings would be taken.—*Bristol Times*.

Prosecutions under the Adulteration Act.

Adulteration of Beer.

At the Police Court, Swansea, June, 1875, Catherine Davey was summoned for unlawfully adulterating beer by putting salt into it on the 26th of May.

Inspector Allison said: On the 26th of May last, he went to the Windsor Arms, St. Thomas, kept by the defendant, and asked if they brewed there. He saw Jane Gough, the sister of the defendant, and she said "yes." He asked her for two quarts of her home-brewed beer, and she brought the quantity required, and he paid her 8*d*. for it. He put the whole of it into a jar, corked and sealed it, and marked it "92," showing the number and seal to defendant. He told her he was going to take it to the public analyst to be analysed, and that she might go there with him if she thought proper. He delivered the sample to Mr. Morgan the same day.

Mr. William Morgan, Ph.D., said he was the public analyst for the borough. On the 26th of May a sample of beer marked "92" was delivered to him for analysis by Mr. Allison. It was a jar, and sealed. He opened it and divided it into two parts, returning one portion to the inspector sealed. The other he examined, and found it contained 117 grains of common salt. He then put in his certificate to that effect. A gallon of water would weigh 70,000 grains. A little salt was generally found in beer. If the Swansea water were used for brewing there would be found to be from $1\frac{1}{2}$ to 2 grains per gallon. Swansea water contained that quantity of common salt. He had tested the water of several wells in the district, and the greatest amount of salt found in the gallon was 5 or 6 grains. If he had found much more than that he would have condemned them.

Jane Gough said she was the sister of the defendant. Witness brewed the beer, and had always been in the habit of racking it into Burton casks, and of course she could not account for the sediment left in them. All she knew was that there was nothing pernicious in it. She did put a little more than a half-pennyworth of salt in two barrels. She always put a little salt in the beer because she thought the beer was insipid without it.

Thomas Davies, of the Station Inn, St. Thomas, was also summoned on a similar charge.

Inspector Allison said that, on the 26th of May, he went to the inn kept by defendant and asked if they brewed beer; on being answered in the affirmative, he purchased two quarts of beer for 8*d.* He corked and sealed it, and marked it "89," saying that he intended taking it to the public analyst, and that the seller might accompany him. He delivered the same to Mr. Morgan the same day.

Mr. Morgan produced his certificate showing that sample "89" was adulterated to the extent of 57 grains of salt.

Defendant said she put 6 oz. of salt into five bushels of malt, as near as she could tell.

David George was summoned on a similar charge.

Mr. William Morgan, Ph.D., handed in his certificate of analysis, showing that in this case the beer contained 70 grains of common salt in the gallon. A gallon of beer would hold about two-thirds its own weight of common salt in solution before it would become saturated. If they used Swansea water for brewing, it would be equivalent to putting two grains of salt into each gallon.

Defendant admitted putting in a little less than a half-pennyworth.

The Bench then retired to consider their decision. On their return into court, Mr. J. T. Jenkin, addressing Catherine Davey, said the offence charged was for selling beer as pure, which was in fact adulterated. The law had provided that if a person sold beer as pure which was not pure, he became liable to a very heavy penalty. The law had explained what made it impure. There was the definition, in section 7, of what was considered impure adulteration, and in that section was comprised common salt. It was provided that if any salt was mixed with beer, the accused was liable to a penalty amounting to £20. The Bench considered putting salt in beer a very bad offence indeed. The object was, no doubt, to induce persons who drink beer to drink more, knowing that the salt would have the effect of making them very thirsty, and drink more of the stuff defendant sold as pure beer. This was the first time any case of that kind had come before the Bench, and therefore they did not intend to go to the extent they were authorized by Act of Parliament. In this case the defendant would be fined £5 and costs, or one month's imprisonment, but if she repeated the offence she would be much more severely dealt with, for it was the determination of the Bench to put down that sort of thing. The conviction would be endorsed on the license. The same remarks would apply to Thomas Davies and David George, and they would be fined £5 each and costs, or one month. The licence would be endorsed in each case.

At the Swansea Police Court, on Wednesday, five more publicans were charged with selling home-brewed beer, which had been adulterated with salt, ranging from fifty to eighty-five grains per gallon. The solicitor for the defence contended that the Excise allowed the use of fifty grains per gallon, and the quantities found by the public analyst were very little in excess of that amount.

The Bench said they could not take cognizance of any alleged permission by the Excise authorities, the Act of Parliament guided them, and this distinctly prohibited the use of salt at all. Such being the case they fined each of the defendants £5 and costs, and ordered their respective licences to be endorsed.

Review.

How to Teach Chemistry: Hints to Scientific Teachers, being the Substance of Six Lectures delivered at the Royal College of Chemistry, in June, 1872, by Edward Frankland, D.C.L., F.R.S., Professor of Chemistry in the Royal School of Mines, etc., etc. Summarized and Edited by George Chaloner, F.C.S., Lecturer on Chemistry at the Birkbeck Institution. Author of "Outlines of Chemistry," etc. London: J. and A. Churchill. 1875.

Few things appear more easy at the first sight, and are more difficult in reality, than to instil the elementary truths of experimental science into the minds of pupils whose whole previous training and surroundings have been of a non-scientific character. It is not sufficient that the teacher should be fairly well acquainted with his subject, that he should himself have passed a creditable examination, or should have been trained in an efficient school; he must also have acquired the knack of putting things in a light unmistakable to his auditors, and by sad experience he must have learned how wonderfully misunderstood, and even misleading, descriptions of operations and processes may be which seem at first sight perfectly clear and intelligible, and almost impossible to misapprehend. He must be prepared to meet and overcome mistiness and obscurity of notions on every point, even remotely connected with the subject, and, in particular, he must clearly perceive that if by any chance an erroneous idea can be gleaned from the phraseology employed, a large number of his class will, apparently from inherent mental perversity, imbibe that incorrect idea, and will utterly refuse to perceive the true state of the case. In short, he must not only be prepared to meet with the ordinary difficulties encountered by every teacher of the subjects constituting what is somewhat sardonically termed "a plain English education," but also numerous others, due to the peculiar nature of the task before him, and the utter want of preparation of the mental soil he tills for the seed therein to be planted.

For these reasons, which must be abundantly visible to everyone who has ever read over the exercises or examination papers of any elementary science class, it is manifest that any means whereby teachers, as yet but little experienced in the peculiar difficulties of their calling, can be shown how best to proceed, so as to communicate knowledge to their auditors without confusing them, and to develope gradually their latent powers of observation and deduction, must be of great value to students and teachers alike. To do this in the subject of chemistry is the end of the little work now before us; and it is hardly necessary to say that the object is thoroughly well carried out, it being duly borne in mind that the plan of the mode of teaching is limited to the small modicum of chemistry required for the elementary stage of the May examination of the Science and Art Department. Remembering the modest nature of the object aimed at, the book may justly be recommended to the class of readers for whom it is intended, and indeed teachers of far higher grades may gather many useful hints from its pages. Many of the lecture experiments described are, if not exactly novel, at any rate simplified and rendered easily manageable with apparatus of no great complexity and variety; whilst as a whole they are admirably adapted to the illustrations of the chemical facts and principles to be taught. A convenient method for the production of zinc ethyl in small quantities is described, although we should be inclined to think that the use of such a substance as this for the mere purpose of illustrating spontaneous combustion is hardly necessary in a course of instruction which only embraces a very few elements and their compounds. Recipes are also given for the preparation of indelible black aniline ink, and its use for the production of tables, etc., stencilled on calico; the advantages possessed by diagrams of this kind over paper ones are great, they are readily portable and do not tear, and when soiled, can be cleansed again by washing as readily as a towel.

We are glad to perceive that although "graphic formulæ" constitute one of the subjects to be mastered by elementary students in accordance with the syllabus of the Science Directory, yet but little reference to them is made, and no encouragement given to the practice adopted by many teachers of cramming their pupils with "crotchet patterns," at a period of their education when they are wholly unable to appreciate the valuable services which these symbols may render as a means of colligating facts, and serving as *memoria technica*. In the matter of notation, too, the ordinary method of writing such radicals as hydroxyl is employed as alternative with the "small o" system, *e.g.*, sulphuric acid is formulated as $SO_2\ (OH)_2$ or SO_2, Ho_2; this strikes us as desirable, the use of the "small o" not being accompanied by any special convenience, whilst its application to polyad groups (*e.g.*, Bao'' for O—Ba—O) not unfrequently misleads a beginner as to the actual quantity of oxygen present. *Apropos*, we must take exception to the use of the same term "hydroxyl" to indicate not merely the water residue OH, but also hydrogen dioxide $O_2\ H_2$. It is no more legitimate to employ the same word in the two senses than it is to use the term "methyl" applied to the radical CH_3 to indicate the totally distinct body ethane, $C_2\ H_6$; or to use the term "oxygen" to indicate indiscriminately ordinary oxygen, O_2, and ozone, O_3; or to use the term "methylene" applied to the radical CH_2 to indicate ethylene, $C_2\ H_4$, or any other member of the olefine family.

The concluding words of the last lecture are so full of valuable advice to teachers of all kinds that we make no apology for transcribing them. "Teachers ought to strive to appreciate the importance of requiring their pupils to take notes during class lessons and of themselves looking over and revising these notes as frequently as possible. This is a most valuable adjunct to teaching. A pupil who is made to take notes not only has the lecture or lesson much more firmly fixed in his mind, but he acquires the habit of expressing his ideas in writing." "Pupils ought also to be encouraged, if not required, to write out at home an abstract of the lesson from the notes they have taken while the lessons were in progress. Questions should also be given out at the close of a lesson, and the answers when brought in examined by the teacher. This of course involves some trouble, but an earnest teacher will not be content to confine himself to giving an hour's lesson and then letting his pupils take their chance of picking up such information as they require. The more a teacher can enter into the individual work and wants of his students, the better it will be for them and for himself."

BOOKS, PAMPHLETS, ETC., RECEIVED.

On Poisons in Relation to Medical Jurisprudence and Medicine. By Alfred Swaine Taylor, M.D., F.R.S., etc. Third Edition. London: J. and A. Churchill. 1875. From the Publishers.

On Alcohol: A Course of Six Cantor Lectures delivered before the Society of Arts. By Benjamin W. Richardson, M.A., M.D., F.R.S., etc. London: Macmillan and Co. 1875. From the Publishers.

Lessons on Prescriptions and the Art of Prescribing. By W. Handsel Griffiths, Ph.D., L.R.C., P.E., etc. London: Macmillan and Co. 1875. From the Publishers.

On Noxious and Offensive Trades and Manufactures. By H. Letheby, M.B., M.A., etc., London: Statham and Co. 1875. From the Author.

Ueber das Verhalten der Lösungen einiger Substanzen zu polarisirtem Licht. Von O. Hesse. From the Author.

Jahresbericht über die Fortschritte der Chemie und verwandter Theile anderer Wissenschaften. Für 1873. Erstes Heft. Giessen: J. Ricker. 1875.

The Harveian Oration, 1875. By William Guy, M.B., F.R.S., etc. London: H. Renshaw. 1875.

Report on the Present Water Supply of Tralee. Read before the Tralee Urban Sanitary Authority, by F. J. Falvey, L.R., C.P.E., etc.

Notes and Queries.

OIL OF MALE FERN.—Dr. Samuel Crompton, Physician to the Salford Royal Hospital, has kindly placed at our disposal the following, as representing his experience regarding the cost of male fern oil:—"I had read in an old dispensatory that Dr. Peschier, of Geneva, many years ago had pointed out that the ethereal extract of male fern was an efficacious remedy in tapeworm. In 1850, my sister was proceeding to Switzerland for an excursion, and asked me if she could do anything for me. I desired her to ascertain whether Dr. Peschier was alive, and whether she could procure for me some of his extract of male fern. She ascertained that he was living, but that he was a very old man and had retired from practice. She found, however, the successor of his brother, a pharmacien, from whom she purchased for me some extract of male fern. On looking through an old note book, I found the original bill which I copy:—

Eugène Bonneville, Pharmacien,
Grand Rue No. 16 à Genève,
Successeur de Peschier.

Memoire des Médicamens fournis pour Monsieur Crompton, Hotel de le Couronne, No. 26.

Juin 8, 1850.

Un flacon Huile à Fougère ℥ij . .	40f.
Une boite pilules Peschier	5
	45f

I can say that as early as 1850, I was in possession of, and using, the oil of male fern, that my two ounces with a box of pills, cost me £1 17*s.* 6*d.*

[442]. INITIAL HONOURS.—*Apropos* of the recent communications respecting the proper contractions for pharmaceutical titles a correspondent forwards us a handbill in which the letters M.S.C.D. are appended to the advertiser's name, and he asks "what in the world" they represent. We confess we are unable to throw any light upon the mystery, but perhaps some of our readers may be in a position to do so.

[443]. INSECTICIDE.—Can any reader inform me of a good and effectual method for destroying moths and ants which are found on worsted healds in the cotton mills?—John Bradshaw.

Obituary.

Notice has been received of the death of the following:—

On the 1st June, 1875, Mr. William Robert Lay, Chemist and Druggist, of Norwich, aged 51.

On the 19th June, 1875, Mr. Edward John Brammall, Chemist and Druggist, of Everton, Liverpool, aged 52.

We have been requested to correct an error in the Obituary for June 12, which had its origin in an erroneous certificate of death. Mr. Thomas Davys Manning, whose death was then recorded, was not the gentleman bearing the same name who is now on the Register of Pharmaceutical Chemists, but his father. The late Mr. Manning was one of the Founders of the Pharmaceutical Society, but retired from it in 1849, and was never registered under the Pharmacy Act, 1868.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

INFRINGEMENTS OF THE PHARMACY ACT.

Sir,—At the meeting of the Council, May 8, Mr. Hampson very ably put forth the chemists' grievance, viz., the infringement of the Pharmacy Act in London and Liverpool. I have been anxiously looking for some more able pen than mine calling attention to the state of the trade in North and South Staffordshire. Mr. Hampson said, while talking to a member of the trade and asking him to join the Society, he was asked, "What did the Society do, etc.?"—see page 892. Now, sir, after passing these examinations and taking a business, I would also ask, What does the Society do for its students and members? I would say they have a terrible foe to contend with in the fact of being opposed by all ignorant persons who think proper to take out a patent medicine licence, which they are not only content to do, but commence retailing all kind of medicines, of the nature and contents of which they are totally ignorant. In this town we have a small grocery shop where anything except the most dangerous poisons can be obtained, where dispensing is freely carried on, one window of which is stocked with patents and other druggists' sundries, in the midst of which is placed a green carboy.

I would like to know if the Council could not afford to appoint a gentleman to visit different districts and enquire of its members where such cases as I have herein described occur, which in my opinion would only be doing justice to its members, and using the power invested in them. What is the use of country members paying an annual contribution when their wrongs cannot be in some way or other adjusted. I hope Mr. Hampson will continue to urge the Council to action in this matter.

A NORTH STAFFORDSHIRE M. P. S.

Kidsgrove, June 23, 1875.

PHARMACEUTICAL TITLES.

Sir,—If you would allow me a few lines of your valuable space, I would reply to a few remarks made by a gentleman who signed himself "An Old Chemist and Druggist," which appeared in the Journal of June 12th last, concerning titles, or as he calls them tails, at the end of their name, or newfangled titles.

It seems to me he is one of the olden times, who is not able truthfully to place any tail to the end of his name. I should not think he has been up to Bloomsbury Square, and passed the inspection as well as the questioning of the sage and learned examiners who represent part of the Society, which is now acting; neither has he spent many days and nights in study and preparation for the examinations. Had he have done so, I do not think he would have written in the way he has done, but would like to have himself titled M. P. S.; but I should think, could we see his shop, it would look rather old-fashioned—simply stating his name, and Chemist and Druggist. Certainly there is no pharmaceutical chemist anywhere about, or he could not consistently write in the way he has done.

We as young men have to work in order to procure respectable situations, and unless we are able to use some small titles we are thought very little about, and the salary is regulated accordingly. As for woollen drapers using titles, what have they to do with the drug trade; they have no examination to pass, and we do not wish to measure calico behind a chemist's counter.

As for myself, I hope ere long to be able if necessary to use a title, and hope that the "Old Chemist" will have grown less narrow-minded than to ask why use titles, but simply to refer to the number of articles to be studied in order to pass the examinations creditably.

I may also say I hope "The Old Chemist's" name will never appear amongst the list of examiners, for I have no doubt he would bring forward some rather old and curious questions.

A SENIOR APPRENTICE.

June 22, 1875.

BOTANICAL LOCALITIES.

Sir,—Your numerous identifications of botanical specimens bear testimony to the growing interest of students in this necessary branch of their studies. In Babington's 'Manual,' fifth edition, it is stated that "localities are only given for new or rare plants," from which it does not follow that they cannot be found elsewhere; but a youth is likely to be daunted by seeing that the habitat of any specimen is given far away from his neighbourhood. It may be an encouraging example that while *Cotyledon umbilicus* is said to grow on rocks and walls in the West, and *Stratiotes aloïdes* in the East, of England and Scotland, they are both found in the Isle of Wight, the latter having been introduced in somewhat recent years. Such instances might be multiplied.

Lest the "Garden Isle" should be considered too favourable a spot for an ordinary example, it has been recently stated that of 875 species (rather more than half the number found in the British Isles) growing in Hampshire, 122 do not occur in the I. of W.

HENRY H. POLLARD.

S.—The ordinary rule applying to the signatures of persons unable to write would apply to such signatures when required for the "poisons book."

A.B.C.—Not if such information consisted in the naming of plants sent for identification.

"*Alpha*" *and Messrs. Carter, Hales, and Co.*—Dr. Richardson's Cantor Lectures on Alcohol are now published in a separate form by Messrs. Macmillan, price 1s.

L. J. M. Campbell.—Dr. King (American Dispensatory, p. 1235) gives the following formula for Tinct. Podophylli:—Root in fine powder three ounces, alcohol one pint, or q.s. Make one pint of tincture by maceration or displacement. We are not acquanted with a formula for a fluid extract.

"*Sambo.*"—We believe not.

G. Roberts.—Possibly a rose-leaf. We feel flattered, but do not attempt impossibilities.

G. Dobson.—*Armeria maritima.*

R. Drury.—Digest powdered cochineal in a weak solution of ammonia or sal ammoniac, and afterwards dilute with water. Other formulæ may be found in Cooley's 'Cyclopædia,' or Beasley's 'Druggists' Receipt Book.'

"*Crinis.*"—It is questionable whether it can be correctly said of any depilatory that "it will not injure the skin," if it be allowed sufficient time to act. A strong solution of sulphuret of barium, with sufficient powdered starch to make a paste has been recommended. Also one part of finely powdered crystallized sulphhydrate of sodium mixed with three parts of prepared chalk, and made into a paste with water. But neither of these should be allowed to remain in contact with the skin more than two or three minutes.

T. Tann.—(1) *Œnanthe fistulosa*; (2) *Epilobium montanum*; (3) *Geranium pratense*; (4) Material insufficient—not British; (5) *Tradescantia virginica*—not British.

R. J. M.—The plant is *Œnanthe crocato.*

"*Pax Vobiscum.*"—Chlorozone is a proprietary artic Carvacrol is a substance, isomeric with carvol, obtained by treating oil of carraway with potash. See Watts's Dict., vol. i., p. 809.

Student.—(1) *Mellitis Melissophyllum*; (2) *Veronica officinalis*; (3) *Melampyrum pratense.*

G. K. Z.—Apply to the Secretary of the College of Surgeons, Lincoln's Inn Fields.

J. H. E.—If you refer to the silvering of glass, an alloy of tin-foil and mercury is used. A patented process consists in the use of a solution of nitrate of silver to which a certain quantity of grape sugar has been added. See Ure's Dictionary, *sub* "Mirrors."

"*Job.*"—We think filtering through charcoal would accomplish your object.

G. T.—Ung. Hydrargyri Nitratis, B.P.

S.—We could hardly have imagined such different results as you describe. They must be due to the rape oil; try olive oil.

A. S.—(1) The sulphate of ammonia is dissolved in the water used for watering the plant; (2) The names probably apply to the private formulæ of a particular practitioner.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Bradshaw, Mr. G. Wilson, "Omega."

NOTE UPON RHATANY FROM CEARÁ.[*]

BY F. A. FLÜCKIGER.

In the interesting drug circular of the firm of Gehe and Co., for April, 1875, occurred a statement that a considerable importation into Hamburg of rhatany from Ceará had taken place. Having been furnished, through the especial kindness of that firm, with a good specimen of this root, I have been enabled to compare it with the other kinds of rhatany, and have come to the conclusion that it is no other than the Pará rhatany, with which we have been acquainted for at least ten years, and which by the Pharmacopœa Germanica, under the name of "Ratanhia Brasiliensis," is excluded from use. I gave a somewhat more complete description of this root in 1869,[†] and wish on the present occasion only to add that the colour of the alcoholic extract of the rhatany in question is rather characteristic. If an alcoholic extract of each of the three kinds of rhatany at present coming into commerce be similarly prepared and diluted to an equal strength, the tincture of the rhatany from Payta, which is the only kind admitted into the Pharmacopœa Germanica, becomes of a clear reddish colour. The tincture of Savanilla rhatany, which under the name of "Ratanhia Granatensis" is also excluded from the German Pharmacopœia, appears yellowish, with a very faint tinge of green. Finally, the Pará rhatany gives perceptibly a purer yellow colour. These slight distinctions agree pretty closely with the colour of the barks of the different roots themselves, though the characters of the latter are better manifested by the general external appearance. If the very diluted tinctures be mixed with solution of acetate of lead, the precipitate from the Payta rhatany is of a red colour, whilst the precipitates formed in both the other tinctures are clear violet.

According to the investigations undertaken in conjunction with my late friend Hanbury,[‡] it may be assumed that the rhatany root from Pará or Ceará is derived from the *Krameria argentea* of Martius, which was figured in 1874 by G. Bennet, in his monograph of the Brazilian Polygalaceæ, fig. 28, fasciculus 63 of the Flora Brasiliensis. This species, according to Bennet, is diffused throughout the eastern provinces of the empire, namely, in Goyaz, Piauhy, Pernambuco, and Rio Preto. Without question, therefore, it would consequently also grow in the provinces of Ceará and Maranhao; its roots would, therefore, be occasionally exported from the different ports of that region, and among them, Pará, as well as Ceará (Fortaleza).

Besides *Krameria argentea*, Brazil grows also the following species of *Krameria*:—*K. grandiflora*, *K. latifolia*, *K. longipes*, *K. spartioides*, and *K. tomentosa*. The latter is the plant that yields the Savanilla rhatany. *Krameria triandra*, which yields the true officinal root, is not mentioned by Bennet, and appears consequently to be absent from Brazil.

Although it is easy to distinguish the three kinds of rhatany from one another when examined simultaneously, with less care a mistake would be very probable. In Paris only the sort from Pará has been described as Savanilla rhatany, and in the London market, where on the whole the varieties are but little represented, the Pará sort is unknown.

The three roots may be most easily distinguished by means of their colour:—

(1) *Red* rhatany, also called Peruvian or Payta rhatany. Official in the German Pharmacopœia to the exclusion of the others (query, whether rightly so). Yielded by *K. triandra.*

(2) *Violet* rhatany; also called Ratanhia Granatensis, Antilles rhatany, and Savanilla rhatany. Yielded by *K. tomentosa*, Hill. (syn. *K. Ixina*, var. *Granatensis*).

(3) *Brown* rhatany; also called Brazilian or Pará rhatany. Yielded by *K. argentea*, Mart. This sort is mainly the object of the preceding notice.

The Texan rhatany, also prohibited in the German Pharmacopœia, has never become a commercial article.

CINCHONA CULTIVATION IN THE MAURITIUS.

A recent report to the Director-General of the Army Medical Department from Dr. Small, the senior medical officer stationed in the Mauritius, contains some interesting details as to the progress of the attempt to cultivate cinchona in that island. The report has been courteously placed at our disposal by the head of the department, and we avail ourselves of the opportunity to make the following extract:—

"A few years ago the culture of the cinchona plant on a small scale was begun at Curepipe on ground belonging to the Civil Government, and immediately adjoining that where our Sanitarium is situated. These plantations, since extended, have been fairly successful, and in time will doubtless prove of much importance to the colony.

"Of the four species originally brought from Ceylon, *Cinchona Pahudiana*, *officinalis*, *Calisaya*, and *succirubra*, the last named thrives best in the Mauritius, the climate being too hot and the soil too heavy for the others. Mr. Horn, the Director of the Government Botanical Gardens, informs me that several of the plants were grown from seed received from Kew, Java, Ceylon, and India, but that he prefers to grow the young plants from either cuttings or layers, the latter mode giving the best and strongest plants; raising from seed, the plants remain very delicate for long periods, requiring no end of nursing.

"A few months ago, a chemical analysis of the red bark, *Cinchona succirubra*, grown at Curepipe was made; and through the kindness of Dr. Reid, I.G. chief medical officer, I am enabled to give in detail the analysis made by Mr. C. Bernard of this island. I may add that the age of the bark submitted for analysis did not exceed three years; it peeled badly off the trees and was not well dried, also that the trees were not then covered with moss as they now are, from which operation I believe, first tried in India, it is expected the yield of the alkaloids will be much augmented.

Analysis.

"1. This sample consisted of small pieces of bark varying in thickness from 1 to 4 millimetres, and presenting in the inside part a reddish orange tint, and on the outside a brown colour. The thinnest pieces of bark stripped from young branches were formed of the cellular envelope alone, whilst the thicker pieces presented a notable proportion of liber. The skin was completely free from any parasitical vegetation.

"2. Examined under the microscope, the pieces in question presented cells containing small greyish crystals soluble in acids (quinates and quinovates of quinine).

"3. According to the instructions I received, the analysis was conducted so as to ascertain:—

"(1) The yield of the samples taken as a whole.

"(2) The comparative yield of the younger bark containing only the cellular envelope, and of the older ones containing liber;

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[*] From the *Schweizerische Wochenschrift für Pharmacie*, for July.

[†] 'Jahresbericht' (1869), p. 97. See also *Pharm. Journ.* [3], vol. i., p. 84.

[‡] 'Pharmacographia,' p. 76.

"4. Moreover, I considered that it might be interesting to ascertain as regards *Cinchona succirubra* the opposite opinions advanced by scientific men with respect to the particular parts of the various layers of the bark, where the different alkaloids are to be found. Weddell and Karsten considered that quinine resided principally in the cellular tissue interposed between the fibres of the liber, and cinchonine in the cellular envelope, while Howard inferred from his examination of the bark of *Cinchona latifolia*, that on the contrary quinine was predominant in the cellular envelope and cinchonine in the liber.

"5. In consequence, the several pieces of bark were carefully sorted, those containing liber being put on one side, and those having only the cellular envelope on the other. The whole lot was thus divided into two parts, as follows:—

"(1) Bark containing liber, 104 grammes.

"(2) Bark without liber, 168 grammes.

"Two-thirds of each sample were separately reduced into powder, and 10·40 grammes of the first was mixed with 16·80 grammes of the second, in order to have an average of the whole. The remaining pieces of bark of the first sample were scraped on their inside with a knife in order to separate the liber and to analyse it apart from the cellular envelope.

"6. The several analyses were made upon quantities of 12 grammes each, by the ordinary process by sulphuric acid and lime; and these analyses were subsequently verified by further analyses made by Woehler's process by chlorohydric acid and ammonia.

"7. This latter process having proved more exact by giving a smaller loss than the former, I shall record only the proportions obtained by it.

"Tabular statement of analyses (on 1000 parts):—

No. 1.—The Average Sample.

	Alkaloids.	Corresponding to Crystallized Sulphates.
Quinine	12·40	16·52
Quinidine	7·74	10·28
Cinchonine	8·52	10·60
	28·66	37·40

No. 2.—The Older Bark.

	Alkaloids.	Corresponding to Crystallized Sulphates.
Quinine	13·80	17·60
Quinidine	8·16	10·90
Cinchonine	10·28	12·82
	32·24	41·32

No. 3.—The Younger Bark.

	Alkaloids.	Corresponding to Crystallized Sulphates.
Quinine	11·50	15·36
Quinidine	6·39	8·50
Cinchonine	7·35	9·10
	25·24	32·96

No. 4.—The Older Bark separated from its Liber.

	Alkaloids.	Corresponding to Crystallized Sulphates.
Quinine	15·05	20·10
Quinidine	9·07	12·05
Cinchonine	9·16	11·46
	33·28	43·61

No. 5—The Liber.

	Alkaloids.	Corresponding to Crystallized Sulphates.
Quinine	11·30	15·08
Quinidine	9·07	12·00
Cinchonine	12·52	15·70
	32·89	42·78

"8. It would appear from these analyses that a Cinchona bark containing, as does *Cinchona succirubra*, the three alkaloids in nearly equal proportions, quinine is comparatively more abundant in the young than in the old bark.

"9. As regards the seat of the several alkaloids in the bark, the figures above mentioned would rather support the opinion of Howard against that of Weddell and Karsten.

"As a general rule the proportion of 32·24 per 1000 of alkaloids in the old bark is a pretty satisfactory yield, when compared with first-rate commercial red bark which, according to Frémy and Pelouze, yields 41·60 per 1000 of alkaloids.

"In an analysis of the bark of Cinchona roots made by Messrs. de Vrij and Howard, that of the young roots was found to contain the enormous proportion of 120 per 1000 of alkaloids. The last hurricane having caused considerable damage to the Chinchona trees at Curepipe, and these plantations being exposed to periodical renewal of such losses, it may be perhaps practicable, as proposed by Dr. de Vrij, to establish a system of cultivation by which the young plants might be cut down and uprooted when 3 or 4 years old, in order to have the bark from the root."

CREAM OF CAMPHOR.*

BY OTTO KRAUS, PH.G.

In an inaugural essay written for his degree of Graduate in Pharmacy of the Philadelphia College of Pharmacy, the author states that cream of camphor prepared according to the following formula has been used successfully in inflammatory affections of the throat, also catarrhal and other pectoral complaints of children, it having the advantage over the linimentum ammoniæ, U.S.P., of being free from all oily matter.

Take of—

White Castile Soap (in shavings)	℥iss
Camphor	℥ii
Carbonate of Ammonium	℥ii
Water	Oiv
Tincture of Opium	f℥i
Oil of Origanum	f℥i

Alcohol and Oil of Turpentine, of each a sufficient quantity.

Dissolve the soap shavings in three pints of water and stand aside. Dissolve the carbonate of ammonium in the remainder of the water, and mix the two solutions. Then add the camphor, previously reduced with alcohol to a thin paste, and agitate briskly. Oil of turpentine is then to be added in sufficient quantity, to bring the mixture to the consistence of a cream, on brisk agitation; after which the tincture of opium and oil of origanum are to be added,—then the whole is to be thoroughly mixed.

As it is readily absorbed by the skin, it may be applied by the hand, or by saturating a piece of flannel and placing over the affected part.

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* From the *American Journal of Pharmacy* for June.

The Pharmaceutical Journal.

SATURDAY, JULY 10, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PHARMACY IN PARLIAMENT.

IT seldom happens that in the space of a few days three measures come under the consideration of the Legislature in each of which the interests of pharmacists are specially involved. Yet this has been the case since the last meeting of Council, and at the meeting just held the Parliamentary Committee has had to report upon its proceedings in reference to the Drugging of Animals Bill, the Irish Pharmacy Bill, and the Sale of Food and Drugs Bill.

As regards the first-mentioned Bill it is satisfactory to find that the objectionable schedule has been withdrawn, and that the Bill is now simply one to make the administration of poisonous drugs or injurious compounds to animals without the authority of the owner, a punishable offence. At page 36 will be found the text of the Bill in its amended form.

Since the publication of our last issue the amended Irish Pharmacy Bill has been printed, and our readers will find on reference to it that very considerable alterations have been made in it besides the withdrawal of the reciprocity clause which gave rise to the opposition to the Bill by the Society. It will be seen, too, that a suggestion we threw out some time since, with a view to render more complete the independence sought for by our Irish friends, has been adopted in the Bill by introducing the provision that "This Act shall apply to Ireland only."

That some further amendment of the Bill is yet possible will be evident from the proceedings of the Council, and from the fact that among the notices of motion on the paper for consideration when the Pharmacy Bill again comes before the House of Commons there is the notice of motion, already given on a former occasion by Mr. THOMAS CAVE, to leave out in certain parts of the Bill the word "pharmaceutical" and insert "dispensing." The adoption of this course would only be an act of justice to the pharmaceutical chemists of Great Britain, while at the same time it would give our Irish friends all that they profess to require—viz., a distinctive indication of the persons who are qualified and legally entitled to dispense physicians' prescriptions. "Dispensing chemist" would do this distinctly and much more intelligibly than the title "pharmaceutical chemist," which is unknown in Ireland, and in itself is much less explicit than the title of "dispensing chemist." If that course were adopted Ireland would then possess three classes of persons connected with the drug trade—viz.: (1) The apothecary, entitled to keep open shop for the sale of drugs and the dispensing of medicines, and at the same time to practise medicine if he chooses. (2) The chemist and druggist, entitled to sell drugs and poisons subject to the regulations of the Poisons Act, Ireland, but not allowed to dispense medicine. And (3) the "dispensing chemist," who would, in regard to the dispensing of prescriptions, stand on an equal footing with the apothecary.

It is to be remembered, in regard to any desire our Irish friends may feel to possess this title of "pharmaceutical chemist," that whatever value at present attaches to it is the result of the action of the Pharmaceutical Society of Great Britain. No aid has been given from Ireland towards the endowment of that title with a certain claim to respect; it was simply the labours of the Society and of its members which created the title and made it one to be desired.

One curious feature of the proposed Irish Pharmaceutical Society is presented by the list of names of the persons who are to constitute the first Council of that body. It is to consist of twenty-one members, and no less than two-thirds at least of these are medical men. This is, to our minds, a very remarkable circumstance, and it appears to indicate a degree of "pharmaceutical" poverty we should have been loth to attribute to Ireland or even to suggest the existence of. Nevertheless it is the fact that two out of three of the proposed members of the Council of the Pharmaceutical Society of Ireland are medical men, while only the third, or odd man as it were, of the three is a chemist and druggist. In face of this fact we confess to being impressed with some very grave doubts as to the existence of any adequate ground for the claim set up by our Irish friends to exercise "independent" action in the regulation of their pharmaceutical affairs. For the same reason also we believe that their desire to enjoy the title of "pharmaceutical chemist" might have been more easily and satisfactorily gratified by their seeking to acquire it through the medium of this Society in a manner that would unquestionably place them on a footing of perfect equality with their British *confrères* possessing a similar qualification. Anyhow, the further we become acquainted with the condition of pharmacy in Ireland, and the more we are able to forecast the probable working of the measure under which a new class is to be brought into existence in the sister country, the more do reasons suggest themselves for objecting to participation in the only title which indicates the possession of such qualifications for the practice of pharmacy as it has been for upwards of thirty years the endeavour of the Pharmaceutical Society to establish. We hope, therefore, that when this Bill comes before the

House the propriety of adopting Mr. CAVE's resolution will be recognized, and that in this way a very possible discouragement of the still voluntary acquirement of this title by examination may be prevented.

REPORTED NEW SOURCE OF SULPHUR.

THE *Pharmacist* for June quotes an account given by Professor GESSNER of a visit which he made in March last to the island of Saba, in the Dutch West Indies, for the purpose of examining the sulphur deposits there. Professor GESSNER describes the island as a volcanic cone, about two miles in diameter and three thousand feet in height at the peak, Leverock, the principal town and seat of government, being situated in a bowl-shaped valley formed by the old crater, one thousand feet above the level of the sea. He speaks of one bed of brimstone as being forty feet thick, and extending a considerable distance, the mass of the bed being gypsum containing on an average sixty per cent of sulphur. He states that in many places masses of quite pure sulphur occur several hundreds of pounds in weight, and resembling brimstone poured into irregular moulds. All volcanic action is reported to have ceased in Saba so long ago, that the sulphur beds are now quite cool and give forth no vapours to interrupt the working of them. Professor GESSNER concludes his report by expressing his belief that this island contains one of the largest and certainly the most accessible deposits of brimstone in the world.

A SECOND ALKALOID ATTRIBUTED TO PILOCARPUS JABORANDI.

IN a recent communication to the Société de Thérapeutique, M. ERNEST HARDY attributed to Jaborandi (*Pilocarpus pennatifolius*) a very complex composition. He states that by exhausting the leaves and stalks with water and alcohol successively, he has obtained first an alkaloid which he terms "pilocarpine," then a volatile body forming voluminous crystals, and appearing to possess the properties of an acid, and finally a second alkaloid. These two latter bodies have not been sufficiently investigated to allow of their being named, nor does it clearly appear upon what grounds M. HARDY considers the last-mentioned to be an alkaloid differing from pilocarpine.

A NEW MEXICAN DRUG.

"DAMIANA" is the name of a new drug recently introduced into the United States from Mexico. It is said to consist of the stems and leaves of an unnamed plant. The leaves are described as "small, pale green in colour, with a large central midrib, the under side of which is of a pale yellow colour." The stems are small, woody, yellow and brownish in appearance, and covered with a fragrant gum. The mixed stems and leaves present an appearance similar to that of *Coptis trifolia*, and have a marked aromatic odour and peculiar pungent taste, resembling that of many Labiatæ. The drug is reported to be a powerful nervous stimulant and aphrodisiac, with the advantage over strychnine and phosphorus that it is not poisonous.

THE name of Mr. JOSEPH HICK, Pharmaceutical Chemist, has been ordered by the LORD CHANCELLOR to be inserted in the Commission of the Peace for the borough of Bradford.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, July 7th, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Baynes, Betty, Cracknell, Frazer, Greenish, Hampson, Hanbury, Mackay, Owen, Rimmington, Robbins, Sandford, Savage, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

The PRESIDENT read a letter which had been received from Professor Dragendorff, of Dorpat, thanking the Council for the honour done him by electing him as an honorary member of the Society, and promising at an early date to contribute some papers to the Journal.

William Arthur Harrison Naylor, being duly registered as a Pharmaceutical Chemist was granted a diploma stamped with the seal of the Society.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

Mason, Philip Henry	Hadleigh.
Naylor, W. Arthur Harrison	Bilby.
Norman, Joseph Slaughter	Bedford.

Chemists and Druggists.

Adcock, Isaac Dickson	Alcester.
Banks, John	Wick.
Jackson, Joseph	Blackpool.
Jones, Walter Robert	Birmingham.
Moore, William John	Stirling.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations, and being in business on their own account, were elected "Associates in Business" of the Society:—

Minor.

Gimson, Joseph	Epsom.
Stedman, Harry Bernard	Liverpool.

Modified.

Day, John Charles Thomas	Limerick.
Jones, Owen	Colwyn.

ASSOCIATES.

The following having passed the Minor examination were elected "Associates" of the Society:—

Neale, Edgar	Faringdon.
Ragg, William Watkins	Edmonton Green.
Wardle, Thomas	Ashbourne.
Wright, Alfred	Stowmarket.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Brett, Thomas	Sherborne.
Chapman, Harry Dugard	Brierley Hill.
Clark, Adam Douglas	Kelso.
Cole, Edwin Henry	Dorking.
Dakin, John Parker	Clewer Green.
Gulliver, George Ekins	Holdenby.
Hunter, Frederick William	Newbottle.
Short, George William	Swindon.

Several individuals were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The following names were restored to the Register of Chemists and Druggists:—

John Smith, 43, Bickerton Street, Lark Lane, near Liverpool.

Alexander Robb Wilson, Leven, Fifeshire.

Frederick Cresswell, 357, Lower Wandsworth Road, Battersea Park, Surrey.

Law and Parliamentary.

The report of this Committee was read, giving the details of its work during the past month, principally with regard to the Irish Pharmacy Bill. The Drugging of Animals Bill had also been under the consideration of the Committee, and a deputation had waited on the Home Secretary to state the objections of the Committee to the measure. With regard to the Irish Pharmacy Bill, the report was very voluminous, giving full details of several meetings which had been held. A paper of objections had been drawn up and sent to Sir Michael Hicks-Beach, especially dealing with the proposal for an *ad eundem* examination. The Chief Secretary for Ireland had announced his intention to carry the Bill in its original form, subject only to a provision to be devised by him, the object of which should be the exclusion of Irish chemists from participation in the accumulated funds of the Society. A circular had therefore been sent to each member of the House of Commons, and also a letter to each member of the Medical Council, drawing especial attention to the proposal to create a new examining body for pharmacy in Ireland, and asking for the aid of the Medical Council in opposing the Bill. Circulars were also sent on the subject of the Bill to each local secretary. After an exchange of telegrams with the Chemists and Druggists' Association of Ireland, the solicitor had been requested to proceed to Dublin and have an interview with that body, a full report of which interview was afterwards presented by him. He ascertained that a deputation from the Association, which was about to visit London for an interview with the Chief Secretary for Ireland, would embrace the opportunity of personal communication with the Council. The 18th Clause having been subsequently withdrawn, the report went on to state that the Committee had decided consequently to abandon opposition to the Bill. A report was also given of the interview with the deputation from the Irish Chemists and Druggists' Association, the deputation favouring the idea of a separate Society in Ireland. The amendments in the House of Lords to the Sale of Food and Drugs Bill had also been before the Committee. Several cases of alleged infringement of the Pharmacy Act had also been considered, the most important of which was that of an unregistered person who was carrying on for his own benefit—with the aid of a qualified assistant—a business which had formerly belonged to his son, who had died a bachelor and intestate some years since. The Committee recommended that the solicitor should be instructed to take proceedings in these cases.

Mr. Mackay thought, with reference to the Irish Pharmacy Bill, the Council of the Society owed their thanks to the Committee who had so ably conducted the case, and through whose action the obnoxious 18th Reciprocity Clause had been set aside. He regretted, however, that an effort had not been made at the same time to prevent their Irish friends using the term "Pharmaceutical Chemist," but after hearing the report, he was afraid that so far as the Council was concerned, it could not take any further steps, however desirable they might be, to prevent the title being used. It appeared that the Committee had given the Chief Secretary for Ireland to understand that, in the event of the 18th Clause being withdrawn, all opposition would cease. He rather regretted that that was so, because he thought it would be a source of great dissatisfaction to pharmaceutical chemists. He was quite aware that a clause might be introduced into this new Bill by which an Irish pharmaceutical chemist would be prevented using the title in Great Britain, but he believed he was also right in stating that even without this clause the solicitor was of opinion that no Irish pharmaceutical chemist, although he held that title, having obtained it by passing an Irish examination only, could use it in Great Britain. That being so, pharmaceutical chemists were to a certain extent protected, but at the same time in the event of this Bill not passing, or if in any other way the door were fairly and honourably opened for taking action to preserve to themselves the term of pharmaceutical chemists, he hoped it would not be lost sight of, but protection for the special title pressed for. He need not ask the Council to go back some twenty-three years, and think of the labour, time, money, and ability spent in the efforts to obtain the Bill of 1852, but, after all that work, literally nothing was obtained but the title of Pharmaceutical Chemist, and with that title only the Society, as a voluntary association, went on from 1852 to 1868. In the latter year a different position was assumed, and the title of Pharmaceutical Chemist was year by year becoming a more recognized title, and one in all respects more valuable. He, therefore, thought the Society had now arrived at a position when it was scarcely fair on the other side of the Irish Channel to assume that title which they in England had gained by their own exertions; and while, therefore, he was afraid that by the proceedings which had been taken, the Society was bound not to persist further in opposing the Bill, he hoped if he was wrong, or if any opportunity arose, by which it might be enabled to insist on the monopoly of the title, which was so peculiarly its own, advantage would be taken to press the retaining of the title for Great Britain alone.

Mr. Sandford said: After the excellent explanation given by Mr. Mackay of the value of the title of Pharmaceutical Chemist, he need not say a word more on that point, except that he thought the title should have the same value in both countries—England and Ireland—and therefore it should not be used indiscriminately. He differed, however, from Mr. Mackay in thinking that the Council could take no action in the matter. The Council appeared to have been pledged by the Committee to cease its opposition to the Bill on the withdrawal of the 18th Clause, and accordingly the Society would cease to oppose the Bill as a whole. But surely it could not be said, if an opportunity occurred for amending it in Committee, that they were precluded from doing so. He therefore begged to move the following resolution:—

> "That this Council having heard the reports and proceedings taken by the Parliamentary Committee in order to prevent the passing of the Pharmacy Bill for Ireland, regrets that the establishment of the separate Board of Examiners for the sister kingdom is still likely to be carried. This Council agrees with the Committee that the removal of the 18th Clause, conceded by Sir M. Hicks-Beach, obviates the greatest difficulty which was threatened to this Society by the Bill, and can no longer oppose the passing of a separate Bill for Ireland, but it is of opinion that the title of Pharmaceutical Chemist, which was created by the Pharmacy Act of 1862, and confirmed by the Act of 1868, should not be used in any part of the United Kingdom save by persons to whom it was given by those Acts, and would be glad to see such alterations made by the Committee of the House of Commons in the Bill now before Parliament as would exchange the proposed title to Dispensing Chemist, or some other."

There had been a little misconception as to what Mr. Thomas Cave, M.P., had done. It appeared that the Bill went into Committee, *pro formâ*, in order that the 18th Clause might be withdrawn, and then the Bill was reprinted. Mr. Cave's amendments to change the word "pharmaceutical" to "dispensing" had been put on the paper at once. Those amendments had not appeared since the withdrawal of the 18th Clause, but they had not been abandoned by Mr. Cave, and that gentleman, understanding that the Council had withdrawn its opposition to the Bill, wished now to know its views before moving further in the matter. He thought, therefore, the Council might fairly tell Mr. Cave that they one and all believed that the title of pharmaceutical chemist ought to be preserved to British pharmacists. That, he thought, would give Mr. Cave quite authority enough to go on with his amendment.

Mr. SAVAGE seconded the resolution.

Mr. MACKAY said the instructions to the solicitor for communication to Sir Michael Hicks-Beach were that the objections of the Society to the 18th Clause having been conceded, it would not offer further opposition to the Bill. Did not that mean every clause in the Bill as a whole?

Mr. SANDFORD: Certainly not. He contended that the Council ought still to watch the proceedings in Committee, because most objectionable things might be then introduced. The Council had never itself authorized the promise given by the Committee, and was not pledged not to try to amend the Bill. He did not think it would be at all right to oppose the Bill as a whole, but it was quite within the duty of the Council to endeavour to amend it in Committee, and he thought the Council would fail in its duty to its constituents if it did not do so. The Bill set forth in the preamble that dispensers of medicine were wanted in Ireland, and therefore the title of "Dispensing Chemist" was suggested.

Mr. SAVAGE said no doubt the English Pharmacy Bill, in the 27th Clause, provided that its operation should be confined to Great Britain, and it seemed important a title which had been granted to the pharmacists of Great Britain should be reserved. It did seem to him that if the title was so valuable as it was conceived to be in England, Irish pharmacists ought to earn it before they asked to use it in Ireland. He had very much pleasure in supporting the proposition.

The PRESIDENT said the reprinted Bill had been put into his hand since he came into that room, and he understood it contained some important alterations, but he did not know whether they were on the point in question.

Mr. MACKAY said they did not appear to be so, because the Bill provided that a registrar should be appointed who should make out a complete list to be called a "Register of Pharmaceutical Chemists for Ireland."

Mr. HAMPSON entirely agreed with the first part of the motion, and to a certain extent with the latter part, and would be glad if the Bill could be so amended that the term Pharmaceutical Chemist of Ireland might not be used in England, but on the other hand, the motion went much further, and would prevent the term pharmaceutical chemist being used by Irish Pharmacists in their own country, which, he thought, was going too far. He admitted the value of the term as used in England and Scotland by British pharmacists, and did not hesitate to say he valued it at its true value. But on the other hand, he conceived the Irish chemist ought to have the same liberty of using the title in Ireland, if his position was described by its use. It seemed to him that opposition to this particular use of the name would be perfectly Quixotic and absurd. There was no reciprocity to take place between Ireland and Great Britain, and therefore all opposition to the Bill ought to cease. The Council was bound by agreement to cease opposition, and by carrying the resolution or continuing its opposition, he considered it would be breaking faith with Sir Michael Hicks-Beach, who had granted an important concession. It was quite possible the Bill might not pass, and if the Council unwisely carried on this useless, and, as it seemed to him, unworthy form of opposition, it would simply be wounding the feelings of Irishmen, who might at some future time form a part of this Society. He did hope the motion would not be carried, because he felt it was very unwise, unnecessary, and altogether in bad taste. He could not understand the feelings of jealousy which certain gentlemen had to the use of this title by pharmacists in Ireland, but there was the sea between them, and he thought gentlemen living in Ireland would feel they were justified, as new legislation was to be enacted, in using such a title, as it would describe their true position. The Colleges of Physicians and Surgeons might just as reasonably in past times have objected to the use of titles similar to their own.

Mr. OWEN said the Irish pharmacists would not be entitled to come and practise in England as pharmaceutical chemists.

Mr. SANDFORD said they might come here and pass an examination as chemists and druggists, and then call themselves "Pharmaceutical Chemists, Ireland."

Mr. BETTY said he understood the solicitor to be of opinion they could not.

Mr. SANDFORD said it was a matter of great doubt.

Mr. OWEN understood the solicitor to say distinctly that no such thing could happen in England, and he agreed with Mr. Hampson this would be a vexatious opposition to the Bill.

Mr. WILLIAMS, as one of the Committee which had taken a very active part in this matter, said, that at the commencement of the labours of the Committee he was strongly in favour of maintaining and retaining the absolute use of the title of pharmaceutical chemist. But when their Irish brethren were consulted, and it became evident how strongly they felt on this matter, he for one must say that he found it necessary to modify his opinion, and to consider that the main thing the Council had to do, was to protect the interests of British pharmaceutical chemists, as far as the carrying on of business in Great Britain was concerned. But to insist on maintaining the monopoly of the title was, in his opinion, almost like vexatious opposition. The Council was bound to be generous if it could, and he thought as the matter was considered so important in Ireland, it would be acting wisely in not trying to get the Government to concede everything, for it was only after a great struggle the Government gave way, and then not very graciously, on the 18th Clause. After what had passed with regard to that, he thought it would be placing the Society in a false position if the Council persisted in opposing the Bill. Here was a Pharmaceutical Society coming into existence, and what was more natural than that they should make use of an appropriate title. He had just looked through the new Bill, and it appeared to him that the new Council would be composed of men who would really do their duty, and it appeared there were to be two classes in the Society, Chemists and Druggists and Pharmaceutical Chemists. One or two clauses appeared rather objectionable, but he did not see that the Council had any right to interfere so long as the action of the Bill was limited to Ireland.

The VICE-PRESIDENT thought the motion did not go quite to the extent which some gentlemen seemed to imagine. Mr. Hampson said the Council ought not to continue its opposition, but he did not think that the carrying of the motion would be doing anything of the kind, it would be more in the way of a friendly suggestion to the parties in charge of the Bill that the Council would be glad to see a certain alteration made in it.

Mr. HAMPSON said the motion attempted not only to prevent Irishmen coming to this country and using the title of pharmaceutical chemists of Ireland, after having *first* acquired a legal status here, but also to interfere with their using that title in Ireland, which he thought the Council had no business to meddle with.

Mr. MACKAY thought a mere friendly suggestion would not be worth making.

Mr. SANDFORD said he believed the Council would gain its object if it pressed it.

Mr. MACKAY said in that case it would be opposition.

Mr. SCHACHT said at the present moment there were two questions raised, one of which was involved in the other. There seemed to be on the minds of some gentlemen an idea that it would be desirable to prevent the use of the words "Pharmaceutical Chemist" by the Irish body, while some seemed to think no such step could be taken by reason of the supposed pledge given by the Committee. As a rule, there was no question that the Council ought to do its best to maintain what a Committee had done, whilst the Committee ought not to pledge the Council further than it had authority. With regard to the Law and Parliamentary Committee, of which he was a member though he had not been able to attend the six or seven meetings which had been held during the past month, it would not be proper for him to pass any reflection on the acts of a body, when he himself might have taken part and prevented that action. But he did not think there would be any impropriety in taking action now to prevent the use of a title, even after what had been done by the Committee. Mr. Mackay had referred rather emphatically to the resolution passed by the Committee, but the very next sentence in the report showed that the solicitor was instructed at the same time to communicate something else, and other phrases showed that the Committee perfectly recognized the right, even after it passed that resolution, to consider and propose amendments. He therefore thought the Council was justified in taking up this subject, if it thought the title English pharmacists had earned was one worth preserving to themselves in its integrity. On the face of it it had a little appearance of selfishness, but the pharmacists in Ireland should earn the right to the title, as pharmacists in Great Britain had done. There might come a time when it would be considered proper for them to share their privileges equally, but at the present moment, with all respect to his Irish neighbours, he did not think they had earned the right to this title, and therefore he opposed their using that which their English brethren had sacrificed so much to obtain, and which was day by day attaining to more significance in the public mind.

Mr. Hanbury agreed with Mr. Schacht that if it were now proposed to take steps which should oppose the Bill as a whole, that would be taking a course which would be morally wrong. But he thought it was a totally different thing to suggest amendments in a form which he conceived could not be objectionable. A great deal depended on the manner in which it was done. There was one point which had not been mentioned, which was of importance, looking to the future. They all contemplated the possibility that sooner or later Ireland might incline to unite with them, and the inducement to do so would be all the stronger if the Society could maintain a distinct position and especially if that position were marked out by a definite and distinctive title.

Mr. Frazer said he should vote against any further opposition to the Bill, and should therefore oppose Mr. Sandford's motion, not because it was stultifying the action of the Council, because he thought the Committee was entirely separate and independent of the Council, and it was quite open to Mr. Sandford to move the resolution in this case, but he should oppose it because he thought the Irish people ought to have a separate Council and Board of Examiners, and that also they should have conceded to them the title of pharmaceutical chemist. It was true the title was of value, and the British Society had worked long for it. It was also true that the original members enjoyed the title before they earned it. For example, no one knew whether he himself knew anything of pharmacy or not. He was a pharmaceutical chemist simply by age, without passing any examination. The same thing should be conceded to Irish pharmacists who would by-and-bye earn the position which they had not at present. He rather thought they should take it as a compliment to themselves that the Irish were so desirous of adopting this title.

Mr. Betty said he was much surprised at the parentage of this motion, its proposer having now, it appeared, returned to his first love, he gave evidence before a Select Committee that it was most undesirable for the general welfare of pharmacy that there should exist two pharmaceutical establishments within the United Kingdom: yet he had supported such an arrangement throughout the whole of the negotiations in connection with the present Bill, and when the Committee was labouring hard against a strong and new government, and was, as it were, contending for the very unity of the Society, he, with all his influence, like Ulysses, retired to his tent, hung up his armour and did not face the fray. It was gratifying to hear that gentleman propose a motion commencing with an expression of regret that a separate Board was to be established. The Council by a majority had decided to oppose the establishment of two Boards, and if this resolution received the support of the minority on that vote, he believed the unanimity of the Council on that point would represent the general opinion of the Society.

Mr. Frazer said he preferred two examination Boards on principle.

Mr. Betty said then he would except Mr. Frazer. He could speak from personal experience of the great amount of labour and energy which the Committee had given to their task, and he would remind the Council that the Committee was empowered to take such steps as it might deem necessary in conducting its opposition to the Government Bill. The position of a political Committee varied from day to day, and it was obliged to act accordingly. Therefore, if the Council really wished to urge the matter further, he hoped it could bed one in such a way as would not involve the Committee in any vote of censure, or the Council in any act of uncertainty or inconsistency. Probably very few members of the Council personally would desire that the title "Pharmaceutical Chemist" should not be protected even beyond Great Britain, but the honour of the Society demanded that no step should be taken contrary to the good faith due to the administration or likely to embarrass the Government in its conduct of the Bill. If such an assurance were taken, possibly the motion would be carried unanimously, but he feared it could not. He might also state in reference to the action of the Committee that the Chief Secretary for Ireland had at first declined to withdraw the 18th Clause, and that in subsequently withdrawing it he had carried out at least the main proposition the Committee had made to him. This all-important concession extorted from the Government must not be undervalued, but set off against what cannot but be a minor defect in the measure. He did not think there was any danger of pharmaceutical chemists from Ireland assuming the title in this country, with the word "Ireland" after it, and the Society's solicitor had assured them that such a thing could not be done. Was it consistent to object to the title "pharmaceutical chemist," and not oppose the title of the Bill? It was called "Pharmacy Bill." What right had it to that title? Had they not already appropriated the title in their own Act? Then it was called a Bill to institute a Pharmaceutical Society in Ireland; why did they not object to that? The Council seemed to him to be attacking the individual members who would join by-and-bye, whilst the very designation of the Society was untouched. If they had a copyright in the word "pharmaceutical" they should object to its use *in toto*, and it should be expunged wherever it occurred in the Bill. If the organization itself were left intact, it was inconsistent to attack the private members. Again, the title "pharmaceutical chemist" was really restricted to Great Britain. The Society was only the Pharmaceutical Society of Great Britain, and when a separate Society was established beyond the bounds mentioned in its Charter or Act of Parliament, the Society had no legal right to interfere.

Mr. Williams said he supposed some steps would be taken to enforce the resolution if it were carried.

The President asked how Mr. Sandford intended to approach the Committee of the House of Commons.

Mr. Betty said he understood Mr. Sandford wished the Council to pass the resolution as a suggestion to the Government.

Mr. Hampson suggested that the motion should be withdrawn.

Mr. Mackay thought the discussion had brought out pretty clearly two things; first, that even if their friends in Ireland carried their Bill as a provision for two classes, pharmaceutical chemists and dispensing chemists and druggists, its operation would be confined to Ireland; secondly, it was proved that his idea that the Council would be placing itself in a false position towards the Government by opposing any particular clause in the Bill was a mistaken one. That being so, he felt very strongly that they should go forward, and in a fair and consistent manner object to the introduction of the title pharmaceutical chemist to Ireland. A remark had been made as to the title of the Bill being "Pharmacy Bill," but that he thought was quite a different matter. As one of the founders of the Society in 1841 he recognized to some extent the remarks of Mr. Frazer, and although, as that gentleman said, it might be questioned whether he was a pharmaceutical chemist in the true (or examined) sense of the term, and though it was even possible that if he went in before the Board of Examiners of the present day he might be sent back for six months, still for the sake of the young men who had joined by examination and who were still coming in, he thought the dignity of the title ought to be kept up. These young men must be compared to the bright and polished stones in a goodly building, but in the foundation of which there might be found some comparatively rude and rugged blocks, which if not so ornamental were yet very useful in giving strength and stability to the structure. Therefore, while he wanted the title of pharmaceutical chemist for himself, he wanted it still more for those who were coming forward to do honour to the cause of pharmacy, and he thought they were bound, if possible, to keep that title intact until the time came, as no doubt it would come, when their Irish brethren would ask to be admitted as part and parcel of the Pharmaceutical Society. He should therefore support the motion.

Mr. ROBBINS said he should like to hear from Mr. Sandford what action it was proposed to take, because it was very desirable, if possible, that the Council should be as unanimous upon this question as it had been in asking for the withdrawal of the 18th clause. If the motion could be carried without any appearance of opposing the Bill, he thought it most desirable that an endeavour should be made to retain the title "pharmaceutical chemist."

Mr. HAMPSON thought this was a very delicate position for the Council to occupy, and he could not help feeling that if the resolution were carried its dignity would be considerably lowered; and that it would be to some extent breaking faith with the Government. Not only so, but it would be showing their Irish brethren how fortunate it was they had not joined hands with this Society.

Mr. GREENISH said great credit was due so the Committee for the labour it had devoted to this subject but he much regretted that the claim to the distinctive title had been given up. He felt very strongly with Mr. Sandford, and should vote for the motion.

Mr. SANDFORD said Mr. Betty had referred to him in very complimentary terms, but it was scarcely correct to say that he had hung up his arms and avoided the strife. The fact was that when the first meetings were held he was confined to his house by illness, but he sent a paper to the Committee in which he strongly insisted on the necessity for uniformity of examination, and in order to ensure it, that the examinations should be under the authority of the Council, adding that only on those conditions ought the Committee to consent to anything like reciprocity. He further urged in that paper that even if the reciprocity clause were erased it would be unwise to allow other persons to adopt the highest title, over which Parliament had given the Society a certain authority. Besides that, a petition had been prepared, although it had not been circulated, in which this point was prominently mentioned at his own suggestion. Mr. Betty had referred to the title of the Bill, but it would be absurd to object to the wording of that, when it was a Bill to regulate pharmacy. He would remind Mr. Betty that in 1852 the title of "pharmaceutical chemist" was created, and that for more than twenty years no one had been allowed to use it unless he had passed an examination.

Mr. BETTY: Within Great Britain.

Mr. SANDFORD said he looked upon Ireland as part of Great Britain; the distinctions between the two countries were dropping away, and he hoped they would continue to do so, and, therefore, a title which was considered of a certain value here should be of the same value there. He had been asked how the Council would approach the Government. He did not think there would be any difficulty about that, and believed the point would be conceded. He felt very strongly that proposing an amendment in committee was not opposing the Bill, and looking to the new Bill and the members proposed for the first Council, including Mr. Hodgson, Mr. Pring, Mr. Tichborne, and Sir Dominic Corrigan, he thought it showed that there was every likelihood of the Bill passing, because it showed the determination of those gentlemen to form a Society of their own. Looking to the possibility of future union, it was extremely desirable that the new society should begin with a distinctive title, and as he did not conceive that it was in any way imperiling the honour of the Council, he should press the motion to a division. He thought if the resolution were put into the hands of Mr. Cave, or any other member of Parliament who desired to move an amendment in committee, it would be quite sufficient authority.

Mr. BETTY said it was only an expression of opinion.

Mr. WILLIAMS thought it would be a step in opposition to the Bill.

Mr. SCHACHT said opposing the Bill was a very different thing, as had been shown by sending round petitions to all the local secretaries and getting them presented by individual members of Parliament.

A division was then taken with the following result:—

For—Messrs. Baynes, Bottle, Cracknell, Greenish, Hanbury, Mackay, Rimmington, Robbins, Sandford, Savage, Schacht, Shaw, and Sutton.

Against—Messrs. Betty, Frazer, Hampson, Owen, and Williams.

The President did not vote.

DRUGGING OF ANIMALS BILL.

Mr. SANDFORD said the Drugging of Animals Bill in its amended form had been put into his hands that morning, and he was glad to find that the schedule of poisons had been removed, together with all restrictions on their sale; in fact it was now simply a Bill to make the administration of poisonous drugs or compounds to animals without the authority of the owner, a punishable offence.

SALE OF FOOD AND DRUGS BILL.

Mr. SANDFORD said it appeared that the night before last it was moved in the House of Lords by Lord Egerton of Tatton, and assented to by the Duke of Richmond, who had charge of the Bill, to omit the word "knowingly" from Clauses 3 and 4 of the Sale of Food and Drugs Bill. He would therefore move:—

> "That this Council deeming the proposal in the House of Lords to erase the word 'knowingly' from the 3rd and 4th clauses of the Sale of Food and Drugs Bill liable to inflict great injustice on retail dealers, hereby deputes the President, Vice-President, the Treasurer, and Mr. Sandford to wait on the Duke of Richmond and such other members of either House of Parliament as they may think fit, in order to represent the opinion of the Council, and endeavour to prevent such alteration."

The resolution was carried unanimously.

It was also resolved that the portion of the report of the Law and Parliamentary Committee referring to alleged infringements of the Pharmacy Act, and recommending that proceedings be taken, be adopted.

VOTE OF THANKS TO LOCAL SECRETARIES.

A vote of thanks to the Local Secretaries was passed for their exertions in opposing the Irish Pharmacy Bill as originally introduced.

FINANCE.

The report of this Committee was received and adopted, and sundry accounts and salaries ordered to be paid.

BELL MEMORIAL FUND.

The SECRETARY said the Council would remember that the original trustees of this fund were Messrs. George Waugh, Daniel Hanbury, and Thomas Hyde Hills. Some time ago, on the decease of Mr. Waugh, Mr. Daniel Hanbury wrote suggesting that a new trustee should be appointed, but the Council then thought it would be as well if the fund were vested in the corporate name of the Society, and Mr. Hills was deputed to confer with the late Mr. Daniel Hanbury on the matter.

The PRESIDENT said he was now left the sole surviving trustee of the Bell Memorial Fund, and he thought the Council could not do better than vest it in the corporate name of the Society, where it would for ever remain.

It was resolved unanimously, on the motion of Mr. Sandford, that the amount standing to the credit of the fund be invested in Consols in the name of the Society.

BENEVOLENT FUND.

The report of this Committee was read, containing a recommendation of the following grants:—

£20 to a member of the Society, aged 59, formerly in business on his own account for thirty-five years, but now suffering from permanent and distressing ill-health.

£10 to the widow of a registered chemist and druggist, having four children dependent on her for support. This applicant had a grant of £10 in 1873.

£15 to a member of the Society, aged 54, formerly in business on his own account, and who had since managed a branch business in a large provincial town. Has a wife and six children, four entirely depending on him, and is subject to occasional attacks of sickness. He has had four separate grants on previous occasions, amounting in the whole to £50.

Two other applications had been deferred for further inquiries.

Mr. SHAW had reported that owing to change of fares from Liverpool to New York he had expended £1 more than the sum entrusted to him recently to defray the expenses of sending an applicant to America. The Committee recommended that Mr. Shaw be reimbursed the £1 he had expended and that he receive the thanks of the Council for the trouble he had taken in the matter.

Mr. OWEN reported that he had been successful in getting a child into the London Orphan Asylum, for which a grant of £20 was recently made.

The Committee also recommended that the name of the widow of an annuitant be ordered to be put on the list of approved candidates for annuities.

The report and recommendations of the Committee were received and adopted, with the exception that in one case the grant was reduced to £15, and the name of the applicant was placed on the list of approved candidates for annuities.

Mr. OWEN reported more in detail the success of his exertions with regard to getting orphans elected to asylums, three having been successful on the Monday previous. In addition to the cases which had been officially entrusted to him, he had assisted the widow of a chemist and druggist, who had previously received a small grant from the Benevolent Fund, to get a child into an asylum. She had spent £15 of her own in so doing, which he believed was a most serious inconvenience to her, and if the Council would for once break through the rule and make a grant to reimburse this poor woman the outlay she had been at, he thought it would be really doing a good action, and it would be a great encouragement to him to help others at a future time.

The VICE-PRESIDENT supported the proposition of Mr. Owen.

The SECRETARY said the widow referred to had communicated with him on several occasions with reference to further aid from the Fund, but had not yet made a formal application.

Mr. HAMPSON hoped the Council would accede to the request of Mr. Owen.

Mr. BETTY was very sorry to say a word against any benevolent action but he thought the Council must act according to its rules.

Mr. GREENISH said the Council was indebted to Mr. Owen for bringing the matter forward, but he must agree with Mr. Betty that no money ought to be granted until a regular application had been made.

This view being acquiesced in, the matter stood over for a proper application to be made.

LIBRARY, MUSEUM, AND LABORATORY.

The report of this Committee showed that the average attendance in the library, during the past month had been, day, 18; evening, 7. In the conversation room, 3·6. The circulation of books had been 146; 114 to London, and 32 to the country to 17 different places. The attendance in the museum had been, morning, 16, evening, 2. On four occasions there had been no visitors. The curator reported that some of the lady students had applied to have a series of bottles out of the cases for examination at their leisure, and for the use of chairs in the chemical museum. The Committee had decided that lady students should be treated in the same way as others in all respects. Professor Attfield had reported that there had been 104 entries in his class since the commencement of the session, of whom 52 were now at work. Professor Bentley had reported that his class at the Botanical Gardens was progressing satisfactorily, there being 62 students. With a view to the more extended study of practical botany, it was recommended that in the winter session the lectures should be given on three mornings a week, instead of two, and that the fees be increased from 1½ to 2 guineas. Professor Redwood had reported that there were 47 pupils now attending his class, and that they were prospering very satisfactorily.

The report and recommendations were read and adopted.

Mr. SCHACHT said one reason why he wished to be a member of the Committee (which however appeared to be impracticable) was that he might see if it were possible in any way to arrange for a practical pharmaceutical laboratory which would, he believed, be very useful, not only to practical students, but to many members of the Society. He thought it would be well if every student had at least once to make an extract or distil a water before his education was said to be concluded. Besides, many chemists and druggists who had not the advantage of large and commodious premises and apparatus would often be glad of a little information, which, he was sorry to say, at present could not be obtained in Bloomsbury Square. He understood that the professor of practical chemistry did occasionally get some of his pupils to prepare a green extract, generally of cabbage, but in so doing he was somewhat overstepping the curriculum laid down for him. He thought it would be well if the Committee took the matter into their consideration.

Mr. HAMPSON thought it would have been well if some notice had been given of the introduction of this subject, which, however, certainly seemed worthy of consideration.

After a few words from Mr. Greenish, it was decided to refer the matter to the Library Committee, in the following terms:—

> "That the Library, Museum, and Laboratory Committee be requested to take into consideration the feasibility of providing within this establishment a model Pharmaceutical Laboratory, and the desirability of including a practical knowledge of its use in the instruction given to the pupils."

APPOINTMENT OF PROFESSORS AND CURATOR FOR THE ENSUING YEAR.

Professor Redwood was reappointed Professor of Chemistry and Pharmacy.

Professor Bentley was reappointed Professor of Botany and Materia Medica.

Professor Attfield was reappointed Professor of Practical Chemistry.

Mr. Holmes was reappointed Curator of the Society's Museum.

REPORT OF EXAMINATIONS.

June, 1875.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major	3	1	2
Minor	13	4	9
Total	16	5	11

PRELIMINARY EXAMINATIONS.

The President and Vice-President were appointed a deputation to confer with the College of Preceptors in reference to the details of the Preliminary Examination, and the Board of Examiners was invited to send two of its members to be present at the conference.

LOCAL SECRETARIES, 1875-76.*

The SECRETARY reminded the Council that on the last occasion he reported that from 131 towns entitled to be represented by a local secretary no answer had been received, but during the month he had been in communication with various persons, and he was happy to say that with the exception of one or two they had all replied and accepted office, and there were only twelve or thirteen changes for the year. There were however nineteen towns eligible for local secretaries which did not possess any one qualified to represent them, whilst there were five in which no gentleman could be found willing to act. In the recent action taken by the Council with regard to the Irish Pharmacy Bill the local secretaries had shown a most cordial desire to co-operate with the Council.

The Council then appointed the following as local secretaries for the ensuing year:—

Towns eligible.	Names of persons appointed.
Aberdare	Thomas, Watkin Jones.
Aberdeen	Davidson, Charles.
Abergele	Ellis, William.
Aberystwith	Davies, John Hugh.
Abingdon	Smith, William.
Altrincham	Holt, William Henry.
Andover	
Arbroath	
Ashby de la Zouch	Johnson, Samuel E.
Ashton-under-Lyne	Bostock, William.
Aylesbury	Turner, John.
Ayr	
Banbury	Linnett, Samuel S.
Banff	Ellis, Bartlet.
Bangor	Griffiths, John E.
Barnsley	Badger, Alfred.
Barnstaple	Goss, Samuel.
Barrow in Furness	Steel, Thomas.
Bath	Pooley, John Carpenter.
Beaumaris	
Bedford	Cuthbert, John M.
Belper	Ashton, John.
Berwick	Carr, William Graham.
Beverley	Hobson, Charles.
Bewdley	Newman, Robert.
Birkenhead	Nicholson, Henry.
Birmingham	Southall, William.
Blackburn	Pickup, Thomas Hartley.
Blackpool	Harrison, John.
Blandford	Groves, Wellington E.
Bodmin	Williams, Joel Drew.
Bolton	Dutton, George.
Boston	Marshall, Robert.
Bournemouth	Duncan Alexander.
Bradford (Yorkshire)	Rimmington, Felix W. E.
Brecon	Meredith, John.
Bridgnorth	Deighton, Thomas Milner.
Bridlington	Forge, Christopher.
Bridport	Tucker, Charles.
Brighton	Gwatkin, James Thomas.
Bristol	Stoddart, William W.
Buckingham	Sirett, George.
Burnley	Thomas, Richard.
Burslem	Blackshaw, Thomas.
Bury	
Bury St. Edmunds	Portway, John.
Buxton	Thresh, John Clough.
Calne	
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Cross, William.
Cardigan	Jones, John Edwards.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, Richard M.
Carnarvon	Jones, John.
Chelmsford	Baker, Charles Patrick.
Cheltenham	Smith, Nathaniel.
Chester	Grindley, William.
Chesterfield	Greaves, Abraham.
Chichester	Long, William Elliott.
Chippenham	Coles, John Coles.
Christchurch	Green, John.
Cirencester	Mason, Joseph W.
Clevedon	Chapman, Henry.
Clitheroe	
Cockermouth	Bowerbank, Joseph.
Colchester	Shenstone, James B. B.
Congleton	Goode, Charles.
Coventry	Wyley, John.
Crewe	McNeil, James Norton.
Cricklade	
Darlington	Robinson, Alfred Francis.
Deal	Green, John.
Denbigh	Edwards, William.
Derby	Frost, George.
Devizes	Portbury, George Henry.
Devonport	Dickerson, Henry.
Dewsbury	Matterson, Edward H.
Diss	Gostling, Thomas Preston.
Doncaster	Dunhill, William W.

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* Local Secretaries are appointed in all towns in Great Britain which return a Member or Members to Parliament, and in such other Towns as contain not less than Three Members of the Society or Associates in business.

Towns eligible.	Names of persons appointed.
Dorchester	Evans, Alfred John.
Dorking	Clift, Joseph.
Dover	Bottle, Alexander.
Droitwich	Taylor, Edmund.
Dudley	Hollier, Elliott.
Dumfries	Allan, William.
Dundee	Hardie, James.
Durham	Sarsfield, William.
Eastbourne	Provost, James A.
Edinburgh	Mackay, John.
Elgin	Robertson, William.
Evesham	Dingley, Richard Loxley.
Exeter	Delves, George.
Eye	Bishop, Robert.
Falkirk	Murdoch, David.
Falmouth	Newman, W. F.
Fareham	Franklin, Alfred.
Faversham	Lenfesty, Wm. G.
Flint	Jones, Michael.
Folkestone	Cadman, Daniel Charles.
Frome	Harvey, William Brett.
Gainsborough	
Gateshead	Elliott, Robert.
Glasgow	Kinninmont, Alexander.
Gloucester	Curtis, A. A.
Gosport	Hunter, John.
Grantham	Gamble, Richard.
Gravesend	Smith, Geo. Mason.
Greenock	Fraser, Charles.
Grimsby, Great	Palmer, Enoch.
Guernsey	Arnold, Adolphus.
Guildford	Martin, Edward W.
Haddington	Watt, James.
Halifax	Dyer, William.
Hanley	Jones, Charles.
Harrogate	Davis, Richard Hayton.
Hartlepool	Jackson, William G.
Harwich	Bevan, Charles F.
Haslingden	Blayney, Joseph J.
Hastings & St. Leonards	Jameson, William Edward.
Haverfordwest	Williams, William.
Hawick	
Helston	Troake, Marler Hamilton.
Hereford	Jennings, Reginald.
Hertford	Lines, George.
Heywood	Beckett, William.
Hitchin	Ransom, William.
Horncastle	Elsey, John.
Holywell	Turner, Frederick Evans.
Horsham	Williams, Philip.
Huddersfield	King, William.
Hull	Bell, Charles Baines.
Huntingdon	Provost, John Pullen.
Huntly	Prott, William.
Hythe	
Inverness	Galloway, George Ross.
Ipswich	Anness, Samuel Richard.
Jersey	Ereaut, John, jun.
Kendal	Severs, Joseph.
Kidderminster	Hewitt, George.
Kilmarnock	Borland, John.
King's Lynn	Atmore, George.
Kirkcaldy	
Knaresborough	Sindall, John William.
Knutsford	Silvester, Henry Thomas.
Lancaster	Wearing, William.
Launceston	Eyre, Jonathan Symes.
Leamington	Jones, Samuel Urwick.
Leeds	Reynolds, Richard.
Leek	Johnson, William.
Leicester	Cooper, Thomas.
Leighton Buzzard	Readman, William.
Leith	Finlayson, Thomas.
Leominster	Davis, David Frederick.
Lewes	Martin, Thomas.
Lichfield	Eaton, John.
Lincoln	Maltby, Joseph.
Liskeard	Eliott, Samuel.
Liverpool	Abraham, John.
Longton	Prince, Arthur G.
Loughborough	Paget, John.
Louth	Hurst, John B.
Lowestoft	Hall, Thomas.
Ludlow	Cocking, George.
Lyme Regis	Thornton, Edward.
Lymington	Allen, Adam U.
Macclesfield	Bates, William Isaac.
Macduff	Henry, James Henry.
Maidenhead	Walker, Robert.
Maidstone	
Maldon	Wallworth, David.
Malmsbury	Brown, Francis James.
Malton	Hardy, George.
Malvern, Great	
Manchester, etc.	Wilkinson, William.
March	Davies, Peter Hughes.
Margate	Knight, Alfred.
Marlborough	
Marlow	Foottit, Charles Miller.
Merthyr Tydvil	Smyth, Walter.
Middlesborough	Robson, James Crosby.
Midhurst	
Montgomery	
Monmouth	
Montrose	Burrell, George.
Morpeth	
Neath	Hibbert, Walter.
Newark	March, William.
Newbury	Davis, Frank Pratt.
Newcastle-under-Lyme.	Cartwright, William.
Newcastle-on-Tyne	Proctor, Barnard S.
Newport (I. of Wight).	Orchard, Herbert Joseph.
Newport (Mon.)	Pearman, Henry.
New Radnor	
Newtown	Owen, Edward.
Northallerton	Warrior, William.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	Atherton, John Henry.
Nuneaton	Iliffe, George.
Oldham	Hargraves, Henry Lister.
Oswestry	Saunders, George James.
Over Darwen	Hargreaves, William Henry.
Oxford	Prior, George T.
Paisley	Hatrick, William.
Pembroke	
Pembroke Dock	Andrews, Charles.
Penrith	Kirkbride, William.
Penzance	Cornish, Henry Robert.
Perth	Dandie, David.
Peterborough	Heanley, Marshall.
Petersfield	Edgeler, William B.
Plymouth	Balkwill, Alfred P.
Pocklington	Cundall, Robert.
Pontefract	Bratley, William.
Poole	Penney, William.
Portsmouth, etc.	Rastrick, J. L.
Preston	Hogarth, William.
Ramsgate	Morton, Henry.
Reading	Hayward, William G.
Redditch	Mousley, William.
Retford	Baker, William.
Richmond (Yorks)	Thompson, John Thomas.
Ripon	Colley, John.
Rochdale	Taylor, Edward.
Rochester	Harris, Henry William.
Rotherham	Horsfield, John M.
Rothesay	Duncan, William.
Runcorn	Whittaker, William.
Rugby	Garratt, John C.

Towns eligible.	Names of persons appointed.
Ruthin	Bancroft, John James.
Ryde (Isle of Wight)	Wavell, John.
Rye	Plomley, James F.
St. Albans	Martin, Henry Gilham.
St. Andrews	Govan, Alexander.
St. Austell	Hern, William Henry.
St. Ives (Cornwall)	Young, Tonkin.
Salisbury	Atkins, Samuel Ralph.
Sandwich	Baker, Frank.
Scarborough	Whitfield, John.
Seacombe	Holt, Richard Wylde.
Selby	Colton, Thomas.
Shaftesbury	Powell, John.
Sheerness	Rayner, William.
Sheffield	Wilson, Edward.
Shepton Mallet	Cottrill, Gilbert Jones.
Shields, North	Williamson, James.
Shields, South	Mays, Robert J. J.
Shipley	Dunn, Henry.
Shoreham	Barker, John.
Shrewsbury	Cross, William Gowen.
Skipton	Foxcroft, Elijah.
Slough	Griffith, Richard.
Southampton	Dawson, Oliver R.
Southport	Walker, William Henry.
Spalding	Rhodes, Frank.
Stafford	Averill, John.
Stalybridge	Brierley, Richard.
Stamford	
Stirling	Duncanson, William.
Stockport	Lowndes, Hervey.
Stockton-on-Tees	Brayshay, William B.
Stoke-on-Trent	Adams, Jonathan Henry.
Stourbridge	Bland, John Handel.
Stratford-on-Avon	Hawkes, Richard.
Stroud	Blake, William F.
Sudbury	Harding, James John.
Sunderland	Nicholson, John J.
Swansea	Brend, Thomas.
Tamworth	Allkins, Thomas Boulton.
Taunton	Prince, Henry.
Tavistock	Gill, William.
Teignmouth	Cornelius, Joseph.
Tenby	Walkington, Wm. Marmaduke.
Tewkesbury	Allis, Francis.
Thirsk	Thompson, John.
Tiverton	Havil, Paul.
Torquay	Smith, Edward.
Truro	Serpell, Samuel.
Tunbridge	Wibmer, Lewis Michael.
Tunbridge Wells	Howard, Richard.
Tynemouth	
Ulverstone	Radnall, William Henry.
Uttoxeter	Johnson, John Borwell.
Wakefield	Taylor, John.
Wallingford	Payne, Sidney.
Walsall	Highway, Henry.
Wareham	Randall, Thomas.
Warrington	Woods, Joseph Henry.
Warwick	Pratt, Henry.
Watford	Chater, Edward Mitchell.
Wednesbury	Gittoes, Samuel James.
Welchpool	Jones, Thomas Pugh.
Wellington	Langford, John Brown.
Wells	Manning, Richard James.
Wenlock	
Westbury	Taylor, Stephen.
West Bromwich	Laugher, William
Weston-super-Mare	Rich, Thomas.
Weymouth	Groves, Thos. Bennett.
Whitby	Stevenson, John.
Whitehaven	Kitchen, Archibald.
Wick	Miller, Kenneth.
Wigan	Dunsford, Samuel.
Wigton	
Wilton	
Winchester	Hunt, Richard.
Windsor	Russell, Charles J. L.
Wolverhampton	Brevitt, William Yates.
Wokingham	Spencer, Thomas
Woodstock	Sant, George.
Worcester	Witherington, Thomas.
Worthing	Cortis, Charles.
Wrexham	Edisbury, James Fisher.
Wycombe	Furmston, Samuel C.
Yarmouth, Great	Poll, Wm. Sheppard.
York	Davison, Ralph.

Parliamentary and Law Proceedings.

PHARMACY ACT (IRELAND) BILL.

This Bill has now been reprinted. It proves to be so considerably altered from its original form, that we deem it advisable to reproduce it here *in extenso.*

Whereas by an Act passed by the Parliament of Ireland in the thirty-first year of the reign of His Majesty George the Third, intituled "An Act for the more effectually preserving the health of His Majesty's subjects, for erecting an Apothecaries Hall in the city of Dublin, and regulating the profession of an apothecary throughout the kingdom of Ireland" (in this Act referred to as "the Act of 1791"), it is enacted that no person shall open shop or practise the art and mystery of an apothecary within the kingdom of Ireland until he shall have been examined as to his qualification and knowledge of the business by the persons and in the manner by the said Act prescribed, and shall have received a certificate to open shop or follow the art and mystery of an apothecary within the kingdom of Ireland from the Governor and Director of the Apothecaries Hall of the city of Dublin:

And whereas a great deficiency exists throughout Ireland of establishments and shops for the sale of medicines and compounding of prescriptions, and great inconvenience thereby arises to the public in many parts of the country:

And whereas to remedy such inconvenience it is expedient to amend the Act of 1791, and to enable persons who, although they do not desire to practise the art and mystery of an apothecary, desire and are qualified to open shop for the retailing, dispensing, and compounding of poisons and medical prescriptions, to keep open shop for the purposes aforesaid:

And whereas for the purposes aforesaid it is expedient that provisions such as are in this Act contained should be made for the formation of a Pharmaceutical Society in Ireland, and for the examination of persons desiring to keep open shop for the purposes aforesaid, and for the registration of such of the said persons as may be found, on examination, to possess a competent practical knowledge of pharmaceutical and general chemistry and other branches of useful knowledge, as fit persons to keep open shop for the dispensing and compounding of prescriptions of duly qualified medical practitioners:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

1. This Act may be cited as "The Pharmacy Act (Ireland), 1875."

2. This Act shall apply to Ireland only.

3. In this Act,—

The term "Lord Lieutenant" shall mean the Lord Lieutenant or other chief governor or governors of Ireland for the time being:

The term "Privy Council" shall mean Her Majesty's Privy Council in Ireland:

The term "licentiate of Apothecaries Hall" shall mean a person who has a certificate to open shop or to follow the art and mystery of an apothecary under the provisions of the Act of 1791.

Constitution and Incorporation of the Pharmaceutical Society of Ireland.

4. A society to be called "the Pharmaceutical Society of Ireland" shall be constituted as hereinafter mentioned, and such society shall by such name be a body corporate, and have perpetual succession and a common seal, and sue and be sued, and have power and authority to take, purchase, and hold land for the purposes of this Act.

5. The following persons, that is to say:—William Allen, of Henry Street, Dublin; Miles Vernon Bourke, M.D., of Limerick; Thomas Collins, M.R.C.S.E., of Harcourt Street, Dublin; Sir Dominic Corrigan, Baronet, Physician in ordinary to the Queen in Ireland; William Frazer, F.R.C.S.I., of Harcourt Street, Dublin; John Goodwin, of Merrion Row, Dublin; William Goulding, of Summerhill House, Cork; William Harrington, Licentiate of Apothecaries' Hall, of Cork; William Hayes, of Grafton Street, Dublin; John Frederick Hodges, M.D., of Belfast; Edward M. Hodgson, of Capel Street, Dublin; John Thomas Holmes, of Upper Baggot Street, Dublin; Charles Henry Leet, M.D., of Rathmines, near Dublin; Rawdon Macnamara, F.R.C.S.I., of Stephen's Green, Dublin; George B. Owens, M.D., of Lower Baggot Street, Dublin; Richard Ward Pring, of Belfast; James Emmerson Reynolds, M.D., of Upper Leeson Street, Dublin; John Ryan, M.D., of Francis Street, Dublin; Aquilla Smith, M.D., of Lower Baggot Street, Dublin; Charles R. C. Tichborne, of Waltham Terrace, Blackrock, near Dublin; Henry Whitaker, M.R.C.S.E., of Belfast; and all other persons who shall be qualified and elected in the manner prescribed by this Act, shall be members of the Pharmaceutical Society of Ireland, and the said persons in this section specifically named as such members as aforesaid shall constitute and be the first council of the Pharmaceutical Society of Ireland.

There shall be a president and vice-president of the said Society, and the said Sir Dominic Corrigan, Baronet, shall be the first president, and the said Aquilla Smith, M.D., the first vice-president of the said council.

6. Every person who shall be registered under this Act as a pharmaceutical chemist shall be qualified to be elected as a member of the said Pharmaceutical Society; and every person so registered and elected a member of the said Pharmaceutical Society shall be qualified to be elected, and when elected to act as a member of the council of the said Pharmaceutical Society.

7. The persons by this Act named as president and vice-president of the said council, and their successors in such offices respectively, shall hold the office of president and vice-president respectively during such time as they shall continue to be members of the said council, and in case of any vacancy in the office of president or vice-president of the said council caused by such president or vice-president ceasing to be a member of the said council, or by the resignation or incapacity of any such president or vice-president, such vacancy shall be filled by the election of some member of the said council to fill such vacancy.

8. The members of the said council shall go out of office by rotation in the following manner; viz., on the first Monday of October in the year one thousand eight hundred and seventy-six one-third of the members of such council shall go out of office, and on the first Monday of October in the following year another third of the members of such council shall go out of office, and on the first Monday of October in the following year the remainder of the members of such council shall go out of office; and on the first Monday of October in every subsequent year one third of the members of such council (being those who have been longest in office) shall go out of office; and in each instance the places of the retiring members of such council shall be supplied by the election by the members of the said Pharmaceutical Society on the first Monday of October in each year of a like number of their body to act as members of the said council in the place of the retiring members.

9. In order to determine the rotation by which the first members of the said council shall go out of office, the said council shall at their first meeting under this Act form a rotation list, and at such meeting the chairman shall write the names of all the members on separate slips of paper, all as nearly as may be of equal size, and having folded them up in the same manner, he shall put them into a ballot-box, and shall in the presence of the meeting draw out such slips of paper in succession, and the names upon the slips so drawn shall be written by the chairman in a list in the order in which they are drawn; and every such list shall be kept among the papers of the said council, and the names therein shall be numbered consecutively, and the members of the said council shall retire from office in the order in which their names appear on such list, in the proportions in this Act mentioned.

10. Every member of the said council going out of office by rotation may be re-elected, and after such re-election he shall, with reference to going out by rotation be considered as a new member.

11. If any extraordinary vacancy shall be occasioned in the said council the said council shall, on a day to be fixed by the chairman of the said council (such day not to be later than ten days after such vacancy) elect another person to supply such vacancy, and every person so elected shall continue a member of the said council until the time at which the person in the room of whom he was chosen would regularly have gone out of office, and he shall then go out of office, but shall be capable of immediate re-election.

12. Elections of members of the said council, and of president and vice-president thereof, under this Act, shall be held and the voting and other proceedings in the case of a contest shall be conducted in the manner prescribed by regulations made in pursuance of this Act.

13. At a meeting of the said council the president, or in his absence the vice-president, shall act as chairman, and in case the president and vice-president shall both be absent, one of the members present shall be elected chairman by the majority present.

At all meetings of the said council the questions there considered shall be decided by a majority. In case of an equal division, the chairman shall, in addition to his own vote, have a casting vote.

No business shall be transacted at any meeting of the said council unless seven members of the council be present, and all the powers under this Act vested in the council may be exercised by any seven or more of the council present at any meeting of the council.

14. The council of the said Pharmaceutical Society shall hold their first meeting within six months after the passing of this Act at such place in the city of Dublin, at such hour, and on such day as the Chief Secretary to the Lord Lieutenant may respectively order and appoint, and they may adjourn such meeting from time to time as shall seem fit.

15. The said council may at their first or any subsequent meeting by resolution determine upon allowing certain persons to acquire the title of Chemist and Druggist, subject to such terms and conditions as the said council shall think proper.

16. At the first meeting of the said council, or some adjournment of the same, they may, subject to the provisions of this Act, make regulations with respect to the matters following:

(1) The meetings and other proceedings of the said council;

(2) The examinations of persons desirous of being registered as Pharmaceutical Chemists under this Act;

(3) The examinations of persons desirous of being

registered as chemists and druggists under this Act, in case the said council shall think proper to allow persons to acquire the title of chemist and druggist;

(4) The times at which and the mode in which elections of members and associates of the said Pharmaceutical Society are to be held and conducted;

(5) The mode in which elections of members of the council, and of president and vice-president thereof, are to be held and conducted;

(6) The fees to be charged for examination, licence, and registration under this Act, and the entrance fees and annual subscriptions to be paid by members of the said Pharmaceutical Society, and the application of the same, and of all moneys received by the treasurer under this Act;

(7) The duties of the registrar, treasurer, clerks, and other subordinate officers, and the manner in which the same shall be discharged, and the salaries to be paid to such officers respectively; and

(8) Generally for all such other matters as may be necessary for the due execution of this Act.

The said council may from time to time, at any meeting of the council held at any time after the expiration of six months after such first meeting, revoke or alter any such regulation, and make new regulations instead thereof or in addition thereto.

17. Any resolution made under the authority of this Act with respect to the title of Chemist and Druggist, and every regulation made under the authority of this Act shall be subject to the approval of the Lord Lieutenant and Privy Council, and shall be of no force or effect until the same shall respectively be so approved, and notice of such approval shall be published in the *Dublin Gazette.*

Any resolution and all regulations made under the authority of this Act and approved as aforesaid shall be laid before before both Houses of Parliament within twenty-one days after the same shall be made, if Parliament be sitting at such time, or if Parliament be not sitting, within twenty-one days after the commencement of the next session of Parliament after the making thereof.

Any such resolution and all such regulations when so approved shall be of the like force and effect as if they had been enacted in this Act.

18. Every person who shall be registered under this Act as a chemist and druggist shall be qualified to be elected an associate of the said Pharmaceutical Society, subject to the regulations made in pursuance of this Act; and every person so elected and continuing as such associate, being in business on his own account, shall have the privilege of attending all meetings of the said society, and of voting thereat, and otherwise taking part in the proceedings of such meetings in the same manner as members of the said society: Provided always, that such associates contribute to the funds of the said society the same fees or subscriptions as members contribute for the time being under the regulations thereof.

General Provisions.

19. The following provisions of this Act shall not take effect until after the publication in the *Dublin Gazette* of the notice of the approval of the regulations made at the first meeting of the said council, and so far as the said provisions relate to chemists and druggists under this Act they shall only take effect after the publication in the *Dublin Gazette* of the notice of the approval of a resolution with respect to the title of chemist and druggist.

20. The said council may from time to time appoint a fit and proper person as a registrar under this Act, and shall have power to remove any such registrar from the said office, and may also appoint and remove from time to time a treasurer, and such clerks and other subordinate officers as may be requisite for carrying out the purposes of the Act, and also to pay suitable salaries to the said registrar, treasurer, clerks, and officers.

21. For the purpose of ascertaining the qualification of persons desirous of keeping open shop for the retailing, dispensing, or compounding poisons or medical prescriptions and being registered as pharmaceutical chemists or as chemists and druggists under this Act, the said council shall cause examinations to be held at such times and in such manner as may be prescribed by regulations made in pursuance of this Act, and the said council shall appoint examiners to conduct the same: Provided always, that no person shall conduct any examination for the purposes of this Act until his appointment has been approved by the Lord Lieutenant and Privy Council, and such appointment shall not in any case be in force for more than five years; and that it shall be the duty of the said Pharmaceutical Society to allow any officer appointed by the Lord Lieutenant and Privy Council for that purpose to be present during the progress of any examination held for the purposes of this Act.

All persons desirous of being registered as pharmaceutical chemists under this Act may at any such examination present themselves for examination, and they shall be examined with respect to their knowledge of the Latin and English languages, of arithmetic, of botany, of materia medica, of pharmaceutical and general chemistry, of practical pharmacy, of the British Pharmacopœia, and of such other subjects as may from time to time be prescribed by any regulations made in pursuance of this Act; and all persons desirous of being registered as chemists and druggists under this Act, may at any such examination present themselves for examination, and they shall be subjected to such a modified examination with respect to their knowledge of the subjects aforesaid as may from time to time be prescribed by any regulations made in pursuance of this Act: Provided always, that such examinations shall not include the theory and practice of medicine, surgery, or midwifery, or any branch of medicine or surgery; and the examiners appointed by the council are hereby empowered, after such examinations respectively, to grant or refuse to such persons, as in their discretion may seem fit, certificates of competent knowledge and qualification and skill to be registered as pharmaceutical chemists or as chemists and druggists under this Act: Provided always, that in case of rejection a rejected candidate shall not present himself for re-examination until after six months after such rejection.

22. Every person by this Act nominated as a member of the council of the Pharmaceutical Society of Ireland shall be entitled to be registered as a pharmaceutical chemist without payment of any fees or charges; and every person who shall be duly examined in accordance with the provisions of this Act, and who shall be certified by the examiners to be qualified to act as a pharmaceutical chemist, and every licentiate of Apothecaries Hall, shall upon giving to the registrar such reasonable proof thereof as may be required under any regulations made by the council of the said Pharmaceutical Society in that behalf, and upon payment of the proper fees and charges, be entitled to be registered under this Act as a pharmaceutical chemist.

Every person who shall be duly examined in accordance with the provisions of this Act, and who shall be certified by the examiners to be qualified to act as a chemist and druggist, shall upon giving to the registrar such reasonable proof thereof as may be required under any regulations made by the council of the said Pharmaceutical Society in that behalf, and upon payment of the proper fees and charges, be entitled to be registered under this Act as a chemist and druggist.

23. For every examination, licence, and registration, such reasonable fees or charges shall be paid as shall from time to time be fixed and determined by any regulation or regulations to be made by the said council in pursuance of this Act: Provided always, that such fees or charges shall at all times be equal, as nearly as may be, to the fees fixed and determined for like purposes by any byelaw or byelaws made by the Pharmaceutical Society of Great

Britain, and such fees shall be paid to the treasurer, and shall by him be applied to the purposes of this Act in manner prescribed by such regulations.

24. The registrar to be appointed under or by virtue of this Act shall from time to time make out and maintain a complete list (to be called the "Register of Pharmaceutical Chemists for Ireland") and also a complete list (to be called the "Register of Chemists and Druggists in Ireland") of all persons registered as pharmaceutical chemists, or as chemists and druggists respectively, under this Act, and in such registers the names shall be in alphabetical order according to the surnames, with the respective residences, in the form set forth in the schedule to this Act annexed, or to the like effect, and shall keep proper indexes of such registers, and all such other lists and books as may be required by the said council and as may be necessary for giving effect to the regulations of the said council and to the provisions of this Act.

25. It shall be the duty of the registrar to keep the said registers corrected, and to erase the names of all registered persons as and when they shall die, and from time to time to make the necessary alterations in the addresses of the persons registered under this Act; and to enable the registrar duly to fulfil such duties, it shall be lawful for him to write a letter to any registered person, addressed to such person according to his address on the register, to inquire whether he has ceased to carry on business or has changed his residence, such letter to be forwarded by post as a registered letter, according to the post-office regulations for the time being, and if no answer shall be returned to such letter within the period of six months from the sending of the letter, a second of similar purport shall be sent in like manner, and if no answer be given thereto within three months from date thereof it shall be lawful to erase the name of such person from the register: Provided always, that the same may be restored by direction of the said council, should they think fit to make an order to that effect.

26. No name shall be entered in the said registers, except of persons authorized by this Act to be registered nor unless the registrar be satisfied by the proper evidence that the person claiming is entitled to be registered; and any appeal from the decision of the registrar may be decided by the said council; and any entry which shall be proved to the satisfaction of the said council to have been fraudulently or incorrectly made may be erased from or amended in the register under an order in writing of the said council.

27. The registrar shall, in the month of January in every year, cause to be printed, published, and sold correct copies of the register of pharmaceutical chemists and of the register of chemists and druggists in alphabetical order according to the surnames; and printed copies of such registers for the time being in force, purporting to be so printed and published as aforesaid, or any extract therefrom, or from the original registers, certified under the hand of the said registrar, and countersigned by the president or two members of the said council, shall be evidence in all courts and in all proceedings that the persons therein specified are registered according to the provisions of this Act, and the absence of the name of any person from any such copy of either of the said registers shall be evidence, until the contrary shall be made to appear, that such person is not registered in such register according to the provisions of this Act.

28. Any registrar who shall wilfully make or cause to be made any falsification in any matter relating to the said registers, or either of them, and any person who shall wilfully procure or attempt to procure himself to be registered under this Act, by making or producing, or causing to be made or produced, any false or fraudulent representation or declaration, either verbally or in writing, and any person aiding or assisting him therein, shall be deemed guilty of a misdemeanour, punishable by fine or imprisonment, and shall on conviction thereof be sentenced to be imprisoned for any term not exceeding twelve months.

29. Every registrar of deaths in Ireland, on receiving notice of the death of any person registered under this Act as a pharmaceutical chemist or as a chemist and druggist, shall forthwith transmit by post to the registrar under this Act a certificate, under his own hand, of such death, with the particulars of the time and place of death, and on receipt of such certificate the said registrar under this Act shall erase the name of such deceased pharmaceutical chemist or chemist and druggist from the proper register, and shall transmit to the said registrar of deaths the cost of such certificate and transmission, and may charge the cost thereof as an expense of his office.

30. So much of the Act of 1791 as prohibits the keeping of open shop within the meaning of the said Act by any person other than a licentiate of Apothecaries Hall shall be repealed: Provided always that it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons within the meaning of the Act of the session of the thirty-third and thirty-fourth years of the reign of Her present Majesty, chapter twenty-six, or medical prescriptions, unless such person be registered as a pharmaceutical chemist or a chemist and druggist under this Act, or to assume or use the title of pharmaceutical chemist, or pharmaceutist, or pharmacist, or dispensing chemist, or the title of chemist and druggist in any part of Ireland, unless such person shall be registered as a pharmaceutical chemist or as a chemist and druggist respectively under this Act; and any person acting in contravention of this enactment, or compounding any medicines of the British Pharmacopœia, except according to the formularies of the said Pharmacopœia, shall for every such offence be liable to pay a penalty of five pounds; but no such penalty shall exempt any person from being liable to any other penalty, damage, or punishment to which he would have been subject if this Act had not passed: Provided always, that nothing in this section contained shall affect any licentiate of Apothecaries Hall, or any person who shall have been registered as a legally qualified medical practitioner before the passing of this Act, or who shall be registered as a legally qualified practitioner after the passing of this Act, and who, in order to obtain his diploma, shall have passed an examination in pharmacy.

31. Nothing in this Act contained shall extend to or interfere with the making or dealing in patent medicines, or with the business of wholesale dealers in supplying poisons in the ordinary course of wholesale dealing, or of chemists or druggists who are practising as such in Ireland upon their own account at the time of the passing of this Act, save and except the provisions against the compounding of poisons or medical prescriptions, and against the preparing of any medicines of the British Pharmacopœia except according to the formularies of the said Pharmacopœia; and nothing in this Act contained shall prevent any person who is a member of the Royal College of Veterinary Surgeons of Great Britain, or holds a certificate in veterinary surgery from the Highland and Agricultural Society of Scotland from dispensing medicines for animals under his care.

32. Upon the decease of any person registered under this Act as a pharmaceutical chemist or as a chemist and druggist, actually in business at the time of his death, it shall be lawful for any executor, administrator, or trustee of the estate of such pharmaceutical chemist or chemist and druggist to continue such business, if and so long only as such business shall be *bonâ fide* conducted by a duly qualified assistant, and a duly qualified assistant within the meaning of this section shall be a pharmaceutical chemist or a chemist and druggist registered as such under this Act.

33. Registration under this Act shall not entitle any person so registered to practise medicine or surgery, or any branch of medicine or surgery.

34. Any person registered as a pharmaceutical chemist

under this Act shall be qualified to be appointed to and to hold the office of apothecary in any district lunatic asylum in Ireland.

35. The Lord Lieutenant and Privy Council may direct the name of any person who is convicted of any offence against this Act which in their opinion renders him unfit to be on any register under this Act to be erased from such register, and it shall be the duty of the registrar to erase the same accordingly.

36. Every penalty recoverable under the provisions of this Act shall be recoverable in a summary way, with respect to the police district of Dublin metropolis subject and according to the provisions of any Act regulating the powers and duties of justices of the peace for such district or of the police of such district, and with respect to other parts of Ireland, before a justice or justices of the peace sitting in petty sessions, subject and according to the provisions of The Petty Sessions (Ireland) Act, 1851, and any Act amending the same.

One-third of every sum of money recovered as a penalty under this Act shall be paid to the person who shall be the means of bringing to justice any person committing any offence against any of the provisions of this Act, and the remainder of such sum shall be paid to the treasurer, and shall by him be applied to the purposes of this Act in the manner prescribed by any regulation made in pursuance of this Act.

Schedule.

Name.	Residence.	Date of Registration.
A.B.	Grafton Street, Dublin -	January 10th, 187 .
C.D.	Patrick Street, Cork -	March 4th, 187 .
E.F.	Corn Market, Belfast -	June 15th, 187 .

DRUGGING OF ANIMALS BILL.

The following is a copy of the Bill as amended in Committee to make the administration of poisonous drugs and compounds to horses and other animals a punishable offence :—

Whereas it is expedient to make provision for putting an end to the practice of administering poisonous drugs and other compounds to horses and other animals by disqualified persons, and without the knowledge and consent of the owners of such horses and animals :

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :

1. From and after the *passing of this Act* if any person other than a member of the Royal College of Veterinary Surgeons of Great Britain, or any person acting under his direction, shall administer or cause to be administered any injurious substance to any domestic animal, with intent to damage or disable such animal, the person so offending shall, on conviction thereof before a justice of the peace, at the discretion of the justice, either be *committed to a common gaol or house of correction, there to be imprisoned only or to be imprisoned and kept to hard labour for any term not exceeding six months*, or else shall forfeit and pay, over and above the amount of injury done, such sum of money not exceeding *twenty pounds* as to the justice shall seem meet, and whosoever having been convicted of any such offence shall afterwards commit any of the said offences in the section before mentioned, and shall be convicted thereof in like manner, shall be *committed to the common gaol or house of correction, there to be kept to hard labour for such term not exceeding twelve months* as the convicting justice shall think fit.

2. From and after the *passing of this Act* if any person other than a member of the Royal College of Veterinary Surgeons of Great Britain, or any person acting under his direction, shall knowingly administer to any domestic animal any injurious substance without the consent of the owner, so as to damage or disable such animal, the person so offending shall, on conviction of such offence before a justice of the peace, forfeit and pay such penalty as shall appear to a justice to be meet, not exceeding the sum of *five pounds*, and in default of payment of such penalty shall be *imprisoned with or without hard labour for any term not exceeding thsree month*, unless such penalty be sooner paid.

3. Penalties recoverable under this Act may be recovered in a summary way before any two or more justices of the peace in petty sessions assembled, and according to the provisions of any Act regulating the powers and duties of justices of the peace ; and one third of every sum of money recovered as a penalty under this Act shall be paid to the person who shall be the means of bringing to justice any person committing any offence against any of the provisions of this Act.

4. This Act shall not apply to Scotland or Ireland.

5. This Act may be cited as "The Drugging of Animals Act, 1875."

SALE OF FOOD AND DRUGS BILL.

In the House of Lords on Monday, the 5th inst., the report of amendments on this Bill was received. On the question that the report be adopted,

Lord Egerton of Tatton moved the omission of the word "knowingly" in the 3rd and 4th clauses.

Lord Aberdare supported the amendment, and said that, as the retailer and his wife could give evidence as to the state in which they had received the goods, no hardship would be done to the retailer by omission of the word.

The Duke of Richmond said that since the Bill passed through Committee he had received a vast number of communications, urging upon him the objections which had been raised by the noble lords who had just addressed the House. He had also been informed that the matter had been discussed in Quarter Sessions with the same result, and he had the greatest possible respect for the opinions of these Courts on points connected with the administration of the law. Under these circumstances, he thought it would be for the convenience of the House to reconsider the decision at which it had arrived. He should, therefore, on the motion for the third reading of the Bill move the omission of the word knowingly and the insertion of such words as might be necessary to meet the objections which had been urged.

Lord Penzance moved the omission from Clause 5 of words which excepted from punishment for adulteration persons who sold articles containing harmless foreign matter, mixed with them for the purpose of making them portable or palatable, of preserving them, or of improving their appearance, provided such matter was not used for the purpose of concealing the inferior quality of the article. He could not help thinking that these exceptions were contrary to the whole spirit of the Bill, which was intended for the protection of purchasers, and ought not, therefore, to be allowed to remain in it.

The Duke of Richmond observed that an article might be "portable" without requiring a handle—as, for instance, ether.* Then, as to the mixing of articles he did not suppose it would be possible to get lard without salt. However, he would endeavour before the third reading to give effect to the noble lord's views by amending Clause 5 so as to make it agree with Clause 7, and on this understanding he hoped the noble lord would allow the clause to remain in its present shape.

Earl Granville thought the words might very well be omitted now and the amendment introduced afterwards.

The Lord Chancellor pointed out that that would be an unusual course. In the present case it was particularly important that an amendment should not be lightly made, because, if he mistook not, the words in question were introduced into the Bill in the other House of Parliament.

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* The Duke of Richmond is thus reported in *The Times*. In *The Standard* he is represented as saying that "ether, he understood, would not be portable unless mixed with some other substance." Evidently the ideas either of the noble duke or of the reporters respecting ether were somewhat misty.

Earl Fortescue called attention to the danger which might arise from the dilution of drugs even with harmless ingredients, and urged the advantage of having drugs of identical strength sold throughout the United Kingdom.

Lord Penzance expressed himself satisfied with the assurance of the noble duke opposite (the Duke of Richmond) and consented to withdraw his amendment.

The Marquis of Salisbury remarked that the logical effect of the proposed amendment would be to make tradesmen label their bread "salted." There were many articles, in fact, which were necessarily of a mixed nature, and if the clause were made too stringent it would be unworkable.

Lord Penzance said absolute chemical purity was not required. A number of articles of food were commonly prepared in a particular way, and if the purchaser obtained them of the nature, substance, and quality he demanded he had no reason to complain.

The amendment was then withdrawn.

An amendment, proposed by Lord Redesdale, to the effect that it should be stated on each article sold what was mixed with it, if anything, and in what quantity, was negatived, after some conversation, and

The report was agreed to.

CO-OPERATIVE STORES.

In the House of Commons, on Friday the 2nd inst., Sir Thomas Chambers again brought the subject of Co-operative Stores before the House of Commons by calling attention to the absence from the Report of the Civil Service Inquiry Commission of any investigation into the complaints made against the system of trading now carried on by the servants of the Crown under the guise of Co-operative Stores. After remarking that the recent reply of the Chancellor of the Exchequer to a question he had addressed to the right hon. gentleman on this subject had occasioned much surprise and disappointment in certain quarters, he proceeded to observe that there was overwhelming evidence to show that the system of Co-operative Stores was the ordinary system of joint-stock trading, with some singular distinctions to which he would presently allude. There were no fewer than 4,500 subscribers or partners in one of these concerns; 15,000 tickets had been issued to outsiders; and the business was carried on just like that of any ordinary joint-stock trading company. He maintained that, both on general principles and on grounds of public policy, Civil Service trading ought to be forbidden. A Treasury minute of March, 1849, stated that as the public was entitled to the whole time of its civil servants they could not be allowed to become directors of companies, if thereby their attendance would be required elsewhere during office hours. The evils against which that Minute was directed were much more serious at the present moment. Very recently another Minute had been issued forbidding civil servants becoming directors of a company which had undertaken a publication which was much engaged in discussing subjects connected with the Civil Service. The Minute set forth that gentlemen in the Civil Service taking upon themselves editorial duties could hardly fail to render themselves liable to misrepresentation, and pointed out that their acceptance of such positions must necessarily disturb the confidential relations which ought to subsist between members of that service and their official superiors. The National Chamber of Trade, having that Minute in view, wrote to the Chancellor of the Exchequer to inquire whether the authorities of the Civil Service would not forbid their servants engaging in trade under the guise of co-operation. To that communication the Chancellor of the Exchequer replied by saying that the cases of civil servants engaging in editorial duties and in co-operative societies did not appear to be exactly parallel. Such pursuits, however, were strictly analogous, because they infringed the principle that the civil servants were bound to give their whole time and energy to the country. These large joint-stock trade associations, which were carried on under the name of Civil Service Co-operative Stores, had several advantages over ordinary trading firms, inasmuch as by registering themselves as provident and industrial societies they escaped the payment of income tax. On the whole, therefore, he hoped Her Majesty's Government would take the subject into serious consideration.

The Chancellor of the Exchequer said that in the speech he had made on this subject last year, he had said that there were two questions to be considered—first, how far this system of Civil Service trading was one which ought to be checked in the interest of other traders as being in the nature of an unfair competition with them; and secondly, how far it ought to be checked in the interests of the Government on the ground of it not being advisable that their servants should engage in these pursuits. He had also endeavoured to point out the difficulties which the Government had to encounter in attempting to deal with the matter from the point of view taken of it by those whom the hon. and learned gentleman represented, and he had endeavoured to show how difficult and unfair it would be for the Government to lay down principles with regard to the civil servants which would exclude them from the privilege and the right of co-operation, and how very difficult it would be to draw a line between co-operation and trading. The upshot of his remarks was that he could not upon the grounds mentioned see his way to any interference with the system. At the same time, however, he was always ready to accept and to listen to representations which might be made as to any unfair advantages that might be taken of their position by civil servants who were engaged in this kind of business, and, therefore, he should take care that the allegation that the Co-operative Stores contrived to escape the payment of income tax should be inquired into, because such associations had no right to put themselves into such a position as to give themselves an unfair advantage over all other traders. Upon the other points of this question the report of the Civil Service Commissioners might throw some light. It was difficult to say where the line should be drawn with regard to what branches of business civil servants might engage in. He did not know that the report of the Commissioners had thrown much light upon that point. Their labours were, however, not yet concluded, and the Government had not taken any steps upon their report. They should no doubt in a short time have to take the report into consideration, and probably some steps in consequence, and it might be that they would have to go into the question as to the employment of civil servants in the manner referred to in connection with the general subject. One such question arose the other day in reference to Captain Tyler, and he only referred to it to show that it was difficult to lay down general rules to govern all cases that might arise. His hon. and learned friend said that the Government had dealt with the question, and asked them to carry out the same principle with regard to all civil servants, and he referred to the Treasury Minute with respect to contributions to newspapers by civil servants, and the entering upon other employments by dockyard labourers. His hon. and learned friend must, however, have been misinformed. Dockyard labourers were not forbidden to enter upon any other engagement. They were only restrained from becoming keepers of public-houses or marine stores, and from entering upon any business of that sort in which it was thought that mischief might arise from temptations to which they might be subjected in respect of government stores. Then with respect to newspapers the step was taken not to prevent undue competition between one editor or publisher and another, but to put a stop to a practice which was found to be productive of mischief and scandal to the public service. From time to time letters, paragraphs, and articles appeared in certain newspapers which were obviously written by persons who had obtained official information which ought not to have been made public, and it was therefore found necessary to issue a Minute prohibiting such communication being made and warning the contributors that they would be held responsible in the event of official information being improperly communicated. With respect to the general question, he could only say, as he did last year, that he must draw the line between two different considerations. As regarded the question of competition with private trade, it was a difficult matter to interfere, and interference must be limited to prevent any unfair advantages existing on the one side, such as exemption from income tax or stamp duties. That branch of the question should have his best attention. The other question related to the employment of civil servants in the manner complained of, and having had their attention more or less directed to it, it would be their duty to consider whether some regulations should not be made or some expression of opinion given in reference to it.

Mr. Goschen said he concurred generally in what had fallen from the Chancellor of the Exchequer. While in office he had stated more than once that he considered it unfair that civil servants should be placed under restrictions which did not apply to those who were engaged in other walks of life. Civil servants were, no doubt, paid out of the public funds, but they were as freely entitled to make use of their leisure in any way they thought fit as were any other class of Her Majesty's subjects. He agreed with the Chancellor of the Exchequer that it would be impossible to hold out any hopes to the tradespeople of the metropolis that the competition they complained of could be put a stop to save so far as the preferences to which reference had been made, and which ought most rigorously to be examined and removed. The second branch of the subject — namely, how far, from the point of view of the public service, it was right that civil servants should be allowed to engage in those operations—remained to be considered. It would be, of course, most unfair that they should be allowed to take advantage of official information for their private benefit in their relation to those societies. If a gentleman were, for example, engaged in the Government Contract Department, it could not be tolerated that he should use his special information of the effect upon the market of Government operations to promote the interests of a cooperative society with which he might happen to be connected. They must, he thought, rely upon the good sense, right feeling, and honour of the civil servants to see that no stone could be thrown at them in that respect. Then, again, came the question of interference with their capacity to serve the State, which was their first duty. It would, he thought, be improper to allow persons who were placed in high position, and whose energies, freshness, and health were vital to the proper discharge of their duties, to take any great share in the manangement of those companies. As an illustration he might mention that when he had the honour of holding the office of First Lord of the Admiralty a gentleman was in the Department who was an eminent civil servant and also an eminent director of one of those societies. It appeared to him (Mr. Goschen) that the strain of the double duty was so great as to threaten his health. A question of promotion arose, and he did not shrink from telling the gentleman in question that he did not feel justified in appointing him to the higher position unless he undertook to resign his office of director—which he did—and received the promotion to which, as being most eligible, he was entitled. In taking that step he thought he was discharging a duty he owed to the public.

Mr. Forsyth said that when this question was before the House last year the Chancellor of the Exchequer stated his opinion that the subject was one calling for inquiry, and he promised that such inquiry should be set on foot. No such inquiry had been instituted, and he thought the public had a right to know what the intentions of the Chancellor of the Exchequer and the Government were. The shopkeepers of the metropolis had no objection to civil servants establishing co-operative stores for the supply of their own class, but they did object, and that strongly, to persons whose salaries were paid out of the general taxation of the country opening stores for the supply of the outside public, and so entering into competition with the tradesmen who contributed to the payment of their salaries.

PROSECUTIONS UNDER THE ADULTERATION ACT.

POISONOUS SWEETS.

At the Bradford Borough Police Court, on Friday, July 2, Charles Frederick Greeb was charged with selling comfits adulterated so as to be injurious to health, and known by the name of "green peas." The "green peas" were bought by Mr. Booker, inspector of nuisances, and analysed by Mr. Rimmington, the borough analyst.

Mr. Rimmington stated that the "green peas" were a sweetmeat, and in his opinion were injurious to health, if eaten. The green colouring matter with which they were coated was formed of chromate of lead, and some blue substance. Chromate of lead was poisonous, as were all lead compounds. The internal portion of the "peas" was harmless.

Defendant was fined 10*s.* and costs, with the alternative punishment of fourteen days' imprisonment.

TREACLE-AND-WATER CIDER.

At the same sitting of the Court, G. Theodore Linde was charged with selling "adulterated cider," at the New Market, on the 12th ult. The cider was bought by Mr. Booker.

Mr. Rimmington, analyst, said he had examined the so-called "cider." It was simply treacle-and-water aërated and flavoured with fruit essence. The objectionable part of the compound was the flavouring matter, which was noxious and injurious to health if swallowed. It was an artificial compound produced from fusel oil, which was the basis of all fruit essences. Fusel oil was a product of fermentation, and came over along with the spirit in distilling whisky and gin. The quantity in one bottle of the "cider" was not sufficient to produce any serious consequences, but if taken in sufficient quantity was exciting and intoxicating, and produced considerable nervous derangement. The "cider" was contained in a very dirty bottle.

Defendant, who, it was stated, did not manufacture the "cider," was fined 10*s.* and costs, with the alternative of fourteen days' imprisonment.

William Hey, of 6, Illingworth's Court, Westgate, was convicted of a similar offence, and a similar penalty was inflicted.—*Bradford Chronicle.*

CONVICTION OF A CHEMIST AND DRUGGIST FOR PRACTISING AS AN APOTHECARY.

The Apothecaries' Society, London, last week brought an action in the Dudley (Staffordshire) County Court against Mr. Adam Lawton, a chemist, of High Street, Price's End, near Dudley, which is of some importance. The defendant practised and acted as an apothecary without the necessary certificate. The proceedings were taken under 55 George III., c. 194, which imposes a penalty of £20 for such an offence, and that sum the Society claimed. The defendant admitted his liability, and judgment was given for the full amount.—*Medical Times and Gazette.*

Notes and Queries.

[442.] INITIAL HONOURS.—In answer to a correspondent's query as to the meaning of the letters M.S.C.D., Mr. A. R. Wilson writes that he should think it most probable that they signify "Member of the Society of Chemists and Druggists," a society of whose existence he was totally unaware until a week or two since.

Similar answers have been received from Mr. J. Houlton, Mr. G. H. Beasley, Mr. W. Carty, H. G., "Paddy," and "Tamaræ Ostium."

[443.] INSECTICIDE.—Mr. Bradshaw will probably find benzoline or mineral naptha answer his purpose.—Jas. Houlton.

[444.] PURIFICATION OF OIL.—A tin with 40 or 50 gallons of sublime olive oil was unfortunately left imperfectly covered. The oil acquired an offensive smell, and four dead rats were found in it. Can any reader suggest an easy and cheap method of disinfecting the oil so that it may be fit for hair-oil?—"Job."

MUCILAGE FOR MINERALS.—The following recipe for a mucilage to mend fossils and minerals is recommended by Professor R. S. Whitfield (*Druggists' Circular*, June 1875):—

Starch	ʒij.
White Sugar	℥j.
Gum Arabic	℥ij.
Water	q.s.

Dissolve the gum, add sugar, and boil until the starch is cooked.

Professor Whitfield is in the habit of drying the mucilage into sheets, on paper, and re-dissolving when wanted. He does not claim to have originated the recipe; but thinks it is one that has been offered to the United States' Government as a composition for gumming stamps. It is stated to yield a very adhesive mucilage, which owing to the sugar does not become brittle and scale off.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Pharmaceutical Titles.

Sir,—As a "Senior Apprentice" has been allowed to throw stones at me, I trust you will courteously allow me to defend myself. It is an old trick when you cannot answer your opponent's argument to abuse him, or at least to pooh-pooh him. "A Senior Apprentice" insinuates that I am not able truthfully to place any tail at the end of my name. It so happens that my name has appeared in your Journal again and again with a tail, indicating a well-known and highly honourable title; and more than once as the author of a literary contribution. Then he is sure I have "not spent many days and nights in study and preparation for examinations." May I tell him that I have spent many nights in study, and in the preparation for the press, as an author, of scientific works, which have passed through more than one edition; and in the preparation of scientific lectures, of which I have given more than two hundred during the past dozen years. Knowing nothing of me, he is sure my shop is a very old-fashioned one, and that there is no pharmaceutical chemist near me, or, with my old-fashioned notions, I suppose I should not be able to get a living. Let me tell "A Senior Apprentice" that my shop is a very handsome and modern one; that I once had an opponent who called himself pharmaceutical chemist, but who closed his establishment—not because *I* could not get a living. I happily live in a neighbourhood where people are not captivated with a bare title, but who put confidence in the man, not his name. Let me assure your correspondent that it is here where a great mistake is so often made. People look out to have their prescriptions made up by some one—no matter what he calls himself, or what length his tail may be—who has gained a reputation for experience, carefulness, attention, skill, civility, etc. When "A Senior Apprentice" says, "unless we are able to use some small titles we are thought very little about," he is quite on the wrong track. He may get his small title and still be thought very little about. I know what I say when I again assure him that the public care nothing as to whether a man calls himself a pharmaceutical chemist or simply a chemist and druggist, but in dealing with him they do care, but about other things of quite a different nature.

An Old Chemist and Druggist.

Sir,—The whole question about our future title appears to be so ludicrous that I am reluctant to add to the controversy on the subject, but I ask your indulgence, thinking that neither apprentices nor assistants should allow the letter signed "A Senior Apprentice," and published in your last issue, to pass without comment.

We all ought to thank our friend the "Old Chemist and Druggist," for coming forward to show us how very ridiculous is this craving of modern chemists for titles, and I am sorry that an apprentice should accept his opinion with such a prejudiced and unmanly spirit.

Are all young men who have obtained the right to add M.P.S. to their names, so very efficient? and do they require a tailed name to distinguish them from their less fortunate confrères? The public never fails to recognize and appreciate an intelligent and well-cultivated mind, but what can they understand by M.P.S.? Is it among young men possessing this title that principals invariably look for good assistants? From my own experience I am unable to think it is so, and doubtless others older than myself will concur.

Therefore, instead of delaying to dispute about some silly title by which we can only hope to intimate to the public that we are educated, let us rather rely upon merit itself to recommend us, and seek while we are apprentices or assistants to acquire a reputation for work and general ability, which alone can command the respect of those under whom we serve.

It is satisfactory to learn that the "Senior Apprentice" is so determined to educate himself for the highest honour open to him, for I do not doubt that as he grows in years and in knowledge he will learn to be more reticent, and above all, to receive and comment upon the advice of his elders and superiors with respect, rather than stigmatize them as "old-fashioned" and "unqualified" because he is able to think that their abilities as chemists and druggists have never been tested by examinations. He must remember that we are indebted to many old chemists for the opportunities for improvement which we now possess, such opportunities as they in their younger days never knew of, and that it is to our own discredit if we do not make proper use of them and be thankful.

I will add for the encouragement of senior apprentices that I am like himself, still a student, and hope one day to be admitted into the rank of pharmaceutical chemists, although I have long filled the place of

A Senior Assistant.

July 6, 1875.

Sir,—With regard to this often debated subject, it seems to me that the right to make use of these titles when obtained, is simply indisputable, "Palmam qui meruit ferat."

But when this is freely admitted perhaps "A Senior Apprentice" would not find all the old stagers quite such muffs as he seems to infer. Of course we have our crotchets, and some of us who have not been up to Bloomsbury Square may judge—

"The rank is but the guinea stamp,
The man's the gowd for a' that."

It is to be hoped we are none of us so narrow-minded as to feel any sort of jealousy about any titles the rising generation of pharmaceutists may have conferred upon them. Certainly those who work to obtain distinction deserve honour and are sure to obtain it.

We old-fashioned folk may sometimes think (especially in the case of young men) that "before honour is humility" so when we see "Pharmaceutical Chemist by examination," and even "Chemist and Druggist by examination," we are more likely to feel contempt than respect.

If in the first case it is intended to imply an invidious superiority over men who by their subscriptions helped to keep the Pharmaceutical Society in existence when help was most needed, it is, to say the least, in bad taste. These old members are getting fewer and fewer every year; in a few more years there will be none. And it is a very long while since any could call themselves pharmaceutical chemists except by examination.

The second case is even worse, for there does not seem much room for self-exaltation in having passed the lowest examination by which the trade can now be entered.

I was glad to hear "A Senior Apprentice" dwell so much upon the necessity of work, and can assure him and every apprentice that if they aspire at acquiring either position or influence they must work, not only to qualify themselves for Bloomsbury Square, but for a much larger sphere. And they will find that "ignorance is" not "bliss" but that knowledge is power.

As a demonstration of the scientific pretentions of the age on which "Senior Apprentice" and other young neophytes are entering, I send for the benefit of any who may not have met with them, the following choice names of select articles which appear in the list of a London house, whose chief business appears to be in the blacking and dye trade for harness and leather generally.

Hoplemuroma, for the improvement of the growth of horses' hoofs.

Pasvatrensis embrocation.

Neurasthenippor skelesterizo for curing lameness, etc.

"Wal, it's a marcy we've got folks to tell us
The rights an' the wrongs o' these matters I vow;
Heaven sends country lawyers an' other wise fellers
To drive the world's team wen it gets in a slough.
For John P.——Robinson he
Sez the world'll go right ef he hollers out Gee."

"One who has known the Drug Trade
more than Thirty Years."

Phosphorus Pills.

Sir,—Will you allow me to add my testimony to the convenience with which Phosphorus may be dispensed in the form of pills by means of cacao butter? I have for some time past made them in this way. They make up easily, quickly, and well, keep their shape, and coated with a solution of shellac in spirit keep unimpaired for a considerable time.

Frederic Gall.

61, *Milsom Street, Bath,*
July 4, 1875.

The Infringements of the Pharmacy Act.

Sir,—I quite endorse what your correspondent "A North Staffordshire M.P.S." says respecting the infringements of the Pharmacy Act.

It seems to me to be high time something was done to make the Act a benefit and not simply a source of inconvenience to the professsion.

Profession did I say! Avaunt false title, empty sound! thou mayest tickle the ears of some more fortunate brother knight of the pestle, but not mine. And why? Simply because more than thirty-three per cent. of the chemists (?) in this district are unregistered! not unexamined, but men who, having failed to pass, commenced business without further delay, and by carefully avoiding the use of the title "chemist and druggist," and by selling paregoric sine opii (*sic*), etc., etc., succeed in harassing the *bonâ fide* chemist very effectually.

Whatever course the Council may think proper to pursue surely they cannot remain indifferent in such matter; and if, as Mr. Hampson says, there are hundreds such, the subject undoubtedly demands immediate attention.

"Spes."

July 6, 1875.

A. S.—See the formulæ for cod-liver oil emulsion in vol. iv., pp. 466 and 581.

W. Jackson.—(1) *Scutellaria galericulata*; (2) *Stellaria graminea*; (3) *Anthemis Cotula*; (4) *Crepis virens*; (5) *Sherardia arvensis*; (6) *Myosotis arvensis*; (7) *Lapsana communis*; (8) *Lathyrus pratensis*; (9) *Viola tricolor*; (10) *Geranium pusillum*.

"*Inquirer.*"—See the paper on the "Bark of the Black Alder Tree," read by Mr. Baildon before the Pharmaceutical Conference, and the discussion which followed (*Pharm. Journ.* [3], vol. v., p. 189).

A.—Several formulæ for the preparation in question have already been given in the present series of this Journal.

R. H. C.—*Pinus Canadensis*, L., is the Hemlock Spruce of North America. The inner bark of the tree is the part used by herbalists; it possesses considerable astringency. It might probably be obtained at Butler and McCulloch's, or Gaines's in Covent Garden Market.

"*Omega.*"—(1) See Hardwich's 'Photographic Chemistry.' (2) You will find recipes for "sympathetic inks" in vol. iv. of the present series, pp. 397 and 419; also some information upon the subject in the Journal for the 26th ult., p. 1038.

Koumiss.—See articles on the preparation and administration of Koumiss, *Pharm. Journ.* [3], vol. iii., p. 544; vol. iv., p. 692; vol. v., p. 323.

L. T. A.—The formula for Mr. Erasmus Wilson's Hair Wash was published in vol. iv., p. 179.

"*Spero.*"—The question is not a proper one for the "Notes and Queries" column of this Journal. You should consult a medical man.

H. H. Pollard.—Croton chloral hydrate and camphor, when triturated together, will not liquefy without the application of heat, and the compound so formed solidifies upon cooling. The prescriber should be made acquainted with this fact.

"*Amor et Veritas.*"—(1) The right of a person to adopt the title of chemist and druggist is dependent upon his name being on the Register of Chemists and Druggists, and not upon his being a Member or Associate of the Pharmaceutical Society. (2) Apply to the Secretary, 17, Bloomsbury Square, for a copy of the Regulations of the Board of Examiners.

G. F. Johnson.—(1) *Agrimonia Eupatoria*; (2) *Orobanche minor*.

G. Dobson.—(1) *Galium saxatile*; (2) *Cochlearia officinalis*; (3) *Endymion nutans*; (4) Yes; (5) *Ajuga reptans*; (6) *Vicia sepium*; *Genista tinctoria*.

F. R.—(1) *Valeriana pyrenaica*; (2) Yes.

J. Leay.—The plant is *Verbascum Thapsis.* It has been used in domestic medicine (see 'Pareira,' or 'Treasury of Botany.' The caterpillars are those of the mullein shark moth (*Cucullia Verbasci*).

G. Ross.—*Polygonum viviparum.* We should be glad to receive a perfect specimen.

W. F.—(1) The use of such a title in the way indicated would, we think, be held to be a colourable imitation of the titles protected by the Pharmacy Act, 1852, and render a person using it liable to the penalty indicated in section 12 of that Act. (2) The certificate is given by the Board of Examiners appointed under the Pharmacy Act, and is not a diploma of the Pharmaceutical Society.

Erratum.—We are requested by the Secretary of the Glasgow Chemists and Druggists' Association, to state that the name of the student who took the first prize in the chemistry class of that Association, is James Murdoch, and not William Murdoch, as stated on p. 1035.

J. T. C. Williams.—*Sedum acre.*

J. G.—(1) Soft Columbian bark. (2) We cannot say.

J. Gray.—(*a*) *Hypericum pulchrum*; (*b*) *Crepis virens* (*c*) *Epilobium montanum*; (*d*) *Heracleum Sphondylium*; (*e*) *Matricaria inodora*; (*f*) *Stachys Betonica*; (*g*) *Teucrium Scorodonia*; (*h*) *Chærophyllum temulum*.

Communications, Letters, etc., have been received from Mr. G. L. Huet, Mr. W. Coles, Mr. E. J. Howell, Secretary of the National Chamber of Trade, Mr. Pocklington, Mr. J. Oliver, "Acalepha," "Sphinx," C. H.

⁂ We have received the report of the meeting of the Midland Counties Association, but are compelled to defer its publication until next week.

ACCOUNT OF A CLINICAL INVESTIGATION OF THE POWERS OF ALLOTROPIC PHOSPHORUS (RED.)

BY J. ASHBURTON THOMPSON, M.R.C.S.

To the use of the ordinary form of phosphorus in medicine a grave objection has existed until within the last two years—the dangers to which its ingestion exposed the subject; and although this has now happily been removed, prejudice has to a certain extent replaced a mistrust which was once reasonable. In consequence, it has often been proposed to substitute the red variety of allotropic phosphorus for the normal element; for perhaps its most striking characteristic, as compared with the latter, is its freedom from toxic power. It is, indeed (regarded as a medicine), an absolutely insoluble body; but it may be presumed that it was expected to undergo changes, either during the process of digestion or at some later period of its passage through the body, which would enable it to take some appreciable effect upon the system. But the mere fact of its being a non-poisonous body lays it open to the suspicion that it would be found to possess either none of the properties of free phosphorus, or some of them in a very modified form; and in the latter case its innocuousness would probably depend merely upon the dose given. It might, however, be found to possess some physiological powers entirely different to these.

All experiments conducted with red phosphorus had shown it to be an inert body, until about sixteen months ago, Dr. Bednar, of Vienna, asserted that he had produced some of the same effects with small and long continued doses of it as may be produced (under some circumstances) with the free element—that is to say, excitement, nervousness, and muscular tremor. In my recently published work, 'Free Phosphorus in Medicine,' I have noticed this report, and have compared it with the results obtained by Orfila, Reynal, Rigaut, Lassaigne, Bussy, and De Vrij. These physiologists experimented upon animals only; and they agree that in the case of rabbits, guinea-pigs, dogs, and some birds, no results were obtained with it in small doses, or in large doses, after a long or short course of treatment. These experiments may not be allowed to compare fairly with Dr. Bednar's, which were made on man, and I have therefore been at great pains to find some other record of observations made upon the human subject. I have succeeded in finding only a single remark made by Dr. Glover in a letter on the use of free phosphorus, which was published in the *Lancet*, to the effect that in doses of 5 grains it gave him no result.

Under these circumstances I was requested by Mr. Arthur W. Postans, at the beginning of this year, to undertake a clinical investigation of the powers of red allotropic phosphorus; and it is the result of this inquiry which I now have the honour to lay before the readers of this Journal.

The report resolves itself into six parts:—(α) Upon the material employed; (β) upon the subjects employed; (γ) upon the doses employed; (δ) upon the experiments made; (ε) upon the production of any of the effects of free phosphorus; (ζ) upon the production of any other effect.

(α) Upon this head I have not much to say as it comes rather within the province of my *collaborateur*. But in the work referred to I have concluded the paragraph upon red phosphorus which is there inserted, with these words:—"Allotropic phosphorus of the red variety always contains some free phosphorus, and requires very careful washing with bisulphide of carbon in order to get rid of it. Perhaps the active properties apparently evinced by this form of phosphorus in the hands of some observers may have been owing to its imperfect isolation." Bearing in mind this criticism, which has lately been endorsed by Dr. Méhu, of Paris, it became necessary to be certain first of all that the material employed was perfectly pure. Mr. Postans accordingly supplied me with a quantity of red phosphorus which had been specially prepared with the object of freeing it from every trace of normal phosphorus. It came to my hands in the shape of a fine powder, chocolate coloured and inclining to maroon, sharply acid, but otherwise tasteless.

(β). The power of red phosphorus over the human body being unknown, I first of all submitted myself to its action. I next administered it to my brother, who consented to become the subject of an experiment. Mr. Postans then underwent a course of it in the manner to be stated below. Having in this way obtained some knowledge of its action upon the perfectly healthy, I saw that there was no reason to hesitate in extending its application to cases of disease. But, both because it would be unjustifiable to deprive persons affected with acute disease of approved treatment, and because the course of acute disease would interfere with the necessary observations, the inquiry was limited to persons suffering from trifling or chronic disorders. The three subjects in health above named, forming one class then, the the others constitute a second and third, one of which consists of persons suffering from general debility merely, the other of those suffering from some distinct disease. The numbers employed in each class respectively were five and four. The former were females suffering from general debility, consequent upon confinement and lactation; they offered no special symptoms of disease. Of the latter, one suffered from serious hepatic obstruction, ultimately resulting in disease of the heart; one from hysteria; one from menorrhagia, followed by pelvic cellulitis, and one from facial acne of about five weeks' standing.

(γ). The quantities administered reached half a drachm, taken three times daily for forty days. This amount was taken in powder, and it followed, without interval, upon a course of a scruple taken three times daily for thirty days. These are the largest doses continued for the longest time on record. Half a drachm was taken for six days in one case; for fourteen days in one case; and for forty days in one case. A scruple taken three times a day was used for four days in one case; for nine days in one case; for seventeen days in one case; and for thirty days in one case. Four grains were taken every four hours for nine days in one case; for fourteen days in two cases. The four grain doses were given in the form of a pill; the larger doses in powder, mixed with sugar, treacle, or honey, by the patient: that is to say, the quantity designated was measured accurately, and not taken, as would be the case if it were dispensed already mingled with a vehicle, by guess.

(δ). The experiments, as stated above, may be divided into three classes, viz., those upon three persons in health; upon five persons suffering from debility; and upon four persons suffering from disease.

I. *Case* 1.—M. Æt. 29, in good health. He took two grains three times a day for eight days; seven days' interval. Four grains three times a day for nine days; seven days' interval. Eight grains twice a day for five days; no interval. Ten grains three times a day for six days; no interval. Twenty grains three times a day for five days.

Case 2. M. Æt. 23, in good health. Four grains three times a day for twelve days.

Case 3. M. Æt. 32, in good health. One grain three times a day for four days; two days interval. Two grains three times a day for four days. Three grains three times a day for four days. Four grains three times a day for four days; six days' interval. Five grains three times a day; six days' interval. Ten grains three times a day for two days.

II. Cases of General Debility.

Case 4. F. Æt. 43, confined one month. Nursing. Complains of headache and slight neuralgia; want of appetite and strength; slight but continuous uterine hæmorrhage; constipation. The secretion of milk abundant, and the child thriving. She took four grains every four hours for nine days.

Case 5. F. Æt. 28, confined six weeks. Had recovered from mammary abscess about a fortnight. Secretion of milk small, and the child hand-fed in addition. Otherwise, as in previous cases. She took four grains every four hours for fourteen days.

Case 6. F. Æt. 30, in her third pregnancy. Anæmic; loss of appetite; muscular pains; constipation. She took twenty grains three times a day for nine days.

Case 7. F. Æt. 24, confined two months, and recovered from puerperal fever (slight) one month. Was still suffering from debility when she grazed the skin of one leg. In a fortnight the wound had ulcerated, and was about the size of a shilling; at the end of another month she came under treatment, and took twenty grains three times a day for seventeen days.

Case 8. F. Æt. 30, general debility after confinement with continued uterine hæmorrhage. She took thirty grains three times a day for six days.

III. Cases of Disease.

Case 9. M. Æt. 37. Engaged in heavy work. He was suffering from hepatic obstruction which had so far interfered with the general circulation at that time as to dilate the cutaneous capillaries of the abdomen and thighs. After about two months the heart itself began to suffer. In the meantime, he took four grains every four hours for fourteen days.

Case 10. F. Æt. 40. Hysteria; an old patient, under treatment the greater part of each year. On this occasion her usual symptoms were complicated by pain and swelling of the larger joints. I was not able to identify the affection with rheumatism, but concluded that it was the result of a special development of the nerve state which is called hysteria. She took twenty grains three times a day for thirty days; and then, without interval, half a drachm three times a day for forty days. She is much pleased with a form of medicine which she has not hitherto taken, and she continues to demand "her powders."

Case 11. F. Æt. 26. Menorrhagia and general debility, three weeks. She took twenty grains three times a day for four days; on the fifth day she had a rigor—the beginning of an attack of pelvic cellulitis.

Case 12. F. Æt. 26. Facial acne, severe, of five weeks' standing. Otherwise pretty well; but there was constipation. She took thirty grains three times a day for fourteen days.

(ε) and (ϛ). These two heads are placed together in reviewing the results obtained of this inquiry; for no effect, either analogous to that of normal phosphorus, or of any other kind, could be detected. In case No. 1 the temperature taken in bed every morning before rising remained at the standard, within half a degree—sometimes one way, sometimes the other, during the whole course and intervals. That person, and the subjects Nos. 2 and 3, felt no difference whatever in their condition or feelings during the treatment. I did not consider however that a series of such experiments upon healthy persons would be conclusive, in consideration of the fact that a healthy person might take small quantities of drugs of known active powers without apparent result. The carbonate of iron, antimonial wine, and nitrate of bismuth are respectively useful in cases of anæmia, of pulmonary disease, and of dyspepsia; but I apprehend that doses of any of these drugs might be taken for considerable periods in such quantities as are known to be useful in disease, without producing any obvious effect upon persons in health. It was therefore necessary to submit some cases of disease, or at least disorder of the system, to the influence of the drug under investigation; and in the first place subjects suffering practically from general debility alone were selected for the purpose. From these experiments it was made plain first of all that red phosphorus certainly possesses no power in the remotest degree analogous to that of normal phosphorus, for these were the very cases in which the latter form would have been (and subsequently was) found to be especially beneficial, and it was for that reason that this kind of cases was selected. After pursuing this treatment with red phosphorus for a sufficiently long period and with sufficiently large doses, no improvement was observed in any one of those patients. But, more than that, no effect of any kind appeared to have been produced upon them, and in each instance it was necessary to have recourse to simple treatment of the ordinary kind, under which they all recovered in the usual manner. Under these circumstances it became at once a matter of very grave doubt whether this form of phosphorus was not, as has always been supposed, an inert body; but it still remained to inquire whether by chance it might not possess some specific action which might only be evinced in the case of one particular disease. I therefore pursued the inquiry with the assistance of the four latter subjects, who were suffering as I have above described. Here again the result obtained was simply negative; and although the number of observations under this head is small, I considered it useless to pursue the investigation further. It is quite true that the possibility I have hinted at—that red phosphorus might be found after all to possess a specific power as against one disease or condition of body—is not excluded by them. But considering that it is an insoluble body in the first place, and in the second that not one of the above observations had yielded any appreciable result of one kind or another, the probability became very strong that its inertia depended upon its indigestibility. When in connection with these observations some of the physiologists already named upon inferior animals are taken into consideration, that probability is strengthened.

The reader may, perhaps, consider that the above investigation has been described with a minuteness out of proportion to the result. Any subsequent inquirer will at once see that the whole value of the report depends entirely upon the degree of accuracy with which the various matters above touched upon are detailed; and, in conclusion, I hope that no important particular has been omitted.

Islington, July 10, 1875.

NOTE ON SALICYLIC ACID.

BY J. C. THRESH.

Whilst experimenting recently with the commercial red tinted acid I found that the colour could be easily and inexpensively removed by dissolving the acid in about four times its weight of glycerine by the aid of heat, and then adding an excess of cold water. The pure acid is precipitated, and the colouring matter retained in solution. By washing with cold water, pressing between folds of filter paper, and drying in the water oven, it is obtained in slender white acicular prisms, having a scarcely perceptible odour, and a sweetish acid astringent taste.

The Laboratory, Buxton, May 12, 1875.

[*** According to a note in the *Pharmaceutische Zeitung*, one part of salicylic acid dissolved in fifty parts of cautiously heated glycerine forms a solution that remains clear after cooling, and may be diluted without separating the acid. A solution made with 1 part of salicylic acid, 20 to 30 parts of glycerine, and 300 to 400 parts of hot water is used in the Bremen hospital.—ED. PHARM. JOURN.]

THE PREPARATION OF FERROUS SULPHIDE.*

BY JAMES F. BABCOCK.

Ferrous sulphide, or protosulphuret of iron, as it was formerly called, though an article of daily use in every laboratory, is not readily procured in the market; or, if obtained, is generally of an inferior quality.

Ferrous sulphide should be in well fused masses, which are readily reduced in size by slight blows in an iron mortar; but most of the ferrous sulphide offered for sale consists of somewhat loosely coherent nodules imperfectly fused, and mixed with much metallic iron. Frequently the greater portion of it is in a sort of coarse powder. Such products are poorly adapted to the production of sulphuretted hydrogen for uses in the laboratory. The metallic iron exhausts the sulphuric acid used, producing hydrogen, which is not only useless for the purposes of analysis, but dilutes the sulphuretted hydrogen which is evolved at the same time.

Finely divided sulphide contains not unfrequently much unchanged iron filings, or, if pure, cannot be used in any of the self-regulating generators for the preparation of sulphuretted hydrogen. The fine particles find their way through the basket or support upon which they are held, into the acid below, and the evolution of gas continues after the stop-cock intended to control its supply has been turned. If used in a flask or bottle, the finely divided iron exposes so much surface to the action of the acid that the generation of gas becomes too rapid, and the liquid frequently froths over.

The combination of sulphur and iron to form ferrous sulphide is very easily managed upon a small scale, but when one has to prepare a number of pounds of this product suitable for laboratory purposes, the processes given in the books are not very satisfactory either in their management or their results.

A process frequently mentioned in the books consists in introducing into a red-hot crucible an intimate mixture of thirty parts of iron filings and twenty-one parts of flowers of sulphur in small portions at a time; but the result of this experiment is generally, that most of the sulphur volatilizes or is consumed before the iron attains a temperature sufficiently high to combine with it, and thus much metallic iron becomes mixed with the product. Ferrous sulphide is somewhat difficult to fuse by direct heat in any ordinary laboratory furnace, and therefore advantage should be taken of the intense heat produced by the combination of the sulphur and iron at the moment of combination, which is sufficient to fuse the product obtained, so that it can be poured out of the crucible upon a flat plate or stone.

The following modification of a process given by Fresenius (*Qualitative Analysis*) has been long used by the writer, and has given highly satisfactory results. It is adapted to the production of from one to twenty-five pounds at a single operation, and gives a product which is well fused, free from iron, and in brittle masses, which may be readily reduced to the required size.

A hessian or blacklead crucible of any desired capacity is somewhat loosely filled with ordinary shingle-nails and is well bedded in coal in a furnace with a good draught.

The crucible should be covered with a flat plate of soapstone, or fire clay. In the centre of the plate is bored a hole of about an inch in diameter. This hole is closed with a small fire clay crucible cover. The iron in the carefully covered crucible is brought to a bright red-heat, and then a ladleful of sulphur which has been melted in a thin iron vessel over a Bunsen burner is carefully and slowly poured through the small hole in the flat plate laid upon the crucible.

Intense combustion of the iron in the vapour of sulphur at once ensues; the product—pure ferrous sulphide—melts and runs to the bottom of the crucible, draining away from the nails which have escaped the action of the sulphur.

Another ladleful of melted sulphur is then poured through the small hole as before, and this operation is repeated until all of the iron has been melted down. The still fluid mass of fused ferrous sulphide is then poured from the crucible upon a slab, or may be cast into little bars of about one inch in width, and of any desired thickness or length.

By having the nails as hot as possible, and uncovering only the small hole instead of the whole crucible when the sulphur is added, and using melted sulphur instead of lumps thrown into the crucible, the process becomes very simple, and gives a product which leaves nothing to be desired.

The writer has been in the habit of casting little cylinders of ferrous sulphide prepared in this manner upon a piece of stout copper wire, which with the end of the wire bent into a hook, can be used in the bell of an ordinary glass hydrogen generator in the same manner as zinc is sometimes used in such apparatus, thus avoiding the trouble of a copper basket filled with small fragments as in the usual arrangement.

FLOWERING OF THE EURYANGIUM SUMBUL, KAUFFMANN, IN ENGLAND.*

This important plant is now flowering in the herbaceous ground of the Royal Gardens, Kew, for the first time in this country. It yields the drug "Radix Sumbul," introduced to Russia as a substitute for Musk about the year 1835, and then recommended as a remedy for cholera. It became known in Germany in 1840, and ten years later in England. It was admitted into the

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* From the *Canadian Pharmaceutical Journal* for June.

* From *The Gardeners' Chronicle*, July 3.

British Pharmacopœia in 1867, and is now prescribed, in the tincture form, as a stimulating tonic. It is said to be a nervine stimulant, like valerian, and to possess antispasmodic properties. Further than the above its history has not been found traceable by the authors of the 'Pharmacographia.' The plant was discovered in 1869 by a Russian traveller, Fedschenko, in the mountains of Maghian, near Pianjakent, a small Russian town eastward of Samarkand. The root, as found in commerce, consists of transverse slices, 1 to 2 inches, rarely as much as 5 inches, in diameter, and an inch or more in thickness; the bristly crown and tapering lower portions, often no thicker than a quill, are also met with. The Kew specimen is nearly $8\frac{1}{2}$ feet in height. The rootstock is somewhat fusiform in shape, about $3\frac{1}{2}$ inches in diameter at the top, where it is thinly covered with the persistent fibres of the old leaves. Those of the present year commenced to wither soon after the flower-stem became visible, and were quite dead when its full height was attained. They are supradecompound, much as in some species of *Ferula*, especially *F. campestris*, to the leaf segments of which those of the sumbul have a very close resemblance. The panicle is composed of about ten alternate spreading branches, the lowest about 5 feet from the apex. The umbels are on short stalks, with 10—13 umbellules. The stem on being wounded exudes a milky sap, which at first has the exact flavour of angelica, afterwards leaving a bitter taste. The resin of the root does not fully develop its musky smell until after contact with water. It is hoped that seeds may be perfected, and a stock raised for distribution; therefore, the treatment accorded to this plant may be of interest. The root came to hand in a dry and dormant condition, was grown in a pot for the first season, and healthy leaves were produced, but which on the slightest check died away. About three years ago it was planted in its present position on a small hillock of stones, with plenty of good loamy soil, and there it has since flourished without intermission. During winter, the protection of a hand-glass has been given against rain—doubtless an important point of attention; it has also been covered loosely with leaves, though, as regards temperature, it is apparently quite hardy. A mulching of litter is beneficial during summer, and when the stem rises, weak manure-water should be given. In a state of rest the roots may be safely sent to a distance, packed quite dry, as a bulb would be. They seem to have a very persistent vitality, and are without fleshy ramifications.

CONTRIBUTIONS TO THE THEORY OF SOLUBILITY.[*]

BY ISIDOR WALZ, PH.D.

(*Continued from page* 10.)

The precipitation of substances soluble in alcohol but insoluble in water (such as fats, oils, and a number of salts), by the addition of water, and *vice versâ*; the removal of substances dissolved in ether, carbon disulphide, the hydrocarbons, etc., by agitation with the suitable aqueous solvents, are entirely analogous phenomena. Even such "dissociations" as that of ferric chloride in a heated aqueous solution may be explained on this principle. We have only to assume, that, under ordinary circumstances, the attraction of the molecules of water for those of hydrochloric acid is equal to that of the attraction of the molecules of the acid for those of ferric oxide, thus insuring a true solution, while at higher temperatures the attraction of the former kinds of molecules is greater than that of the latter, or, what amounts to the same thing, that at higher temperatures the attraction of the molecules of ferric oxide for each other is gradually increased. The tendency of salts of ferric oxide to form insoluble basic salts when their solutions are heated, would seem to strengthen this view.[*]

We have now reached a point at which the mechanical and chemical reactions of the molecules become so closely associated that it is almost impossible to keep them apart, and to assign to each its due share in bringing about observed phenomena, even if such an attempt could be successful at all in the present condition of atomechanics. The two orders of phenomena shade off into each other by insensible gradations, and reflection upon them leads to the strong belief that chemical phenomena will find their explanation by atomic forces, closely analogous to the molecular forces which underlie the phenomena of solution, and that we shall then dispense with the notion of that hypothetical special force, *chemical affinity*.[†]

As yet, we have no unit by which solubility may be measured, and no means of designating the degree of solubility of any substance with anything like the precision demanded in physics, with the exception of the solution of gases in liquids, in which case the ascertained coefficients of absorption answer the requirement. Of all other substances we only predicate that they are soluble or insoluble, and express the intermediate degrees of solubility by such vague terms as very, quite, little, sparingly, soluble, and similar generalities. It is customary to state the number of parts of water in which one part of substance is soluble at given temperatures, or the number of parts of substance which dissolve in water at certain degrees of heat. It would seem to be more rational and more likely to lead to the discovery of general principles to adopt the molecular weight of the solute expressed in grammes or parts as a basis of comparison, instead of one part of it; or the molecular weight of the solvent, expressed in grammes or parts of the solvent instead of the arbitrary standard of 100 parts.

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[*] From the *American Chemist* for February.

[*] Prof. Leeds, of the Steven's Institute, has photographed a precipitate of nickel tungstate, formed by adding nickel chloride to ammonia tungstate, the solutions being left undisturbed for a long time. The appearance of the precipitate suggests strikingly that of a mass striving to concentrate, as it were, upon itself.

[†] It is a striking fact that in the more prominent of recent text-books the term *affinity* is scarcely as much as even mentioned, and this is hardly to be wondered at, considering the condition of the subject. Formerly chemical affinity was defined as the force which effected the union of dissimilar atoms. Subsequently it was found necessary to introduce the notion of molecular affinity; and finally, if we wish to explain consistently the existence of such molecules as those of the elements in the free state (Cl_2,H_2,O_2, etc.), it would seem necessary to assume a kind of chemical affinity which effects the union of similar atoms, which is an absurdity.

The term *affinity* has recently been used in a *quasi* quantitative manner for the power of an atom of combining with a varying number of other atoms, the "affinity" for hydrogen being taken as the unit for comparison. Thus, we speak of uni-, bi-, triaffine, etc., atoms. Whether the affinity of an atom is assumed to be constant, as by one school of theoretical chemists, or variable, as taught by another, it seems to be tacitly agreed by all that the affinity or valency of an atom is a characteristic of *the atom taken by itself*, and as peculiar to it as its specific gravity, or its size and shape. But, it seems to me, that the facts connected with atomic valency are less easily explained by the theory that it is inherent in the atom, than that it is a *state of the atom which is induced in it by juxtaposition with dissimilar atoms*. The affinity of O for H, Cl, etc,, according to this view, does not pre-exist in the O atom, but is induced in it, at the moment when it comes into sufficiently close proximity to the other atoms, and the "affinity" thus induced varies according to the nature, quantity, temperature, etc., of the atoms brought together. Much in the same manner in which currents of electricity of very different intensity are generated if we connect zinc with copper, or zinc with platinum, chemical energies of very different strength are developed when atoms of oxygen come into contact with those of H, Cl, etc,

II. *Relations between the Solubility of Substances and their Specific Volumes.*

If the reasoning that has led us to the supposition of a relation between the solubility and the specific volumes of substances is correct, we may expect to find—

1. That there exists a relation between the solvent powers and the specific volumes of different solvents.
2. That the solvent power of one and the same solvent varies with its specific volume.
3. That the solubility of a solute in one and the same solvent varies with its specific volume.
4. That in a series of similarly constituted substances, such as the chlorides, sulphates, sulphides, etc., the solubility of the members of the series varies with their specific volumes.

1. *Relation between Solvent Power and Specific Volume of different Solvents.*—For reasons mentioned above, solutions of gases are best adapted for such a comparison of the solvent power of different solvents. If we compare the coefficients of absorption of the permanent gases in water and alcohol, as determined by Bunsen, and the specific volumes of water and alcohol, we find a very remarkable coincidence.

Water: molecular weight = 18; sp. gr. (at 4° C.) = 1; specific volume = 18.

Alcohol; molecular weight = 46; sp. gr. (at 0° C.) = ·7946; specific volume = 57·7.

Ratio of spec. vol. of water and alcohol: 18 : 57·7 = 1 : 3·2.

Coefficients of absorption (at 0°C. and 76 mm.) of—

Hydrogen in water = 0·0193; in alcohol 0·96925; ratio 1 : 3·5.

Nitrogen in water = 0·020346; in alcohol 0·126338; ratio 1 : 6·2.

Oxygen in water = 0·4115; in alcohol 0·2825; ratio 1 : 6·8.

Carbon monoxide in water = 0·032874; in alcohol 020443; ratio 1 : 6·2.

Thus, we see that the *solubility of hydrogen in water and alcohol is directly proportional to the specific volumes of these solvents; and that of oxygen, nitrogen, and carbon monoxide to a simple multiple of the ratio of the specific volumes of the solvents.* The coefficients of absorption of the condensible gases show less simple relations, as is to be expected; but they are all greater for alcohol than for water, or, in other words, greater for the solvent with the greater specific volume. The lowest ratio is that of carbon dioxide, whose coefficient of absorption at normal temperature and pressure is:—in water, 1·7967; in alcohol, 4·32955; ratio = 1 : 2·41.

The ratio of the coefficients of absorption in water and alcohol for sulphur dioxide, obtained in the same manner, is 4·09; and for sulphuretted hydrogen, 4·11. Between these numbers, 2·4, 3·2, 4·09, or 4·11 exists, the simple relation, 3, 4, 5, so that, although the solubility in the case of these condensible gases is modified by the introduction of chemical influences, such modifications stand in a simple relation to the specific volumes of the solvent.

I am not aware of the existence of other series of quantitative data which could be made the subject of similar comparison. In their absence we find qualitative proof of the truth of the principle which we are discussing in the solubility of most of the fats, oils, etc., which are soluble in alcohol, but insoluble in water. These substances, possessing high molecular weights and low specific gravities, have consequently very large specific volumes; thus tristearin ($C_{57}H_{110}O_6$), *e. g.*, in one of its modifications has the molecular weight 890, specific gravity at 65°C. 0·9245; and therefore, the specific volume 963. It will be shown hereafter that the specific volumes of such very soluble substances in water as $CaCl_2$, $SO_4H_2K_2S$, and others lie between 50 and 54; it would seem natural, therefore, to conclude that the insolubility in water of the molecules of fats and oils is due, partly at least, to the fact that their specific volumes are disproportionately large compared with that of water; they cannot penetrate into the intermolecular spaces of the latter, and therefore float on its surface, while they are able to dissolve in alcohol, the specific volume of which is more than three times greater than that of water. They are, therefore, still more soluble in solvents with still larger specific volumes, such as carbon disulphide, ether, oil of turpentine, etc., of which we give the data below.

	Formula.	Molecular weight.	Specific gravity.	Specific volume.
Carbon disulphide	CS_2	76	1·293 at 0° C.	58·7
Ether	$C_4H_{10}O$	74	0·735 „ „ „	100·6
Oil of turpentine	$C_{10}H_{16}$	136	0·89 „ „ „	152·8

Having considered the relative solubilities of substances which combine high molecular weights with low specific gravities, and which possess, in consequence, very high specific volumes, let us turn to the opposite class, which are endowed with very large molecular weights, high specific gravities, and small specific volumes such as $PbSO_4$, AgCl, and others. While the former class float, insoluble, on water, the latter fall through it and collect, or remain insoluble at the bottom, exactly as a piece of light wood dropped on a net would remain on it or would be caught in the meshes, if of proper size and form, while a piece of lead, iron, etc., of the same size and form as the wood, would fall through, breaking the filaments if not strong enough to withstand the impact. But while these substances are insoluble in water, solvents with large specific volumes are in many cases able to dissolve them. Thus, tin dioxide, titanium dioxide, etc., are soluble in strong sulphuric acid; mercury dissolves a number of the metals; many of the heavy metallic oxides are soluble in caustic alkalies, etc.

The question may be asked, why, under this explanation, should not alcohol, with a specific volume of 57·7 act in the same manner on lead sulphate, for example, as SO_4H_2, the specific volume of which is 53·26; in other words, why should there be such a vast difference between the action of two solvents, the specific volumes of which do not differ very much, as to constitute one pre-eminently a solvent for large and light molecules, and the other for small and heavy molecules, leaving for the moment the difference of chemical structure and composition out of view? We shall not receive a clear and perfect answer to this question till we shall know more of molecular mechanics and shall succeed in separating specific volume into the two factors of which it is composed. The specific volume of solids and liquids, obtained by dividing the molecular weight by the specific gravity, does not represent the space actually occupied by a molecule, but that space *plus* a proportionate part of the intermolecular space which surrounds it. What the ratio between these two components of the specific volume is in the various molecular systems and at varying temperatures, we have, at present no means of ascertaining, though such a knowledge would be of the greatest importance and value in interpreting the phenomena of solubility. For the present we must be satisfied with pointing out that given, *e.g.*, two solvents like alcohol and sulphuric acid, the respective molecular weights of which are 46 and 98, and the specific volumes 53·2 and 57·7, it is evident that the acid molecule contains very nearly twice as much matter in the same space as the alcohol molecule, which circumstance must make a material difference in the nature of their solvent action.

From these considerations, then, we deduce the conclusions, that *the solvent power of solvents, considered in regard to one and the same solute, is a function of their specific volumes;* and for equal specific volumes a function of their molecular weights.

2. *Variation of the Solvent Power and Specific Volume of a Solvent.*—Under this head we have to consider principally the influence of temperature on solvents. The specific gravity of substances is decreased by heat, and, as the molecular weight remains unchanged, the specific volume, which is the ratio of the two, becomes propor-

tionately larger, and we find, also, as a general rule, that the solvent powers of substances are enhanced by higher temperatures. In fact, in many cases of solutions of all classes, solution only becomes possible when the specific volume of the solvent has been enlarged to a certain extent by the application of heat. Cases in point are the absorption of oxygen by melted silver, the occlusion of hydrogen by red-hot iron and other metals, the formation of alloys by fusion, and numerous others that readily suggest themselves. As a general rule, therefore, *the solvent power of a substance increases directly with its specific volume.*

3. *The Solubility of a Solute Varies with its Specific Volume.*—There is a limitation to the regularity noted under the previous head, however, owing to the fact that we have to consider not only the increase by heat of the specific volume of the solvent, but also that of the solute. If the specific volumes of both increase in the same ratio, the increase of solubility will be directly proportional to the increase of temperature. This regular increase of the solubility with the temperature is presented, *e. g.*, by potassium chloride and barium chloride (as shown by the well-known graphic representation of solubilities which is found in many of the text-books), and it is a curious coincidence that the solubility of these two salts in water is very nearly alike, and that their specific volumes and that of water show a very simple relation, viz.:—

H_2O, molec. weight, 18; spec. grav. 1; specific vol. 18.
KCl, „ „ 74·6; „ „ 1·944; „ „ 38 3 (Mean of 9.)
$BaCl_2$, „ „ 208; „ „ 3·855; specific vol. 53 9 (Mean of 8.)

or very nearly the ratio, 1, 2, 3.

If, on the other hand, the specific volume of the solute increases under the influence of temperature at a more rapid rate than that of the solvent, the solubility will increase much more rapidly than the temperature; and this is actually the case in most instances of salts dissolved in water. It might seem, at first sight, very unlikely, that the specific volume of a molecule of a solid saline substance should increase more rapidly under the influence of heat than the molecule of an elastic fluid, like water; but it must be remembered that when salts dissolve in water the specific volume of their molecules is very considerably enlarged by their forming a molecular combination with a part of the water, and that we must deal with these hydrated molecules. When, as in the case of sodium sulphate, the saline molecule, at a certain temperature, becomes unable to retain its molecular connection with the water of hydration, and, in consequence, a reduction of specific volume takes place, we find this phenomenon attended with a corresponding reduction of solubility. Below 33° C. the solubility of Glauber's salt increases much more rapidly than the temperature; above 30° C. the anhydrous salt is in solution, and as the expansion of the saline molecule by heat must be assumed to be very small compared to that of the molecule of water, the attraction of the similar molecules begins to preponderate, and further increase of temperature is attended with an actual though slight decrease of solubility. The specific volumes of Glauber's salt and anhydrous sodium sulphate are, respectively—

Na_2SO_4 molec. weight, 142; sp. gr. 2·64; spec. vol. 53·78 (Mean of 12.)
$Na_2SO_4+10H_2O$ „ „ 322; „ 1·45; spec. vol. 222·0 (Mean of 8.)

It is not improbable that the greater solubility of other salts, such as lanthanum and didymium sulphates, calcium butyrate and citrate, etc., in cold than in hot water is to be explained in the same manner, viz., that they are capable of forming hydrates at a lower temperature, but that at higher temperatures they exist in solution as anhydrous salts. The specific volume of the saline molecule being but slightly increased by heat, while that of the water molecule increases very rapidly under the same circumstances, the ratio of the specific volumes becomes greatly different from that which conditioned the initial solubility, and a decrease of the latter takes place in consequence.

In sodium chloride we possess another salt which exists in the anhydrous state in aqueous solution, the specific volume of which is consequently but little affected by variation of temperature; and the increase of its solubility between 0° and 100° C. is, therefore, but slight. It is analogous to sodium sulphate also in another respect, for Rüdorff[*] has shown that it exists in solutions as $NaCl+2H_2O$ below 9° C., while above this point it is dissolved as anhydrous NaCl.

In the cases which we have just considered the variation of the specific volume of the solute takes place in the solution itself; but a variation of the specific volume of the solute, *before it is dissolved*, is also attended by a corresponding change of its solubility. Thus, sulphur exists in three allotropic modifications, which differ in specific gravity, and consequently in specific volume, from each other. The difference of their behaviour to solvents like carbon bisulphide, potassium bisulphite, etc., is well known. Phosphorus with its three allotropic modifications offers another illustration. The allotropic modifications of silicic acid, stannic acid, alumina, ferric oxide, and numerous other substances, and their different behaviour to alkaline, acid, and other solvents, may also be instanced.

4. *Relations of solubility and specific volume of substances of analogous composition.*

In order to verify the supposition that there might be a relation between the solubility and specific volume of substances, I have calculated the specific volumes of several series of compounds, and in order to avoid any subjective bias in the selection of the data in cases where different specific gravities had been found by different observers, I took the specific gravities as given in the 'Constants of Nature,' by F. W. Clarke, recently published by the Smithsonian Institution, and where a number of specific gravities were found attributed to the same substance, I took the mean of all, except in some instances in which a manifestly erroneous determination was not taken into account.[†] The results are tabulated below:—

Sulphides.

Formula.	Molec. weight.	Spec. grav.[‡]	Spec. vol.		
CoS	90·7	5·45	16·64	Soluble in acids.	Insoluble in water.
NiS	90·7	5·12	17·71		
FeS	88	4·835	18·40		
MnS	87	4·00	21·75		
CuS	95·5	4·199	22·50		
ZnS	97·2	4·017	24·19		
PtS	229·5	8·847	25·94	Insoluble in acids.	
HgS	232	8·039	28·86		
CdS	144	4·67	30·83		
Pbs	239	7·488	31·91		
Na_2S	78	2·471	31·56	Soluble in water.	
Ag_2S	248	7·204	34·42		
SnS_2	182	4·507	40·38		
K_2S	110	2·130	51·64		
Tl_2S	440	8·00	55·00		
CS_2	76	1·2484	60·87	Insoluble in water, soluble in alkalies & alkaline sulphides.	
Bi_2S_3	516	7·357	70·13		
As_2S_3	246	3·45	71·24		
Sb_2S_3	340	4·499	75·57		

(*To be continued.*)

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[*] Rüdorff, 'Pogg. Annal.,' 1861, 114, 63; 1862, 116, 55 (as cited by L. Meyer).

[†] I may be permitted to state that most of these calculations were made and the results compared in the fall of 1873, but not published, owing to the difficulty I encountered in collecting the necessary data regarding specific gravities, of which I was relieved by the appearance of Clarke's valuable tables, when I revised my previous calculations. While engaged on the first series of calculations, I observed the isosterism of certain chlorides and other compounds, to which Dr. H. Schroeder has recently drawn attention in the *Ann. de Chem.* (vols. 173 and 174), and recognized the relation between certain physical properties and the specific volume.

[‡] The specific gravities under this column in the following tables are the means of those given in Clarke's work.

POISONING BY GOATS' MILK.

The *Lancet* for last week publishes the following information respecting an occurrence which in Italy has caused considerable sensation and given rise to several conflicting reports :—

"Throughout the month of June the inhabitants of the Rione Borgo in Rome suffered from quite an epidemic of gastro-intestinal irritation; in other words, from vomiting, pains of the epigastrium and bowels, with diarrhœa, thirst, shortness of breath, pallor, small and frequent pulse, and lowering of temperature. The symptoms were traced to the consumption of goats' milk, and were more or less severe according to the quantity of milk consumed. In some cases a healthy reaction set in within the twenty-four hours; others took four or five days to get round. Veterinary surgeons examined the goats from which the milk was taken; but nothing was found wrong with them. Professor Ratti, of the Sapienza, then subjected to chemical analysis the vomitings of the sufferers and the milk of the goats, and, in the first instance, found no trace of metallic poisoning. He next proceeded to the goats' pasturage, and found, among the herbage on which they browsed, four species of plants, all more or less poisonous—*Conium maculatum*, *Clematis vitalbula*, *Colchicum autumnale*, and *Plumbago Europæa.* Every one of these bore marks of having been nibbled by the goats. Fresh experiments were then made on the vomitings and the milk, and Professor Ratti detected in both a solid matter of yellow colour, which yielded the chemical reactions of colchicine. The *Colchicum autumnale* had passed in the form of its alkaloid from the plant to the milk, and the drastic and other symptoms from which the consumers of the milk had suffered were at once explained. An attempt was made at the meeting of the Roman Academy of Medicine to supplement Professor Ratti's induction, by showing that *Momordica Elaterium* was among the pasturage of the goats, and that its passage into the milk might account for the symptoms in the consumers, if not wholly, at least in part. But it was shown that the goats instinctively avoid this plant, and Professor Ratti's impeachment of the *Colchicum autumnale* remained, at the end of an animated discussion, untouched."

GLYCONATED EMULSION OF COD LIVER OIL CONTAINING STRYCHNIA.

The following modified formula for this preparation is published in the *American Journal of Pharmacy* for July, by Mr. T. D. M'Elhenie :—

"First prepare glyconin ʒxviii by thoroughly triturating in a half-gallon mortar,

Glycerin,
Yolk of Egg . . . . *aa* ʒix
Then add Oil of Bitter Almond . . ʒi

And triturate until the mixture thickens and becomes a creamy yellow.

"Prepare a strychnia solution as follows:

Take of Strychnia Sulphate . . . gr. i
Distilled Water . . . . . ℥ii
Jamaica Rum . . . . . ℥iv

Add eight fluidounces of filtered cod liver oil very slowly to the glyconin mixture, preferably by steady dropping from a vial having a grooved cork, and at intervals add small portions of the strychnia solution.

"All this is to be done by active and constant trituration, the success of the process depending upon the fidelity with which this is performed. The finished product will measure about twenty fluidounces, until, by subsidence, the air bubbles have escaped. An incidental benefit to the operator is a superb development of the flexor muscles.

"As proposed by Dr. Beard, the mixture contained diluted phosphoric acid. At the request of Dr. Bartlett, I substituted strychnia. He gives the dose, a dessertspoonful, containing 1-64 grain of the salt. Phosphorus in etherial solution, Fowler's solution of arsenic, pyrophosphate of iron, etc., may be readily substituted.

"The "glyconin" without the oil of almonds, soon separates, and with the oil, soon becomes too thick to flow from a wide-mouthed vial.

"Experiments, with a view to preparing it in a ready form for all emulsions are thus far unsuccessful, but will be further prosecuted, and the result announced later, if favourable. The writer is disposed to lay stress on the two facts that the above mixture *does not nauseate* and *does not separate.*"

THE CHINA OPIUM TRADE.

The recent discussion in the House of Commons respecting the duty of the Indian Government in respect to the opium trade with China has directed considerable attention to the subject. Amongst other results it has drawn forth a letter to the *Times* (July 6) from a Chinese resident in London, in which he discusses the question under six heads. They are—(1) Is the use of opium in China injurious or not, and should it be prohibited? (2) Whether or not Great Britain is in any way to blame for the evils and miseries which opium has caused to China? (3) What ought Great Britain to do in the matter? (4) Will the Chinese Government be willing to prohibit the importation, cultivation, and use of opium? (5) Supposing the Chinese Government be determined to put down the growth and consumption of opium in China, could their injunctions be carried into effect? (6) If the cultivation of poppy should cease in India, by what means can the coffers of the Indian Government be supplied to the extent of six millions sterling, while no material benefit would thereby accrue to China, as the supply of opium may come from other nations?

The first question, whether the use of opium in China is injurious and should be prohibited, he answers with a decided affirmative, and curiously enough quotes the fact that it is included in the schedule of poisons to the Pharmacy Act, 1868, in support of his position. He disputes the assertion that opium may be used in moderate quantities without ill effects ensuing, and evidently referring to a report which was quoted in vol. v., p. 510, of this Journal, says that it is calculated to give currency to an erroneous idea. His opinion, based on considerable experience of opium smokers amongst his countrymen, is that the use of opium, except for medicinal purposes (Chinese doctors recommending consumptive patients to smoke opium), is invariably more or less injurious, according to the physical constitution of the smoker and the quantity of opium smoked by him. Moreover, assuming that the habit of smoking a moderate quantity daily can exist without detriment to health or capability, it inevitably incites the moderate smoker to constant increase. A beginner might commence with one pipe a day, but after one week or two he would require two, and in about a month or six weeks he would not do, perhaps, without a daily allowance of five pipes.

Proceeding to the second proposition, whether or not Great Britain is in any way to blame for the evils and miseries which opium has caused to China, the writer says :—"I wish with all my heart, for the good name and national honour of Great Britain, I could answer this question in the negative. I am afraid, however, that no one who has read a fair account of the opium war in 1841, or is tolerably acquainted with the history, past and present, of the British trade in connection with the opium traffic in China, will acquit the English nation of the serious charges of encouraging and fostering the opium traffic, and of compelling, by moral force and coercion, the Chinese Government to admit the drug into China . . . Opium was unknown to the ancient people of China, and though the exact period in which it was introduced into China is doubtful, yet it is certain that its use in my country two centuries ago was very little—it was more used as a medicine than for any other purpose—and the amount was scarcely worthy of notice. It was not till the year A.D. 1767 that the importation of that drug reached about 1,000 chests, and it continued at that rate for some years. In 1773 the East India Company made a small adventure of opium from Bengal, and seven years after established a depôt of two small vessels in Lark's Bay, south of Macao, for the sale of opium. In 1781 the Company freighted a vessel to Canton with it, and sold 1,600 chests. It must be remembered that opium has always been considered as a poisonous drug in my country, and its importation and consumption, as soon as they were known to the Government, were condemned and prohibited. In 1793 the authorities at Canton complained of the two opium ships in Lark's Bay. Their owners, however, being inconvenienced by the distance from Canton, and annoyed by pirates, removed the opium on board a single vessel, and brought her to Whampoa. She was then sent out of the river, and the drug was introduced in another ship. This practice continued till 1820, when the Governor and Collector of Customs at Canton issued an edict forbidding any vessel in which opium was stored to enter the port. The Portuguese were also forbidden to introduce it into Macao, and every officer in the Chinese Customs service was held responsible for preventing it. Its importation had been interdicted by the Emperor of China in 1800 under heavy penalties. The busy merchants at Canton were required to give bonds in 1809 that no ship which discharged her cargo at Whampoa had opium on board; but they contrived to evade the law. The opium traffic was principally carried on by British merchants at Whampoa and Macao through the connivance of local officers. Ships laden with opium were repeatedly despatched along the coasts. Thus the contraband traffic in opium in the river of Canton and along the coasts of China increased so rapidly and to such an extent as to cause the alarm of the Supreme Government in 1839. Lin tseh en, Governor of Hukwang (commonly known as Commissioner Lin), was therefore appointed with unlimited powers to put an end to the opium trade. What the Commissioner did at Canton is well known, and needs no repetition; sufficient it is to remark here that he carried out his Imperial master's instructions to the fullest extent, and that by coercive measures he obtained 20,291 chests of opium, which he caused to be destroyed. I do not mean to justify the manner in which he discharged the difficult duties of his commission, but this I venture to say, that he was sincere in his work, and did to the best of his knowledge and ability what he thought to be for the good of his country. For the seizure of that opium and for other concurrent causes a war was waged by England against China, which resulted, as we all know, among other things, in the payment of an indemnity by China of six millions of dollars for the opium thus destroyed. Since then the opium trade has been vigorously and openly carried on without interruption against the express wish of the Chinese Government and its people, and, to crown the success of a Government interested in the opium trade, the poisonous drug was introduced by the victors, notwithstanding a strong remonstrance on the part of the Chinese Government, into the tariff fixed by the Treaty of 1858 between England and China.

"As to the share of the Indian Government in the cultivation of the poppy, the facts are so well known that I need not enter into details. It is only necessary for me to remark that the British Indian Government, by holding a monopoly of the preparation and sale of opium, derives a profit from the obnoxious drug to the extent of six millions sterling annually. Thus it is clear that for holding an opium monopoly in India, and for encouraging that trade in China, the British Government is undoubtedly responsible."

As to what Great Britain ought to do in the matter, the writer is of opinion that the Indian Government should at once withdraw from the monopoly, and should prohibit the cultivation of poppy in India; but if it should be deemed wrong to interfere with the industry of the natives in India, it ought at least, not to encourage the poppy cultivation by way of making advances to the ryots.

As to whether or not the Chinese Government is willing to prohibit the importation, cultivation, and consumption of opium in view of the class of opium smokers being so numerous, the writer says that ever since the introduction of opium into China its use, though it has become very prevalent, has never been recognized, nor has its cultivation been sanctioned; on the contrary, the Chinese Government has fulminated edicts from time to time against its cultivation.

Discussing the question whether if the Chinese Government were determined to put down the growth and consumption of opium in China it could cause its injunctions to be carried into effect the writer thinks that its despotic power would enable it to do this.

But it has been alleged, even by some conversant with Chinese affairs, that the proposed step, if carried into effect, would be very dangerous, because the habit of smoking opium is so prevalent in China that if the supply were suddenly cut off one-third of the whole nation would die. Respecting this the writer says:—"This would be a startling fact if it were true. Opium smoking is chiefly confined to men, and women are comparatively exempt; at least, the number of female opium smokers is very small in comparison with that of men. Then deduct the children and those men who do not smoke, and the total number of opium smokers in China does not, I believe, exceed, at most, one-fourth of the whole population. Such being the case, will the opium dealers urge that if the supply were cut off all and every one of the opium smokers, without exception, would die? Surely not; they would allow that a large proportion of the smokers, at least one-half, would outlive the supply. I am not prepared to prove that my rough estimate is correct, for we have no returns of the exact number of opium smokers, which may be considerably above or below the figure I put. I only maintain that the calamity predicted to fall on the opium smokers by cutting off their supply will not be so disastrous as anticipated. But I assert that the habit of opium smoking is not in any case irremediable. I grant that the difficulty of breaking it off is very great, but it is not insuperable. I have not yet seen or heard of a case where a confirmed opium smoker could not reform himself if he had been compelled to leave off his vicious habit by necessity or from determined resolution. A case bearing upon this point is vividly before my mind. Some years ago a well-to-do Chinese, who was an inveterate opium smoker, and who had, in consequence, become very thin and delicate in health, was convicted of a crime in Hong Kong, and sentenced to a long term of imprisonment. When the sentence was passed on the offender, all his friends and relatives predicted that if ever there should be a man who would die from deprivation of opium, that man certainly would, because he had been in the habit for the past ten years of taking an allowance of five or six mace weight every day, and even when he happened to have a less quantity he felt languid and sick. However, their fears were proved to be groundless, for he underwent his gaol discipline pretty fairly, though he was sick for some time in gaol; and when he came out, he was healthy and strong, and, in fact, became, physically speaking, an altered man. On being jocularly asked one day how he liked the gaol he had been in, he replied, 'For one thing I like it very much; it has cured me of the confirmed habit of smoking opium. I wish all you opium smokers would go there to, for it would do you good.'"

Finally, the writer does not profess to be able to cope with the financial portion of the sixth question; but he expresses his belief that if England were to strike out the clause concerning opium in the Tien-tsin Treaty, the Chinese Government would prohibit all importations of the drug, and that it is therefore not likely other nations would go to the expense and trouble of growing an article for importation into a country where it is liable to seizure.

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THE IRISH PHARMACY BILL.

It is unfortunate that the consideration of the Irish Pharmacy Bill in Committee came on last week at so late an hour that few of those members of Parliament who intended to oppose the use of the term "pharmaceutical chemist" were in the House at the time.

The explanation given by Sir MICHAEL HICKS-BEACH of the reasons why he cannot agree to the substitution of the words "dispensing chemist" for "pharmaceutical chemist" does not really meet the objection raised against the introduction of the term "pharmaceutical chemist" into Ireland. It appears, indeed, from the remarks offered by Sir MICHAEL in reply to Mr. WHITWELL's motion that he fails to appreciate the real grounds for the claim to exclusive use of the term "pharmaceutical chemist." The reference he makes to the title of "surgeon" or "physician" has, indeed, no bearing upon the question. These titles have been in common use for a very long time, and so indiscriminately that it would be, as Sir MICHAEL considers, quite unreasonable for any body to claim the exclusive right of using them. If there were any analogy between the use of those titles and that of "pharmaceutical chemist," the validity of Sir MICHAEL's argument would be unquestionable.

But it is precisely in this particular that we conceive there is good reason to differ with Sir MICHAEL, and the reason for doing so is highly important in reference to the question whether the title should be introduced into Ireland. The truth is that the term "pharmaceutical chemist" never was in use anywhere until it was adopted by the Pharmaceutical Society. The adoption of this title was an essential feature of the effort made, some years ago when the Society was instituted, to establish a superior class of pharmacists in Great Britain, for since all chemists and druggists had by usage the right to dispense medicines, it was necessary to introduce a distinctive designation by which those who belonged to the superior class might be distinguished from the general body.

The term "pharmaceutical chemist" was in fact created by the Society for that special purpose, and the expediency of giving the Society power to prevent ignorant and incompetent persons from assuming the title of, or pretending to be, pharmaceutical chemists was fully recognized by the Pharmacy Act of 1852, which gave to the Society the exclusive right to confer this title, and the power to prosecute such persons as assumed it improperly.

For twenty-two years this title has been used only by those who have passed the Major examination of the Pharmaceutical Society: it has been gradually becoming recognized as a distinction worth having, and has been a means of producing marked improvement in the general character of the trade, and, when it is now proposed to be inconsiderately appropriated as a remedy for an Irish "grievance," it is scarcely to be wondered at that those who have voluntarily taken the pains to obtain this qualification should consider themselves unfairly dealt with, or that the Society which created the title and has received Parliamentary protection in conferring it should regard that appropriation as an invasion of its well-earned privileges.

The case to be dealt with in Ireland is essentially different from that which obtained in Great Britain when pharmaceutical legislation had to be provided. In Ireland none but licentiates of the Apothecaries' Hall have the right to dispense medicines, and, although there are chemists and druggists in Ireland, the only thing necessary in establishing a new body of pharmacists, entitled like apothecaries to dispense medicines, is to designate that body in such a way as to distinguish clearly between those who belong to it and the chemists and druggists who are not permitted to dispense medicines. That object, as we have repeatedly urged, would be fully ensured by adopting the title of "dispensing chemist."

We have, on previous occasions, pointed out the probability that whatever want may exist in Ireland of greater facilities for obtaining medicine, it is not likely that qualified pharmaceutical chemists are likely to be able to supply that want, because the places where it exists are, in reality, not capable of supporting pharmaceutical chemists. This was clearly indicated by the witnesses who gave evidence before the Select Committee last year, and a correspondent in this week's Journal (see page 59) puts forward on his own knowledge the same facts. All circumstances, indeed, point to the probability that the existing want in Ireland is rather to be met by a class of persons of a grade inferior to that of the chemist and druggist in this country than by the pharmacist of the higher grade who acquires by examination the right to use the title "pharmaceutical chemist."

A certain degree of competence to dispense medicine, combined with a willingness to engage in the business of a general store, to deal in paint and groceries, tobacco-pipes and drysaltery, appears to be the kind of qualification for those who are to supply the want existing in Ireland, which Sir MICHAEL HICKS-BEACH describes as a "grievance," and proposes to remedy by a measure of confiscation.

The introduction into the Bill of provision for conferring even upon "chemists and druggists" the qualification to dispense medicine, which has been made one of the amendments of the Bill when the provision for reciprocity of right was struck out, is another significant fact that points unmistakably in the direction of the probability we have suggested.

Under such circumstances the appropriation of the title of "pharmaceutical chemist" really appears to be unnecessary, and merely a device for remedying one "grievance" by creating another.

THE ILLEGAL SALE OF POISONS.

The case reported some few weeks since, of the oil and colourman at Islington, who was not only surprised but somewhat indignant at finding himself the object of a twofold prosecution, in the first place for selling oxalic acid without a label, and in the second place for selling it at all, might fairly have been expected to produce an impression on the mind of other persons engaged in this illicit trade, and to have convinced them that it was no less unprofitable than improper. We were disposed to hope that such an effect was produced by the case we refer to as would deter many from entering upon or continuing the dangerous practice, but our legal report this week bears evidence that there is still much need to educate that portion of the trading community who are not on the Register of Chemists and Druggists, in respect to their disabilities in the matter of the sale of poisons.

In the case now referred to, which, by the way, is a charge of murder, the seller of the poison was a grocer, who may possibly have taken a partial but insufficient lesson from the result of the Islington case, for it appears that he so far manifested respect for the law as to keep a sale of poisons register, and to make the prescribed entries of transactions in the vending of poisons. Unfortunately however he appears to have omitted the very essential preliminary precaution of obtaining due registration as a person entitled to deal in such commodities, and that being the case, it is probable he may find himself performing the useful though perhaps unpleasant function of appearing as a warning to others who do likewise.

AN EXTRAORDINARY EXPLOSION.

A few weeks since an explosion took place in Boston, (*Massachusetts*) at a large druggist's establishment by which three persons were killed, several others seriously wounded, and the house laid completely in ruins. At the inquest several witnesses concurred in saying that a booming sound and a flash of light were connected with the explosion, but beyond this there is nothing but speculation as to the origin of the accident. The proprietor states that he had no explosive agents in his store, such as gunpowder or nitroglycerine, and that he thinks there could not have been any leakage of gas. There were soda-water fountains charged in the basement, but no evidence was forthcoming that any them exploded, and if they had they would have been incapable of producing such extensive damage. Under these circumstances the editor of the *Boston Journal of Chemistry* suggests the probability of the catastrophe having been caused by the vapour of ether, several five-pound bottles of which substance were known to have been stored in the cellar. Our contemporary speaks of having had practical experience of the powerfully explosive properties of a mixture of ether with atmospheric air in 1859, when by the leakage of a retort such a mixture travelled more than fifty feet in a few seconds of time, and coming in contact with the furnace fire caused an explosion which "lifted the building from its foundation and levelled a brick wall of great strength." On that occasion a flash and a rumbling report were observed, as is stated to have been the case in the present instance.

MELBOURNE ALES.

An examination on a considerable scale of colonial brewed ales, collected in the vicinity of Melbourne, has been recently made under the superintendence of the government analyst, Mr. William Johnson, formerly a student in the School of Pharmacy, Bloomsbury Square, and President of the Pharmaceutical Society of Victoria. Altogether 709 specimens were examined; 160 by Mr. Johnson, 200 by Mr. Cosmo Newbury, B.Sc., 211 by Mr. Sydney Gibbons, F.C.S., and 138 by Mr. C. R. Blackett, a prominent pharmacist. The report is, on the whole, favourable, and speaks of an improvement since the last examination in 1867. Offensive alcohols belonging to the fusel oil series were detected in several of the ales and to their presence generally a "peculiar taste and odour," stated to be characteristic of the colonial ales, are attributed by Mr. Blackett; but Mr. Gibbons says the "twang" is due to the "immature flavour of the hop," and that if allowed rest to develop the beer loses its "twang." Mr. Newbury evidently favours the fusel oil theory, and quotes words of Liebig in support of his opinion that the larger proportion of hops used in English ales prevents the development in them of fusel oil. Indications of common salt, and also of quassia and coriander, were met with in some cases, but not to an injurious extent. Signs of cocculus indicus were sought for without success, except possibly in one case, although picrotoxin, added for the purpose of experiment, was always detected by the method used. A crystalline substance resembling the crystals of picrotoxin, and liable to be mistaken for them, was, however, met with; but a careful examination, in which chemical and physiological tests were used, led to the conclusion that it was not picrotoxin in either a modified or unmodified form, but a saccharine substance which had some relation to the formation of fusel oil.

We learn from the *Eastern Morning News* that the son of Mr. George Beall, chemist and druggist, of Hull, has been accidentally poisoned. Whilst Mr. Beall was engaged in dispensing he placed on the counter a measure containing prussic acid; the deceased, a child of two years and four months, took up the glass, and being unobserved, drank the contents. Medical assistance was at once called in, but the child died a few hours afterwards.

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual meeting of members and associates of the above Association was held at the Great Western Hotel on the 30th ult.; the President, Mr. Thomas Barclay, in the chair. After the usual routine business, the President delivered the following address :—

President's Address.

"Gentlemen,—It is usual for any one placed in the position I now occupy to address a few words to the members assembled at their annual meeting; so being somewhat of a conservative, I have endeavoured to follow the custom; and must claim your indulgence for a few minutes whilst I make the following remarks. Met together as we are to celebrate our sixth anniversary, we cannot do better, perhaps, than review our position as pharmaceutists.

"The profession of pharmacy has of late become a subject of great interest in the public mind, and we have frequent mention of it in Parliament—some think oftener than is desirable—and now the chemist and druggist is a legally recognized practitioner, the conditions being that he shall pass examinations more difficult than that required by the College of Surgeons for its qualification as dispensers of medicine. These examinations, as we all know, cost a considerable amount of time, anxiety, and money, for although the Preliminary examination to a student fresh from school is a very easy matter, yet it is a barrier to many who had entered the business as apprentices before the Pharmacy Act came into operation, and it is very hard for such young men to begin *de novo* and learn English grammar, arithmetic, Latin, etc.; this examination is, no doubt, to such a far greater obstacle than the Minor, and many are debarred from pursuing their legitimate calling on account of it. Having passed this, and by dint of further study and expense got through the Minor and received the Government certificate as a legally qualified chemist and druggist, what advantages, we may ask, are offered him? Let us look at a chemist and druggist under the Act. He has a monopoly of the name and title chemist and druggist, he only can sell a certain number of poisons scheduled in the Act, and he only is entitled to dispense the prescription of any duly qualified medical practitioner. We will, however, proceed to analyse these things. We find tradesmen acting perfectly within the law—keeping open shop for the sale of drugs, etc., their shop windows decorated by handsome show bottles, etc., and presenting the same appearance as an ordinary druggist's shop. They have their names on their signboards without any descriptive title, or call their shops drug, oil and colour warehouses, etc., etc.; in such shops they are able to sell everything that a legally qualified druggist can do, excepting the few poisons which, but for the public convenience, every druggist would be only too glad to get rid of altogether, for any profit they yield is more than counterbalanced by the responsibility and risk in supplying them.

"Then as to the other advantage—the sole right to dispense the prescriptions of medical practitioners. This appears on the face of it a great concession, but we all know that the great bulk of the profession do not write prescriptions but dispense their own medicines. Now, if we could get the average returns made by the whole of the chemists in Great Britain for dispensing we should find the amount very small indeed, and if we put to this amount that which is realized by the sale of poisons—scheduled by the Act — which only chemists and druggists can sell, the two together would, from my knowledge of the business, be an absurdly small sum, utterly insufficient for their support and the amount of time, money, and anxiety required to pass the examinations.

"Now, I thoroughly believe in free trade; yet in this instance I would have the Government, as it has gone so far by causing compulsory examinations, etc., to proceed further, and by legislative enactment confine the sale of drugs and pharmaceutical chemicals to chemists and druggists, excepting in small country places, where the number of inhabitants is too small to support a chemist. As a rule in such a place there is one tradesman who supplies almost everything and he should be allowed to sell some few simple and useful drugs—which had been put up by a qualified chemist; in this way there could be no hardship to the public, on the contrary, there would be room in many places for a *boná fide* chemist where at present there can only be a few traders in drugs who have no qualification whatever.

"Then it is also to be hoped that the medical practitioner will in a short time, wherever there is a chemist, give up the dispensing of medicines, and I feel sure that if this were the case there would be reciprocity on the part of the chemist, who would, instead of prescribing, recommend many patients to the surgeon; and so all would be benefited. The practical pharmaceutist possesses many advantages over medical practitioners by his training and practice in medicine; his knowledge of the quality of drugs and the compounding of medicines is necessarily much greater, and this will become more and more apparent every year—for the number of new drugs and powerful alkaloids constantly coming into use make the practice of pharmacy a profession and the pharmaceutist becomes a necessity to the medical practitioner. It is not unlikely before long but that we shall have degrees in medicine, our friend, Mr. Dewson, and others being doctors or masters in pharmacy. When we look at the practice of pharmacy now, and see that the whole world, animal, vegetable, and mineral, is laid under tribute to produce remedies to aid medical skill, and from the crude materials the most elegant preparations are obtained, and these again are by the ingenious pharmacist made so palatable that the most delicate lady can not reject them it is almost impossible to believe that in former times, such remedies as the following were used. They are very amusing. For epilepsy or the falling evil, as it was called, the following prescription was ordered: 'The braines of an asse, first dried in the smoke of certain leaves, drank to the weight of ½ an ounce every day in honied water, is good against the faling evil; some give counsell to eat the heart of a black he-asse, together with bread.'

"'The gall of a lion is also recommended to be mixed with water, provided the patient so soon as he hath taken it, run about for a while to digest the same.'

"The cure is also said to be infallible 'if the patient eat the flesh of the vulture, especially when he hath eaten his full of man's flesh.'

"To cure gout take 'the ashes of the hyæna's ridge bone, the tongue and the right foot of a seale, put them to a bull's gall, seethe them altogether, and make a cataplasm thereof, spreading the same on a piece of the hyæna's skin, and apply it, and you shall see how it will ease the pain of the gout. Also the hair of a young boy child easeth the said anguish if applied to the place.' For sore eyes, 'If the eyes be dripped three times in the water wherein a man or woman hath washed their feet.' And although neither Mrs. Allen nor Madame Rachel was living then the ladies were not neglected, for we have the following recipe for beautifying the complexion. 'The pasterne of a young white bulkin or steere, sodden for the space of forty days, until such time as they be resolved into the liquor. If the face be wet with a fine linen cloth dipped into the decoction it causeth the skin to look white and without any sivels or wrinkles, but the same must be kept to the face all night, in manner of a mask.' For beautifying the hair, 'Take ante's eggs incorporated with flies which give a lovely black colour to the hairs of the eiebrows.' Even now some of our country friends come in for oil of bricks, earthworm, and swallow, and if you begin to explain to them that you cannot supply such things they at once put you down as ignorant of your business.

"The public analysts would be at a loss to find a test for some of these things. During the past one hundred and twenty years rapid strides have been made in every branch of science, and from our own ranks as pharmacists many eminent men have risen. Thus Marcgraf discovered magnesia and alumina. Soon after the world-famed Carl William Scheele, a German by birth, a Swede by fame, whilst an assistant, discovered fluoric, boracic, tartaric, citric, and oxalic acids, also chlorine and nitrogen. At the age of thirty-five he went into business on his own account, and he discovered after that prussic acid, manganese, baryta, etc., his career ending at the early age of forty-four. Then I should here mention Priestley, our own townsman, who has but lately had justice done his memory for his great discoveries; he, strangely, in England, Lavoisier in France, and Scheele, in Germany, discovered chlorine independently of each other. Priestley, also, has the great honour of being the discoverer of oxygen. He was not a pharmaceutist, and I should have omitted his name from this list but for his being a townsman. Then we have Pelletier, the discoverer of quinine. Vauquelin, Fourcroy, Chaptal, and Dumas were all pharmaceutists; the latter born in 1800 and an ornament to his century. Oersted, the discoverer of electro-magnetism was a pharmacist. Sir Humphry Davy was an assistant to a surgeon and chemist at the commencement of his studies. We owe much to him, not the least of which was the bringing out of the illustrious Faraday.

"Baron Liebig commenced his researches in a pharmaceutist's laboratory. Pettenkofer was for long a pharmaceutist to the royal family of Bavaria. Then we must not omit the names of William Allen and Jacob Bell, nor last but not least the name of Daniel Hanbury, who by his botanical researches has added lustre and honour to the profession of pharmacy in this country. It would be easy to extend this list considerably, but as there is a considerable amount of business to be transacted this evening I must draw these remarks to a close. In doing so I would urge upon the younger members of this Association the necessity for close observation and study. No doubt it is difficult, after the toils of the day and the long hours which would seem to be almost inseparable from a retail business, to take up the study of a subject like botany, pharmacy, or chemistry. But the self-denial necessary will be more than repaid in many ways. Few of us, if any, can look back upon similar work without satisfaction, on the one hand, for having done anything, and on the other of regret that we did not give more time to such studies. In conclusion, the motto of our town is "Forward," and I trust that every member of this Association during the coming year will remember it, and if so some future President may, in his address, be able to name some student dating from this time who has made himself and the town in which he lives illustrious."

At the close of his address the President was asked to allow it to be printed, and it was also urged that the President be nominated for the London Council, the Birmingham chemists not being represented there. The President said his address was at the service of the Association. He was obliged by the honour they proposed doing him, but his hands were too full to entertain the idea at present.

The following report having been circulated amongst the members and associates was taken as read:—

"The Council has much pleasure in submitting to the members and associates the sixth annual report; for although the Association is not so vigorous and useful as it might be, yet, comparing its present condition with that in which it was twelve months ago, there is reason for congratulation and encouragement; then the funds of the Association were in such a low condition that it was decided to remove from the Quadrant, and instead of having rooms requiring the constant presence of an attendant, it was thought the library and cabinets of materia medica, etc., might be circulated amongst the students, and the meetings of the Association held in some good hotel; by this means a considerable saving would be effected. The result has been so satisfactory that, with a greatly reduced subscription, both for members and associates, namely, from 5*s.* and 3*s.* 6*d.*, to the nominal sum of 2*s.* 6*d.* and 1*s.* 6*d.*, the Council is able to report a balance in hand; and is gratified to announce that the books and cabinets are in considerable demand, so that instead of their usefulness being impaired, it is thought on the contrary, that the alteration has been beneficial.

"The Adulteration Act has occupied the attention of the Council: and the members will remember an important meeting when Professor Postgate favoured the Association by his presence. It is satisfactory to report that the recommendation adopted at that meeting has been embodied in the new Act, namely, that a sample, sealed by the inspector, should be left in the hands of the tradesman whose goods are to be subjected to analysis.

"The quarterly reports on novelties in pharmacy, etc., by Messrs. H. W. Jones and Stokes Dewson proved interesting, and pleasant evenings were spent in discussing them. It is hoped that these may be continued regularly.

"The Association has long felt the desirability of placing within the reach of all apprentices and assistants in the district, an opportunity for gaining technical instruction, to fit them for the pharmaceutical examinations; and the Council, not forgetting past failure in this direction, was glad to secure the valuable services of Mr. Stokes Dewson, who has had much experience in professional teaching, and who has commenced courses of lectures on the various subjects necessary to enable students to pass the Preliminary examination; and also lectures on botany, pharmacy, and chemistry. The Council earnestly requests that each member and associate will do all in his power to make these classes successful.

"A circular was issued during the year, which was freely circulated amongst the chemists in the district. giving all particulars as to fees, etc. The Council desirous of stimulating the students, recommends that out of the surplus funds in the hands of the Treasurer £5 be distributed in prizes of money or books; £2 10*s.* each session, in the proportion of £1 to the highest Major candidate; and two prizes of 10*s.* each to the two highest Minor, and 10*s.* to the highest Preliminary. These prizes to be distributed by the President at the annual soirée. The Council also recommends that 10*s.* be given to each student who enters for a full session under Mr. Dewson.

"Mr. Dewson having taken rooms in a central situation, Educational Chambers, 20, New Street, it is proposed to use them for the purposes of the Association, holding the ordinary meetings there, and also placing the library, cabinets of materia medica, etc., under the care of Mr. Dewson, who will act as librarian. The Council propose paying him 5*s.* each meeting for the use of his rooms.

"The Council made every arrangement last summer for a botanical and pleasure excursion, but the number who were prepared to go was so small that the project was reluctantly abandoned.

"The Council during the year has issued a new edition of the 'Price Book,' which has been revised and enlarged.

'The soirée, which has now become a popular and annual festival, it is scarcely necessary to say, was a great success. The Assembly Room at the Royal Hotel was considered inadequate to comfortably accommodate the numbers who attended last year, so after considerable hesitation it was decided to take the Town Hall, the result being satisfactory in every respect. There was a large gathering of chemists and their friends, and many of the neighbouring towns were represented; the programme, being an interesting one, offered special attractions. The exhibition was of a novel character—processes of art and manufacture being conducted in the Hall, including the manufacturing of confectionery; fancy paper boxes; the sublimation and sealing of chemicals, etc., etc., during the evening. Mr. Pumphrey illustrated a lecture by the lime-light. There was a handsome surplus, which has enabled the Council to recommend the spending of money in prizes, etc.

"The Irish Pharmacy Act has been under the consideration of the Council; and it is gratifying to learn, that the action it took by sending to each of the members of Parliament representing the district, a copy of the resolution it agreed to, has strengthened the hands of the Pharmaceutical Society, and helped to make the Bill acceptable to the chemists of Great Britain.

"The Council deeply regrets that, through the long continued and severe illness of the Treasurer, E. Snape, Esq., it is reluctantly obliged to accept his resignation; but in doing so, would acknowledge its thanks to him for his valued services, and hopes he will before long be again able to take an active share in the work of the Association.

"In concluding this report, the Council would urge upon all chemists, chemists' assistants and apprentices, the necessity for combination—both for social, educational, and trade purposes. The nominal subscription need not keep any one out of the Association."

General Account and Balance Sheet, May 31st, 1875.

Dr.

	£	s.	d.	£	s.	d.
To Subscriptions, Members				4	10	6
,, Ditto Associates				1	11	6
,, Price Lists sold				3	5	0
,, Donations:—						
Southall Brothers and Barclay	2	2	0			
Walter Churchill	0	10	6			
Alfred Bird	0	5	0			
Per Stirling Grieves	1	7	0			
				4	4	6
,, Soirée Account, Receipts over payments as per Statement				20	10	5
				£34	1	11

Cr.

	£	s.	d.	£	s.	d.
By Balance due to Treasurer as per 1874 Account				4	9	11
,, Printing Account, 1874				1	7	6
,, Expenditure:—						
Hire of Rooms, etc.	3	16	6			
Postage and Stationery	1	3	1			
Printing	2	7	0			
Printing Price Lists	6	15	0			
				14	1	7
,, Balance in hands of Treasurer				14	2	11
				£34	1	11

Examined and found correct, Stirling Grieves, Richard Brown, } Auditors.

June 21st, 1875.

Soiree Account.

Dr.

	£	s.	d.
To Tickets Sold, etc.	72	7	6
	£72	7	6

Cr.

	£	s.	d.
By Payments in connection with Soirée, Exhibition, and Lectures thereat	51	17	1
,, Surplus carried to General Account	20	10	5
	£72	7	6

In the discussion which followed a strong feeling was generally expressed that Mr. Stokes Dewson's classes are of great benefit to the chemists and druggists in the district, by providing the means whereby apprentices and assistants may gain information to enable them to pass their examinations, and so draw such to Birmingham and the district in preference to other towns less favourably situate in that respect. Illustrations of Mr. Dewson's success in training pupils who have most creditably acquitted themselves at their examinations having been given, that part of the report suggesting the giving of prizes, and subsidizing pupils who enter for a full session under Mr. Dewson, was unanimously agreed to, and a further recommendation made that gentlemen who may feel disposed to assist in that way be requested to offer further prizes.

Letters were laid upon the table from the following members of Parliament:—Messrs. Bright, Dixon, Muntz, Walker, Davenport, and Allsopp, in reply to the memorial sent them by the Association against the Irish Pharmacy Act, each promising to give the matter their best consideration. A second letter was read from Mr. Muntz, saying that the Irish Solicitor-General had given way, and the difficulty was removed. After further discussion, the report was unanimously adopted.

A vote of thanks was accorded to the officers of the Association and to the Council for their services during the past year. Special allusion was made to the treasurer, Mr. E. Snape, and much sympathy was expressed towards him in his affliction.

The officers and Council were then elected for the ensuing year, Mr. Thomas Barclay being re-elected President, Mr. Jos. Lucas, treasurer, Mr. W. Jones hon. secretary; and sixteen gentlemen were, by their consent, elected to serve on the Council.

A discussion arose on the revision of the rules, and it was resolved that the Council have power to amend them as suggested by the meeting. It was stated that the number of members and associates was nearly double those on the books last year. It was unanimously agreed to give a vote of thanks to Messrs. Clarke, Morris, Ground, Challoner, and Jones for their services in canvassing for new members and subscriptions. The meeting then terminated.

Proceedings of Scientific Societies.

PARIS SOCIÉTÉ DE PHARMACIE.

A meeting of this Society was held on Wednesday, June 2, under the presidency of M. Planchon.

The Oxidation of Sulphur.

A communication from M. Polacci, of Pavia, was presented, giving the results of some comparative experiments as to the oxidation of sulphur. The method adopted was to expose a paste made by moistening flowers of sulphur, free from sulphuric acid, with distilled water, to the action of the air at various degrees of temperature. It was found that the conversion of sulphur into sulphuric acid goes on slowly at a low temperature; is more active at 35° to 40° C., and becomes rapid at 65° to 70° C. Dry sulphur was also converted into sulphuric acid in contact with air, provided that the air had not been deprived of its aqueous vapour.

Ammoniacal Compound of Glycyrrhizin.

M. Roussin read a paper on the nature of the sweet principle of liquorice root. The author stated that his attention had been drawn to the subject by the fact that glycyrrhizin, the so-called sweet principle of liquorice root, is insipid compared with the root itself. Glycyrrhizin, purified by four solutions in alcohol, and four successive precipitations of foreign matters by ether, appeared, after the evaporation of the alcoholic-ethereal liquor, as a yellowish substance, insoluble in cold water, and nearly devoid of taste, only developing in the mouth after some time a sweetish sensation, recalling faintly the taste of liquorice root. It therefore seemed evident to the author that the substance hitherto called glycyrrhizin is not really the sweet principle of the liquorice root in the state in which it exists naturally in the root, where it is extremely sweet in taste and rapidly soluble in water.

It is mentioned in chemical treatises that alkalies give a yellow colour, both with glycyrrhizin and with infusions of the liquorice root, but it does not appear to have been noticed that the sweet taste is not developed in glycyrrhizin except when its solution is effected in alkalies. Dilute solutions of potash and soda determine the solution of glycyrrhizin very rapidly; the sweet taste being quickly developed, whilst the liquid takes a bright yellow colour. If the solution be evaporated in a water-bath it yields a scaly, translucid, deep orange residue, which re-dissolves rapidly in cold water, and possesses the peculiar sweet taste of liquorice. The employment of potash or soda is, however, attended by several disadvantages, especially, when added in excess, that of altering the glycyrrhizin and communicating to it a kind of soapy taste.

Glycyrrhizin does not exist naturally in liquorice root as a sodic or potassic compound. The saccharine matter contained naturally in the root is the result of a compound of glycyrrhizin with ammonia. This may be demonstrated by washing some previously bruised liquorice root, either fresh or dry, in a concentrated solution of potash or soda, when there is immediately developed a rather strong ammoniacal odour. The same reaction takes place with a pure extract obtained by exhausting the root in cold water and evaporating in a water-bath.

Glycyrrhizin forms with ammonia two compounds, one with excess of alkali, which yields a deep yellow solution, the other containing half the proportion of the alkali and giving an amber solution. The first compound is obtained by employing an excess of ammonia to dissolve the glycyrrhizin in water. The resulting deep yellow solution evaporated to dryness, either at the ordinary temperature or in a boiling-water bath, leaves a shining, scaly, friable, non-hygroscopic residue, which is of a yellowish colour and constitutes the second ammoniacal compound; it re-dissolves readily in water, communicating to it an amber colour. The addition of a few drops of ammonia immediately turns the colour of this solution a deep yellow. The aqueous solution of the second ammoniacal compound reproduces very exactly the characteristic taste of liquorice root.

The author states that glycyrrhizin in these two compounds plays the part of a true acid, and that the compounds are true salts, which undergo double decomposition not only with nearly all the metallic salts but also with the salts of the organic alkaloids. The precipitates formed contain glycyrrhizin in combination with the oxide or the alkaloid. Glycyrrhizin, or glycyrrhizic acid, appears to be an acid intermediate in its principal properties between tannic acid and pectic acid. The yellow combination formed by excess of ammonia is the basic glycyrrhizate of ammonia. The second, containing less ammonia, and which the author considers to represent the true sweet principle of liquorice root, is the glycyrrhizate of ammonia, or, as he proposes to call it, ammoniacal glycyrrhizin. 2·50 grams of ammoniacal glycyrrhizin were dissolved in a mixture of alcohol and ether previously acidulated by some drops of hydrochloric acid, and platinum perchloride added in slight excess. The chloroplatinate of ammonia collected at the end of forty-eight hours, washed and dried, weighed 0·0455 gram. Calcined, it yielded 0·0205 of platinum, corresponding to 0·0035 of ammonia. Consequently ammoniacal glycyrrhizin contains 14 per cent. of ammonia, and the equivalent of glycyrrhizin would be higher than it has been hitherto considered.

In order to obtain the ammoniacal glycyrrhizin in a very pure state, the author prepares it as follows:—A sample of liquorice root is chosen as sweet and well preserved as possible, all the portions presenting a dark fracture are eliminated, and only those presenting a homogeneous yellow fracture are used. These are scraped superficially, and then well pounded so as to reduce them to a kind of stringy tow. This substance is macerated in cold distilled water for some hours, pressed and treated a second time in the same manner. The two liquors are mixed and allowed to stand some time to deposit the starch. The supernatant liquor is then boiled, and filtered to separate the coagulated albumen. After cooling, sulphuric acid, diluted with its weight of water, is added gradually, with brisk stirring, until a precipitate is no longer formed. The precipitate, at first gelatinous and flocculent, after standing some time forms a compact semi-solid mass at the bottom of the vessel. The supernatant liquor is rejected and after roughly washing the precipitate several times with pure water, it is finally kneaded repeatedly in distilled water until all trace of acidity has disappeared. The mass is then well drained, and agitated in a flask with three times its weight of 90° alcohol until dissolved, when a similar quantity of 96° to 98° alcohol is added to the syrupy liquid so produced. A little pectic acid is thus precipitated, which is removed by filtration. Ether is then added to the alcoholic liquor as long as a precipitate is formed. After standing twenty-four or forty-eight hours a blackish pitchy substance is deposited, which adheres to the glass and allows of the clear liquor being decanted. To this clear liquor is added a small quantity at a time, 90° alcohol charged with gaseous ammonia, which determines the formation of a yellow rather heavy flocculent precipitate of glycyrrhizate of ammonia. This precipitate is washed rapidly on a fine cloth with a mixture of equal parts of alcohol and ether, pressed and dried in a current of warm air or over sulphuric acid. The ammoniacal glycyrrhizin so obtained which the author considers to represent the true sweet principle of liquorice root is of a yellowish tint, very light, and entirely and rapidly soluble in water, to which it communicates an amber colour and an extremely sweet taste. It can be rendered more dense by re-dissolving it in a small quantity of water, and evaporating the solution on a plate or on a glass. It is thus obtained in very brittle translucent shining scales, which are readily detached. In either form pure ammoniacal glycyrrhizin is unalterable in the air, non-hygroscopic, and dissolves nearly instantaneously in cold water, forming a pale amber solution having an intensely sweet taste. The solution froths upon agitation.

One gram of pure ammoniacal glycyrrhizin dissolved in a litre of water gives a solution which is very sweet. The same quantity dissolved in two litres of water gives a solution that is more agreeable to the taste and resembles closely that of the liquorice root. If a very small portion of ammoniacal glycyrrhizin be placed upon the tongue it develops instantaneously a sweet taste, so strong as to be disagreeable to most persons.

That glycyrrhizin itself is nearly insoluble in water and insipid, and only acquires its sweet taste when in combination with an alkali, may be shown by taking a solution of 1 part of ammoniacal glycyrrhizin in 300 of water, which would be a very sweet liquor, and adding to it sufficient of any acid to saturate the ammonia, and set free the glycyrrhizin. The liquor immediately loses its sweet taste, and after a time flocks of glycyrrhizin are precipitated. With more concentrated solutions (1 in 100 or 1 in 50), and acectic acid, the precipitate forms more slowly as a firm transparent jelly. This jelly has no taste, but if there has been no excess of acid used a slight taste of liquorice is gradually developed in the mouth, due to the natural alkalinity of the saliva. A small quantity of ammonia re-dissolves the flocks and restores instantaneously the primitive taste.

The author considers that these facts explain simply several phenomena that have hitherto been obscure. Frequently liquorice is met with that has but little taste, especially when the drying of the root has been slow or incomplete, or when it has been kept in a damp place. This result he attributes to a commencement of fermentation by which acid products, and especially acetic acid, are generated. The ammonia of the ammoniacal glycyrrhizin is partially saturated, the insoluble glycyrrhizin being set free and the sapidity of the root proportionately diminished. If these roots be allowed to remain a sufficient time in a slightly ammoniacal atmosphere, they recover their original taste and readily yield their sweet principle to water.

Those who have had occasion to prepare large quantities of extract of liquorice by exhausting the coarsely powdered root, will have remarked that the liquor although limpid when first obtained, frequently becomes turbid in the course of a few hours, especially in summer; giving off carbonic acid, and depositing a voluminous gelatinous yellow precipitate. The liquor becomes strongly acid and loses the greater proportion of its sweet taste. The precipitate so formed, which is frequently separated and thrown away, is really the glycyrrhizin set free ; it can be redissolved and the sweet taste restored to the liquor by the addition of a few drops of ammonia.

The extract obtained by evaporating the macerate of the liquourice root is very hygroscopic, and frequently can only be preserved in the solid form by being mixed with large quantities of inert substances : starch, gum, etc. In the heat of summer the cylinders of extracts will soften and run in spite of all precautions. Ammoniacal glycyrrhizin, on the other hand, has no hygroscopic tendency, and does not soften even at a temperature of 80° to 100°. It is therefore to foreign matters that the softening of the extract is to be attributed.

The author has found that sulphate of quinine, sulphate of magnesia, iodide of potassium, and ipecacuanha, lose most of their taste if mixed with a sufficiency of ammoniacal glycyrrhizin. It would appear that besides the chemical reaction the very persistent taste of the sugar of liquorice root renders the palate for some moments insensible or indifferent to other sensations. He considers that ammoniacal glycyrrhizin might frequently be advantageously mixed with pill masses, powders or mixtures, it being more efficacious in masking the taste than one-hundred times its weight of sugar. The taking of such medicines as cod liver oil and syrup of iodide of iron would be much facilitated by previously dissolving a very small quantity of it in the mouth.

Ammoniacal glycyrrhizin may be prepared industrially, without treatment by alcohol and ether. The bruised liquorice root is exhausted methodically by the smallest possible quantity of cold water, the liquor boiled and cleared from coagulated albumen, then precipitated after cooling by an excess of sulphuric or hydrochloric acid. The precipitate is collected and well washed, and then redissolved in ammonia water. This solution filtered and evaporated yields the ammoniacal glycyrrhizin in a friable varnish-like residue. Its taste resembles exactly the taste of the liquorice root, as by this treatment the acrid matter naturally present in the root is preserved, whilst it is almost entirely removed by treatment with alcohol and ether.

M. Baudrimont remarked in confirmation of M. Roussin's statements that he had noticed frequently that when the sirop d'acide citrique of the Codex was added to a mixture sweetened by liquorice, the mixture lost almost all its sweet taste.

M. Bussy noticed that as a consequence of these experiments it became evident that liquorice was unsuited for sweetening mixture containing alkaloid in solution.

M. Mialhe remarked that the inability of diabetic patients to perceive the taste of liquorice was now explained by the fact that at the commencement of mastication their saliva was ordinarily acid.

CRYSTALLIZED MONOSULPHIDE OF SODIUM.

M. Ernest Baudrimont read a paper in which he described some experiments he had made respecting the preparation of crystallized monosulphide of sodium, a salt used in France in the preparation of artificial sulphuretted waters and Barèges baths. The Codex directs its preparation by passing sulphuretted hydrogen into a concentrated solution of caustic soda (36° B.) until no more gas is absorbed. If the solution be kept sheltered from contact with air it deposits transparent colourless crystals which consist of monosulphide of sodium ($Na_2S.9H_2O$). This process has been criticized by several chemists who have asserted that it gives rise to the formation of a sulphydrate of sodium ($NaHS$), which, however, could be converted into monosulphide by adding a quantity of caustic soda equal to the saturation of the sulphuretted hydrogen,

$$NaHS + NaHO = Na_2S + H_2O.$$

To the clearing up of this point M. Baudrimont's experiments were directed, and he found that when a current of sulphuretted hydrogen is passed through a solution of caustic soda (36° and especially 40° Baumé), the surrounding temperature not exceeding 15° C., acicular crystals almost immediately begin to form, having the composition probably of $NaS.6H_2O$. Very soon these crystals give place to a magma of octahedral crystals having a square base, consisting of the monosulphide with nine molecules of water. That these crystals were not the sulphydrate was shown by the fact that when treated with a titrated solution of iodine 1 gram absorbed equal to 1·07 grams of iodine, the theoretical number for the monosulphide being 1·05, whilst that for the sulphydrate is 2·32.

The crystals of monosulphide of sodium dissolved in the mother liquor by the aid of a gentle heat, and the solution supersaturated with sulphuretted hydrogen, formed a true sulphydrate; but this was totally uncrystallizable under the conditions present, and was reconverted into monosulphide by losing the excess of sulphuretted hydrogen during the ebullition necessary for its concentration. The ready crystallization of the monosulphide is due to its slight solubility in caustic soda, which is in excess at the commencement of the operation. It is much more difficult to crystallize it from an aqueous solution, and when pure, if melted in its water of crystallization, will frequently not resume the solid state.

M. Baudrimont states that the monosulphide of sodium may be readily distinguished from the sulphydrate by its reaction with chloral hydrate, with which it gives a magnificent intensely blood-red coloration, a precipitate of sulphur and a brown amorphous acid of complex composition being formed at the same time.

Parliamentary and Law Proceedings.

HOUSE OF COMMONS.

PHARMACY ACT (IRELAND) BILL.

Friday, July 9th, 1875.

MR. RAIKES IN THE CHAIR.

Sir Michael Hicks-Beach : I move that this Bill be committed.

Mr. Whalley : There are serious objections raised to this Bill by many pharmaceutical chemists in England, and therefore I hope the Bill will not be discussed at this late hour.

Sir Michael Hicks-Beach : I only know of one question for the consideration of the Committee, and that is whether the title of the Society shall be "pharmaceutical" or "dispensing."

The Chairman : That the preamble be postponed. Agreed to.

The Chairman : Clause 2.

Mr. Whalley : I am sorry again to interrupt, but I must move that you, sir, report progress and ask leave to sit again. My constituents and many other pharmaceutical chemists complain of this Bill in principle, and also to many of its details. Not expecting that the Bill would be proceeded with to-night I have not a copy of the Bill to which to refer, and I cannot therefore now discuss it. The right hon. baronet might take my assurance that there are serious objections entertained to some of the provisions for admitting to the benefits of the Pharmaceutical Society of England a new body to be established in Ireland. That is objected to by the

English Pharmaceutical Society. It is very hard upon us to be called upon to discuss this matter at twenty-five minutes past one o'clock in the morning.

Sir Michael Hicks-Beach : The opposition to the Bill was solely on the part of the English Pharmaceutical Society and on account of that opposition I struck out the 18th Clause of the Bill. Since that time it has passed a resolution, a copy of which I have in my hand, admitting that the withdrawal of that Clause had removed its principal objection to the Bill. The sole point for consideration now is whether the word "pharmaceutical" shall be changed to "dispensing" and when we come to the Clause and any honourable member moves the change of word, I will explain why I cannot agree to it.

Mr. Whitwell : A large number of petitions have been presented against the Bill, and the Bill has not been reprinted in sufficient time for honourable members to ascertain the opinions of their constituents. Whatever the English Pharmaceutical Society might have consented to, we have not had time for properly considering the Bill since it has been reprinted. I support the amendment.

The Chairman : The question is that I report progress, and ask leave to sit again. As many as are of that opinion will say Aye. (Cries of No.) The Noes have it.

Mr. Whalley : I challenged your decision.

The Chairman : The honourable member did not do so until it was too late.

Clause 2 was then agreed to.

Clauses 3, 4, and 5 were agreed to.

The Chairman : Clause 6.

Mr. Whitwell : In Clause 6, page 3, line 15, leave out "pharmaceutical" and insert "dispensing."

Sir Michael Hicks-Beach: No, sir; I must object to the amendment. The object of the Bill is to provide for the institution of a Pharmaceutical Society in Ireland to remedy a grievance that exists there, and is at present confined to that country, but they will have powers under this Bill by alteration in the bye-laws, sanctioned by the Privy Council, to make rules in reciprocity with the English Pharmaceutical Society. For that purpose I have adopted in the Bill the terms that are in the English Pharmacy Act, in order that the law might make no obstacle, if the two agreed, that the terms used should be the same. The English Society claims for itself, and very properly too, the use of the term "pharmaceutical" in England and Scotland, to which countries alone the operations of the English Society extend; but it has no more right to the exclusive use of the name in Ireland than has a surgeon or a physician. I can see no reason for the claim, and as I wish to prevent the possibility of any obstacle arising to prevent reciprocity between these two Societies, I must object to the amendment.

The amendment was negatived without a division.

Clause 6 was then agreed to.

The Chairman: Clause 7.

Mr. Errington : I have an amendment to this Clause which is not on the paper, and it has for its object to limit the period of office of the President and Council of the Society to one year.

Sir Michael Hicks-Beach : I have no objection to the amendment, with the addition that they may be re-elected.

Mr. Whalley : I beg to acknowledge the great attention that has been paid to the matter by the right honourable baronet, and so far he has met the objection I urged. I beg to say that I have visited my constituents specially in reference to this matter because they feel an injustice was being done to their profession. I have investigated the matter, and the right honourable baronet has met the objections so far as I understand them, subject to further inquiry.

The amendment was then agreed to, and Clause 7, as amended, was ordered to stand part of the Bill.

Clauses 8 to 33, inclusive, were agreed to.

The Chairman: Clause 34.

Sir Michael Hicks-Beach : I have an amendment to propose in this Clause to secure the rights of the licentiates of Apothecaries' Hall in Ireland, by preventing pharmaceutical chemists in that country from prescribing for patients.

The amendment was agreed to, and the Clause as amended was ordered to stand part of the Bill.

Clauses 35 and 36, and the schedule of the Bill were agreed to.

The preamble of the Bill was also agreed to, and the Chairman was ordered to report the Bill as amended to the House. The Chairman then left the chair, and the House resumed.

Mr. Whitwell: I hope a little time will be allowed before the report of amendments, for the pharmaceutical chemists of England to examine the amendments that have been made in Committee.

Sir Michael Hicks-Beach: Thursday next.

Mr. Whitwell: That will be quite time enough.

The amendments were ordered accordingly to be reported on Thursday next.

POISONING BY A VERMIN KILLER.

At the Durham Summer Assizes, on Thursday, July 8, Elizabeth Pearson, was indicted for the wilful murder of her uncle, James Watson. It appeared from the evidence that for twelve months previous to the time of his death, deceased had been living with prisoner and her husband. His death having taken place somewhat unexpectedly and suspicions having been aroused by the prisoner's behaviour, an inquest was held and a *post mortem* examination made, the result being that strychnine was found in the intestines by Dr. Scattergood, of Leeds, together with particles of Prussian blue and unbroken granules of starch.

At the trial the following evidence was given with respect to the purchase of the vermin killer, with which it is supposed the murder was committed:—

John Corner said : I am a grocer, living at Gainsford, I know the last witness. I supplied her with a packet of Battle's Vermin Powder, on the 17th March. A month before that I had supplied her with another. On the 12th April I supplied Superintendent Thompson with a packet. The packet was wrapped up in yellow paper and sealed. All the packets are wrapped up in the same kind of paper. I asked Jane Pearson what she wanted the packet for : she said for killing mice. When she came for the second packet I asked if she was going to poison herself. She said no ; the last packet had killed about a dozen mice. The word "poison" is printed on the paper.

The Judge: It is a great pity you have not brought a packet here to-day.

Cross-examined: The poison is meant for killing vermin, and is pretty well known in the trade. People buy it when they want to destroy mice.

By the Judge: The first packet sold to Mrs. Pearson was not entered in the sale of poisons book. I made an entry of the second.

The Judge: I should recommend you to be very careful what you are doing in the future. It is a very dangerous article to sell, unless you take proper precautions.

Superintendent Thompson deposed to the purchase of two threepenny packets of Battle's Vermin Killer and forwarding them to Dr. Scattergood, who deposed that he had analysed one of them and found it to contain 10·7 per cent. of strychnine, and 4·7 per cent. of Prussian blue, together with wheaten flour.

John Corner recalled and examined respecting the two packets of the "killer" he sold to Superintendent Thompson, said they were wrapped in papers like those produced. The packets he sold to Jane Pearson were enclosed in the same kind of wrapper, and were of the same shape and size as those sold to the superintendent. There was a white paper inside. He did not know anything about them, as he sold them sealed up.

Eventually the prisoner was found guilty and sentenced to death.

Reviews.

A MEMOIR OF THE LADY ANA DE OSORIO, Countess of Chinchon and Vice-Queen of Peru, with a plea for the correct spelling of the Chinchona genus. By CLEMENTS R. MARKHAM, C.B., F.R.S. London: Trübner and Co. 1874.

Few occupations are more agreeable than the contemplation of a well-trained intellect when turned aside from the trim gardens in which it dwells on ordinary working days, to disport itself by scampering over the wide fields of fancy, scrambling among the hilltops of speculative thought, or burrowing amid the relics of the past. Of this unbending of the bow, Mr. Clements Markham's book on the introducer of Peruvian Bark to Europe supplies a most pleasant instance. Those who know Mr. Markham only as an enthusiastic geographer, and as the author of that marvellous blue book on the Moral and Material Condition of India which appears yearly to delight those who take an interest in the affairs of our Eastern Empire, would hardly be prepared to hear that he, when at leisure, loves genealogies, dwells with reverent eye upon heraldic bearings, and is not satisfied until he has demonstrated the sixteen quarterings of his heroine. From a psychological point of view, it is exceedingly interesting to watch the workings of the scientific mind when engaged in the task of telling a story—a plain narrative. In every part of the Memoir of the Lady Ana de Osorio crops out the inclination to begin at the beginning, a method scientific perhaps, but hardly attractive enough to enchain the attention of the reader. As the book purports to be the memoir of a lady, and not a disquisition on quinine, we can hardly complain that it adds nothing to the history of cinchona, but for all that we cannot resist the remark that Mr. Markham is a long time in getting to the core, or rather to the bark, of his subject. He does not quite begin with Adam, but is content to trace the family of Osorio to Nebuchadnezzar, from whom probably a love of vegetable productions was transmitted to his descendants. An Osorio appears at the battle of Clavijo, and one of his successors becomes a Count. Another turns up as a smiter of the English, when John of Gaunt, "time-honoured Lancaster," claimed the throne of Castile by right of his wife—the daughter of Peter the Cruel. The English, it seems, were driven into the village of Valderas. The astute inhabitants of that village left their cellar doors open and put a quantity of salt into the wine. The more the English drank the more thirsty they got, until they became insensible and were easily killed; but despite this mishap, John of Gaunt succeeded in getting his expenses paid, and his daughter, Catharine, married to the heir of Castile. Various stories are told us of the great warrior who discomfited the English at Valderas, and we are then compelled to work our way gradually on from father to son through a terribly wearisome genealogy. We read of Osorios who were assassinated, and of Osorios who were poisoned after the pleasant custom of the good old times, of Alvaro, the early riser, first Marquis of Astorga, of the second "of that ilk," who wrote couplets, becoming a person of quality, and of Alvarez Osorio, who, when Rome was sacked by the army of the Constable de Bourbon, and Pope Clement took refuge in the castle of St. Angelo, stood at the door with a drawn sword and a speech—the latter of which speedily dispersed the enemy. In recognition of this service the Pope gave him a piece of the winding sheet of Lazarus, and an emerald salt cellar, which was entailed as a heirloom. Pedro Alvarez Osorio, eighth Marquis of Astorga, was of extremely blue blood—"*sangre muy azul*"—for no less than two of his grandfathers and one of his grandmothers were Osorios—a bit of in-and-in breeding which, against all theories, produced "a nobleman of cultivated taste and considerable ability," the father of the Lady Ana de Osorio. This beautiful girl was married at the age of sixteen to Don Luis de Velasco, grandson of the first Marquis of Salinas—an old gentleman who had been once Viceroy of Peru, twice Viceroy of Mexico, and then was President of the Council of the Indies at Seville. Within four years the husband of Lady Ana succeeded to his title and his grave, and the beautiful widow, after the lapse of two years, married another great nobleman, Don Luis Geronimo Fernandez de Cabrera y Bobadilla, fourth Count of Chinchon. This marriage is made by Mr. Markham an excuse for treating his readers to the genealogy of the Counts of Chinchon—a freak for which the only excuse is that Mr. Markham went one day from Madrid to the village of Chinchon in an omnibus, and passed his time in gazing at the sculptured arms of Cabrera y Bobadilla till he became infected with the *genius loci.* The Bobadils did not quite begin with Nebuchadnezzar, but they are tiresome enough, and it is with a sigh of relief that we arrive at last at the fourth Count of Chinchon, who became the husband of Notre Dame de Quinine. On Wednesday, September 13th, 1623, they entertained at the Alcazar of Segovia no less important personages than "Baby Charles and Steenie," then on their Spanish jaunt, and at supper gave them "certaine trouts of extraordinary greatnesse." In 1628 the Count of Chinchon was appointed Viceroy of Peru, and the Count and Countess made their solemn entry into Lima on the 14th January, 1629. The viceroyalty of Chinchon was signalized by three events: a rebellion among the Indians inhabiting the rushy fastnesses of the great lake Titicaca, the navigation of the Amazon, and the discovery of Peruvian bark. Mr. Markham is confident that this famous febrifuge was "unknown to the Indians in the time of the Yncas," and insists on what is after all merely negative testimony—the omission of all mention of it by the Ynca Garcilasso and by Acosta in their lists of Indian medicines. The itinerant native doctors appear to have been ignorant of its virtues, which, however, were appreciated by the Indians round Loxa—a town in the Andes about 230 miles south of Quito. A Jesuit is said to have been cured by it at Malacotas, near Loxa, as long ago as 1600; but this much is certain, that in 1636 an Indian of Malacotas revealed the secret virtues of the *quinquina* bark to the Corregidor Cañizares. In 1638, therefore, he sent a parcel of it to the vice-queen, and the new remedy administered by her physician, Dr. Don Juan de Vega, effected a rapid and complete cure. There is a tradition that the particular species from which the bark was taken which cured the Countess of Chinchon was that known as *Cascarilla de Chahuaguera*, a variety of the *Cinchona officinalis* of Linnæus, which has been successfully introduced into India. *Apropos* of this Mr. Markham observes that "there are four alkaloids with febrifuge virtues in the Peruvian bark—quinine, quinidine, chinchonine, and chinchonidine," and that the presence of the last named "probably contributed to the cure of the Countess"—a perfectly safe statement as to the virtues of cinchonidine, which is more than can be said for the following prophetic but not altogether accurate passage:—"It is now understood that, owing to its being at the same time as efficacious as, and cheaper than quinine, the chinchonidine will eventually be the chief agent by which health and the cure of fevers will be diffused among the vast population of British India." Now, without speculating on the future of British India—a subject on which Mr. Markham's opinion is worthy of the highest respect—we may venture to point out to him that cinchonidine by no means proved equal in curative power to quinine when, in 1866, the Madras Government appointed a Medical Commission to test the respective efficacy in the treatment of fever of quinine, quinidine, cinchonine, and cinchonidine. The difference in remedial value of the four alkaloids was stated by the ratio of failure per thousand cases treated—quinidine having failed, six; quinine, seven; cinchonidine, ten; and cinchonine, twenty-three times. From other considerations, however, than that of relative strength cinchonidine is now bought more freely than of old.

It is hardly necessary for us to recapitulate how the

Countess of Chinchon returned to Spain in 1640, nor to note that the powdered bark was at first called *Pulvis Comitissæ* in honour of her, especially as Mr. Markham has set his heart on altering the spelling of *cinchona*. For our own part we regard language as so much of a living, moving, growing thing that we are disinclined to attach much importance to spelling at all, and have certainly very little sympathy for Mr. Markham's project for altering the spelling, scientifically and commercially recognized as correct, in order to introduce an extra h in cinchona. Many very good authorities side with Mr. Markham, whose spelling is undoubtedly correct, but for all that, we are inclined to think the matter too insignificant to provoke serious discussion. Linnæus made a blunder, as Europeans nearly always do when they try to put dog-Latin in the place of an original Indian name. Quina, or quinquina, did well enough, was easier both to write and to pronounce, than cinchona, and after all the alteration of Linnæus and others is immortalized in quinine, which in real practical importance is to the other alkaloids of quina bark "as London is to Paddington." Touching this subject of following foreign spelling we may add that the habit of pronouncing foreign places after the manner of the natives is becoming somewhat of a nuisance. Italians and some Englishmen say Pavía, but how would these lines look ?

"'Twas after dread Pavía's day
When Fortune left the brave François."

What would be thought too of an Englishman who should leave the final s out of Lyons, and pronounce Rheims with the true French accent ? We merely suggest these examples to Mr. Markham as indications that it may perhaps be well for a little while longer to pronounce Andalusia otherwise than as Andalusía and to write—when we are writing English—Peter the Cruel rather than Pedro el Cruel.

TRAITÉ PRATIQUE DE LA DÉTERMINATION DES DROGUES SIMPLES D'ORIGINE VÉGÉTALE par G. PLANCHON, docteur en médecine, docteur ès sciences, professeur à l'école supérieure de Pharmacie de Paris. Paris : F. Savy. 1875. (T. I., pp. 664 ; T. II., pp. 535 ; with numerous woodcuts.)

(A practical treatise for the identification of the drugs of vegetable origin.)

A few months ago we had the opportunity of reviewing the 'Pharmacographia,' by Hanbury and Flückiger (see *Pharmaceutical Journal*, November 14, 1874, 397) without being aware that it would be so soon followed on the other side of the Channel by a text-book on the same branch of pharmaceutical science. It was stated in the review just alluded to, that the authors of the 'Pharmacographia' were well qualified for the special researches to which their book is devoted. Professor Planchon, likewise, is no doubt the most competent man on the subject among the French ; he was a personal friend of the late Daniel Hanbury, and is still so related to the collaborator of the latter. It is a matter of interest therefore to show how differently one and the same subject has been treated by these three authors. In the first place it must be granted, however, that it is scarcely possible to compare Professor Planchon's book with the 'Pharmacographia ;' he states expressly that his task consists in exhibiting the leading features of each drug in order to identify it with certainty in that form exclusively in which it is used in pharmacy.

The scope of such a work is, of course, much narrower than that of the 'Pharmacographia,' and required simply an exact enumeration of facts which lay openly before every observer, whereas the authors of the 'Pharmacographia' sought to afford observations and researches of their own, together with such results of an important character as are to be derived from the works of other writers on materia medica. Professor Planchon's treatise is especially devoted to students not yet exactly acquainted with drugs ; the 'Pharmacographia' would be misplaced in the hands of many pupils of average knowledge, zeal, and experience. Yet Planchon's book will certainly mark a considerable progress of the knowledge of the materia medica as hitherto professed in France. The author himself was, in 1869, the editor of a new edition of Guibourt's 'Histoire naturelle des Drogues simples,' for many years the standard text-book of the French pharmacy. Guibourt was no doubt, in his time, the most eminent pharmacologist, except only Pereira, whose knowledge, we may say, was much more extensive. But Guibourt, although he was an extremely careful observer of every fact in connection with drugs as far as they were accessible to the naked eye or the lens, neglected the use of the microscope. He was utterly ignorant of the great progress which had been realized in his science by means of microscopic researches due to Pereira, Weddell, Schleiden, Oudemans, Berg, and others. In Germany especially materia medica was no longer professed without constant recourse to the microscope.

Now, by the 'Traité pratique,' Professor Planchon intends to introduce into France the same plan of studying his science. This certainly is a great merit ; he affords no new original matter and restricts himself merely to structural or physical characters either immediately observable or requiring the armed eye. But the student examining the drugs attentively under Planchon's guidance will certainly get a thorough impression of the individual character of each herb, root, seed, bark, or other drug he ever will be expected to deal with. There are very numerous excellent woodcuts scattered through the two volumes, all of them very nice looking. Some of them, however, contribute but very little to the information of the student. Thus, for instance, what can be the use of an even good figure of star-anise (T. I., p. 273), or of a thorn-apple (I. 202) ? Nor can we understand why the author furnishes a few botanical sketches, such as for instance that of the pepper-vine (T. I., 344), or that of colchicum flower (I. 265), or of the cotton plant (II., 113). The general rule, as the author himself says in the preface, does not require a botanical description of the mother-plants of drugs. Yet the figures for the most part refer to the prominent characters of the drugs themselves, and are excellent illustrations of the author's verbal descriptions. The figures are very irregularly distributed ; the first volume contains not less than 280 woodcuts, the second only about 20. The tissues of most of the barks, for instance, are well exhibited by good drawings, yet not so the structure of the most important among them, namely the cinchona barks. This is the more striking as a good deal of Professor Planchon's scientific reputation precisely depends upon his able pamphlet on cinchonas.*

The second volume is partly devoted to "products of the vegetable kingdom," viz., sugar and manna, gums, resins, oleo-resins, essential oils, fatty matters, dyes, milk-saps, extracts (cutch, gambier, aloes), pulps (guarana and tamarinds). This part of the work is necessarily less complete than the descriptions of those drugs which are provided with the characters of organic tissues. The full "identification" of gums, essential oils, fatty matters, and most of the substances described by the author in the class of "*produits retirés des végétaux*," requires certainly much more exact chemical and physical knowledge and skill than the author displays in this part of his book. We believe it would have been much safer to omit these substances altogether ; every good chemical text-book will no doubt afford a much more satisfactory description of linseed oil or castor oil, for instance, or of essential oil of anise or of cloves, than that met with in this book. It is somewhat strange that Professor Planchon furnishes no particulars at all respecting the manufacturing of essential oils, which is so extensively carried on in the south of his own country. The book, on the other hand, is quite different from so many other French books in giving mostly the correct spelling of English and other foreign *nomina propria.* We may, however, except Drymis, which ought to be written *Drimys,* Mr. Carteusen (T. II., p. 176), the British Vice-Consul at Mogador, whose name is *Carstensen,* and the names of a few German writers, which are not quite correctly quoted. The book is provided with a good table of contents and a very copious index. The work, on the whole, appears to be well appropriated to become the text-book of the French student; from an English point of view we must be struck with the enormous bulk of herbs, flowers, roots indigenous in France, contained in the book, which are quite out of use with us. Are they really to be met with in French "pharmacies?" What's the use of, say, *Ruta muraria,* of holly leaves, of *Alchemilla vulgaris, Vinca minor, Portulaca,* flowers of Dianthus, *Calaguala* root, and other very numerous plants or parts of vegetables, which are entirely unknown in British pharmacy?

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* 'Des Quinquinas.' Paris et Montpellier, 1864. 150 pp.

Obituary.

Notice has been received of the death of the following:—

On the 14th June, 1875, when on a visit to London, Mr. James Lewis, Chemist and Druggist, Market Square, Narberth. Aged 31 years.

On the 20th June, 1875, Mrs. Elizabeth Walker, Chemist and Druggist, of County End, Lees, Yorkshire, aged 52 years.

On the 4th July, Mr. Cornelius D. Garbutt, Pharmaceutical Chemist, of Gateshead-on-Tyne, aged 46 years. Mr. Garbutt had been a Member of the Pharmaceutical Society since 1853.

On the 12th July, 1875, Mr. John Arthur Coulson, Chemist and Druggist, of Scarborough, aged 53 years.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE IRISH PHARMACY ACT.

Sir,—As an Irishman and a registered chemist for England allow me to say that my opinion coincides with that of the majority at the last Council meeting. The title "pharmaceutical chemist" is undoubtedly the property of the English Pharmaceutical Society. The Society has laboured for it and acquired a right to it by time and qualification, and no body of men in the United Kingdom has any right either to rob it of that title or share it without being properly qualified and examined by the parent Society.

In looking at the justice of the case we must bear in mind that in Ireland there are no vested interests and rights and no body of chemists and druggists capable of dispensing or allowed to dispense prescriptions. It was not so in this country before the passing of 1868 Pharmacy Act. Here we had a large body of chemists in actual business as compounders of physicians' prescriptions and conversant with every pharmaceutical preparation. On the other side of the Channel chemists and druggists, except in some of the large cities, are merely sellers of common drugs, drysalteries, and paints. It is only a couple of years since I saved a person from being poisoned through the ignorance of an Irish druggist. The affair occurred in the largest druggist's shop in an Irish city, where one of the shopmen was illegally compounding a prescription containing liquor hydrarg. perchlor., and instead of the well known formula containing half a grain of corrosive sublimate to the ounce of solution, he was actually using the test solution of the 1864 Pharmacopœia, with twenty grains to the ounce. To my own knowledge a family in Dublin was poisoned by a druggist giving arsenic instead of sodæ carb., and I have more than once seen the arsenic drawer in juxtaposition with drawers of drugs in common use. All this of course shows the want of a "Poisons Act," but it cannot show the necessity for a number of persons who never practised pharmacy, or dispensed prescriptions, arrogating to themselves the title of "pharmaceutical chemist," and vaulting, by Act of Parliament, into the same saddle with a tried and time-honoured Society. Even the title "dispensing chemist" will be anomalous to begin with as there are no dispensing chemists in Ireland. There may be a few chemists in Ireland who are on the English register, and there are assistants who hold the dispensing qualification from the Dublin Apothecaries' Hall, but these cannot dispense in a druggist's shop, and they are all, or nearly all, attached to apothecaries' establishments. Either the Apothecaries' Hall of Ireland or the Pharmaceutical Society of Great Britain could or should have filled up the want of dispensing shops, if such a thing were absolutely required, and that I deny. There is no living to be had by a dispensing chemist in any of the small towns in Ireland. A man must sell ironmongery or grocery if he wants to eke out a miserable subsistence. Every village possesses a free dispensary, where medicines and advice are supplied gratis, and every large town possesses several apothecaries' shops, and these apothecaries are the true pharmacists of Ireland. I served some years myself in an Irish apothecary's shop where nothing but officinal preparations were in use. There was no such thing as selling soaps, toothbrushes, and perfumery, etc., in my time, but the thorough knowledge of dispensing acquired in my youth enabled me in after years to follow the calling of a chemist and druggist here. Had I been in an Irish paint and drug shop, I could not possibly have done so.

If our liberal Conservative Government really means to give Ireland "Home Rule," it has begun at the wrong end. Let the countries be separated and then Irish druggists can call themselves by whatever name they choose. But until that event actually occurs, don't let them rob an old and chartered society of its greatest honour—its good name.

HIBERNICUS.

PHARMACEUTICAL TITLES.

Sir,—If you will pardon me again encroaching on your space, I would add a few words on the subject of my former letter, and the kindred one of the "Major Qualification" with which it has been connected.

I am but little surprised that the query as to what letters attached to a name would, in the least troublesome and most proper way indicate that a man is a pharmaceutical chemist, should have called forth such petulant and envious comments and scraps of advice as your readers have been favoured with.

Having in my time had experience of the "nothing but vanity" of a class of men whose ambition begins and ends with the affixing of an array of letters to their names, and, like "Urtica," having seen the reverse of the medal, and knowing how easily some highly-thought-of titles can be procured, and how little they may mean, I could sympathize with some of the remarks if applied to such; but, Sir, the title I speak of is not meaningless.

If "Pharmaceutical Chemist" is not known and respected it is certainly not the fault of those who have passed the Society's examinations within the last few years; neither, I think, is it their fault that there exist both "Pharmaceutical Chemists" and "Chemists and Druggists" who are neither pharmacists nor chemists, and whose only qualification is their title, and the weight of whose scientific ignorance the rising generation must struggle under. But since the present is but a transitory state, time will eliminate this class, and the day is not so far distant when the pharmaceutical chemist will be a man who can be confidently consulted or appealed to in the many questions of medical or sanitary chemistry that constantly arise, instead of, as now, in some towns being avoided as the "fossil" of the craft.

I think, therefore, it is much to be regretted that the title Ph.C., or whatever may be the correct contraction, is so little used by the more eminent writers to the Journal. I would humbly remind them that it is by such as they thinking Ph.C. not unworthy of their use that the body of the trade, and, through them, the public, will ultimately respect it. So long as pharmaceutical chemists prefer titles which may be procured—I should scarcely like to say how easily—and neglect the one that so many have worked so hard to make what it is, and others are willing to study hard to procure, it is not astonishing that what I know to be a pretty general feeling throughout the trade should find expression in the *cui bono* of "Urtica."

That anything more than the title can be given by the Society for the extra study and the five guineas I greatly doubt. The F.P.S. suggested by Mr. Penney has long ago been discussed and dismissed; still, some genius may yet discover how the Society may "grant higher privileges" to Majors, but to create a new title is only to create a new mystery, and to be regretted, since I feel that the public are already half educated into the recognition of the pharmaceutical chemist, and if we will but have patience, and work, it may astonish us how soon undreamt of honours may follow the Ph.C.

Since the title is all that is given for the extra study and cost, let every pharmaceutical chemist make it his endeavour to make his title an honourable one. This, I think, is the only answer to "Urtica." Those who take the Major qualification now are in one sense working for posterity, and as we stand in a position gained for us by others, let us, whether "Ph.C." or "Old Chemist and Druggist," not be backward in giving our unit of influence to the Society to which our future is confided, either as support or constitutional opposition.

I consider there are but few who use the sophistry of "T. T." even to themselves. Passing three examinations, and parting with ten guineas is not generally considered a process by which of itself "pleasure, satisfaction and benefit" is to be "derived," neither is it a mode of gaining scientific knowledge. If you will permit a little egotism I will best answer your Trowbridge correspondent by detailing some of my own experience, prefacing this chapter from my hitherto unwritten autobiography with the precaution that my name need not be searched for on the register in the guise I have written it at the end of this letter; yet to many of those who know me, the said signature will not obscure my individuality, and to those who do not, it is sufficient they be assured that I speak the truth.

Having served my apprenticeship and attended classes, I considered that I knew my business, though I had no definite intention of taking the "Major," as these events happened before the passing of the Pharmacy Act of 1868, but latterly I became possessed with the ambition to obtain the Ph.C. qualification, which I concluded would convey at once to those with whom I came in contact what otherwise they might take weeks of intercourse to discover, even if they were qualified to judge. Accordingly, I rubbed up my rusty spots, took three months of a classical 'grinder,' duly passed the examinations, paid my ten guineas, and got my diploma, and I may say *en passant* that I don't think I have ever invested money to more advantage; it soon returned to me tenfold—but perhaps my case is peculiar. Will "T. T." say that I should have endeavoured to keep the value of the barren title in the background and studied for the sake of study, and paid my hard-won ten guineas for the sake of paying? I trow not, I was born "too far north" to think of any such nonsense, I reckoned that if I possessed the title, I could make a certain commercial use of it, just as most others do who possess titles. I procured it, stuck it to myself, just as "T. T." may affix a label to show at a glance the contents of a vessel, and since that time I have been selling said "contents" to very satisfactory advantage, so that I look upon it as a most auspicious day when I was dubbed "pharmaceutical chemist."

In concluding what I fear has proven too lengthy an epistle, let me say I would wish to have it known and felt amongst ourselves that this higher title is now one to be coveted, and the public recognition is sure to follow; but I would again plead with those who could by their undoubted attainments shed lustre on any profession, not to consider themselves above its use. I think it is a duty they owe to the society whose welfare they have at heart, and to the trade whose every member's ambition is, I am sure, to be considered a co-worker, however humble, with such as they.

G. E. HUET.

[*** Two other correspondents writing under the names "Vanity" and "Litmus," send instances of the absurd use of tails which have no real value, even if they possess any intelligible significance. In one of the instances mentioned the number of letters amounts to no less than nineteen, and they are followed by the words "by examination." Such a practice is instigated by motives very different from those which are justly regarded as commendable in the above letter.—ED. PH. JOURNAL.]

J. Hessell.—The term "equivalent weight" is incorrect as regards the numbers used in the new system; these do not generally represent equivalents, but relative atomic weights, which are totally distinct things.

A. D. P.—We are not aware that in respect to the income tax, Associates of the Pharmaceutical Society stand on any footing different to that of the rest of Her Majesty's subjects.

T. Hope.—*Thalictrum flavum.*

Alf. B.—(1) *Galium verum*; (2) *Lamium purpureum*; (3) *Plantago major*; (4) *Sedum acre*; (5) *Fumaria officinalis*; (6) *Sedum anglicum*; (7) *Galium cruciatum*; (8) *Centaurea nigra*; (9) *Prunella vulgaris*; (10) *Stellaria graminea*; (11) *Galium saxatile*; (12) *Holcus lanatus*; (13) *Sisymbrium officinale*; (14) *Lepidium Smithii*; (*a*) *Honkeneja peploides*; (*b*) *Trifolium arvense*; (*c*) *Filago germanica*; (*d*) *Sedum acre*; (*e*) *Salicornia herbacea*; (*f*) *Jasione montana*; (*g*) *Lotus corniculatus*; (*h*) *Aira caryophyllea*; (*o*) *Agrostis alba.*

G.—*Samolus Valerandi*, remarkable in the Primulaceæ for showing scales which are supposed to be modified stamens alternate with the lobes of the corolla.

R. T.—The address of the London Temperance Hospital is 112, Gower Street, W.C.

R. F. M.—Genuine degrees are conferred by all the German universities; but by some of them degrees are granted *in absentia*, a practice which renders the degrees of those universities comparatively worthless out of Germany.

G. Dobson.—We know of no experiments that would justify us in saying that deterioration takes place, but as a rule it is advisable that tinctures should be used which are fresh.

C. H.—Ext. Cinchonæ Flavæ Liquidum.

R. W.—"Boldo" consists of the leaves of *Peumus Boldus*, Mol., and "Jaborandi" of the leaves of *Pilocarpus pennatifolius*, Lem. See articles in vol. v., pp. 405, 564, and 581.

G. W. Watt.—(1) *Matricaria Parthenium*; (2) *Deutzia scabra*; (3) *Potentilla fruticosa*; (4) *Geranium Robertianum*; (5) *Vicia sepium*; (6) *Geranium pratense*; (7) *Veronica officinalis*; (8) *Galium saxatile*; (9) *Potentilla tormentilla.*

G. C. Druce.—(*a*) *Anthroxanthum odoratum*; (*b*) *Arrhenatherum elatius*; (*c*) *Bromus erectus*; (*d*) *Kœleria cristata*; (*e*) *Agrostis vulgaris*; (*f*) *Poa nemoralis*; (*g*) Yes; (*h*) *Juncus acutiflorus*; (*i*) *Carex disticha.*

Sphinx.—We believe the colour is generally due to the presence of copper, and that the method of preparation is to heat the oil for a considerable time in a copper pan.

W.S.W.—(*a*) *Geranium sanguineum*; (*b*) *Medicago sativa*, probably, but the pod should have been sent; (*c*) *Lapsana communis*; (*d*) *Chærophyllum temulum*; (*e*) *Chiococca racemosa*, not British; (*f*) *Mercurialis annua*; (*g*) *Ranunculus acris*, probably, no calyx; (*h*) *Epilobium angustifolium*; (*i*) *Malva sylvestris*; (*j*) *Fumaria officinalis*; (*k*) *Lycium barbarium*, not British.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ*. A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Shields, Mr. J. F. Stanford, Mr. Robertson, Mr. J. James, "Dispenser," "Litmus," "Vanity," A. A.

THE INDIA MUSEUM AT SOUTH KENSINGTON.

After having for some years remained stowed away in the upper stories of the new India Office, the collections of the products and specimens of art from India are now placed in a position where they will probably attract more notice, and be the means of making better known to the general public the vast resources of our rich, but not too well explored, Eastern Empire.

The India Museum was founded by the directors of the East India Company, in 1798, and was then located in Leadenhall Street. In 1860 it was removed to Fyfe House; and in 1869 to the India Office. Even its present position at South Kensington, in the galleries of the Exhibition building, is but temporary, the rooms having been leased from Her Majesty's Commissioners for the short space of three years only. But the present locality of the collections will serve the purpose of bringing them into view, preparatory to their final classification. It is to be hoped, however, that ere the three years have elapsed the energetic efforts of the able director of the museum, Dr. Forbes Watson, will meet with success, and that permanent accommodation in a position nearer to the great centres of commerce in the city will be provided for these valuable and interesting collections.

There are two public entrances to the galleries in which the museum is located: one by the French annexe, which is nearly opposite to the large red building of the South Kensington Museum, and the other by the orchid-house entrance to the Royal Horticultural Society's Gardens. On Wednesday and Thursday the charge for admission is sixpence; on the other four days of the week it is one penny. For the same small sum a useful little guide is officially issued, which explains briefly the arrangement adopted, and enables the visitor to find without much difficulty the various objects of which he may be in search.

The collections occupy altogether ten rooms, each of which is numbered; five of these rooms are on the ground floor, and five in the second story.

The purpose of the present article is to give a sketch of the general arrangement adopted; in future articles it is intended to refer more particularly to those Indian products which are likely to be of special interest to pharmacists.

On entering the building by the French annexe the first thing that strikes the eye is a collection of old Indian sculptures, which appear to be cut in a kind of soft limestone, and although somewhat rubbed, give one a good idea of the style of ornamentation of the ancient Hindoo temples.

In room No. 1 the vegetable products of India are exhibited. Throughout the length of the room, and alternating with the cases, are a number of stands, from each of which radiate—being hung to the stands in a perpendicular position by means of freely moving hinges—several metal frames. These frames are filled with numerous small glazed tin boxes which contain samples of the various native products. In this way a large number of articles are shown in a very small space. It needs only to examine one of these stands to realize the danger of becoming bewildered by the variety of articles contained in them. Native grains used for food, gums, resins, oils, fibres of all kinds, native materia medica, fruits, horticultural seeds, and a multitude of other substances put forth their individual claims to a much closer investigation than can be accorded to them in a first or many succeeding visits.

The principal articles of trade have larger space allotted to them in central cases. Of these, tea, opium, india rubber, tobacco, rice, indigo, and spices are well represented; cinchona bark from the Neilgherries and Kangra plantations also occupies a prominent position. The agricultural implements used by the people of India, their domestic, culinary, and other apparatus, occupy the wall cases, while the life of village communities, and the processes of agriculture are well illustrated by a set of photographs and by a series of sepia drawings by Mr. Kipling.

The vegetable products are also accompanied by excellent coloured engravings, and by photographs showing the outline and relative size of the various trees yielding them. These are placed chiefly on the central cases. By the aid of this judicious arrangement a very good idea can be obtained of the general appearance and habit, as well as of the distinctive characters of the useful trees of India, such as would enable any intelligent traveller in that country to readily recognize them in the growing state.

The series illustrating cotton, which is exhibited on the left-hand side, at the upper end of room No. 1, may be taken as an instance of the complete manner in which it is intended to illustrate the various native and cultivated products. Every step in the cultivation of the plant, from the sowing of the seed to the maturity of the fruit, the implements used and the manner of using them, the various stages of manufacture through which the cotton passes until it ultimately arrives at a marketable state, as well as the secondary products obtained, such as cotton-seed oil, cotton-seed cake, and paper, are here fully illustrated, so that a careful observer has the opportunity of learning more in a short time from these specimens and drawings than could be derived from hours of reading. To illustrate all the principal articles of Indian trade in this way will necessarily be a work of time, since many of the drawings must be made upon the spot, and photographs of the trees can only be taken in the districts in which the trees grow. There can be no question as to the value and the amount of instruction that may be conveyed to the public mind in this simple and natural way, and when the descriptive catalogues now in hand are published, the India Museum will undoubtedly rank high among the national collections.

Another interesting feature in this museum is a collection of the insect pests inimical to agriculture. It is intended to supplement these by specimens illustrative of the various fungi which destroy cultivated plants. The insects are in some instances accompanied by sketches of their appearance in the caterpillar and chrysalis state, the importance of which is obvious, since until the life history of these plagues is known it is impossible to combat their ravages. Specimens of the natural enemies of these insects, such as bats, birds, etc., would render this portion of the collection still more interesting.

In passing through this room, one cannot help noticing how few of the products of this vast country are yet known in commerce, and, considering that this collection is by no means complete, to how great an extent it is possible for the resources of India to be developed.

In room No. 2 are exhibited specimens illustrating the mineral products of the various districts as well as the physical geography of the country. The central cases are occupied by metallic ores and substances used in pottery. In the metallic group appear iron, copper, antimony with silver, chromium, copper, and gold; the specimens of magnetic iron ore and iron sand being especially numerous. The graphite from Ceylon seems to be of very good quality and the native sulphur from Rangoon and Chusan is remarkably pure. The materials used in the art of pottery and enamelling are illustrated by numerous specimens of China clay, that from Coringa appearing to be of excellent quality, and by the various native and other pigments used in the process of enamelling; these are accompanied by specimens of encaustic tiles. The cases at the end of the room are filled with varieties of building stone and coal, some of the latter mineral being of remarkable purity; a specimen from Rurhurbali, containing only 8 per cent. and another from China Kuri only 11 per cent. of ash. The precious stones occupy the wall cases, garnets, cornelians, chalcedony, cats'-eyes and cairngorms being the more abundant, while corundum and emery are also represented.

Room No. 3 is occupied by the offices of various departments. It is intended to fill up the space on the side of the room opposite to the offices with models of engineering works.

Rooms No. 4 and 5 contain the zoological collections, including mammals, birds, fishes, and insects. The whole of these were formerly kept in closed boxes, in the cellars of the India Office, and therefore have not, until now, been readily accessible to working naturalists. The animals are so grouped that the visitor can readily notice the preponderance of any particular tribe.

Room No 4 contains chiefly the fishes, among which may be noticed the *Polynemus Indicus*, one of the fishes furnishing Indian isinglass.

In Room No. 5, one of the central cases contains various birds, among which the hawk tribe preponderates, and another contains monkeys. Among the birds the thrush tribe is remarkable for the brilliant colouring of the feathers, as compared with the sober tints of our English species.

The window recesses are occupied by cabinets of insects and specimens of leather made from various animals. Silkworms of different species and the various qualities of silk produced by them are fully illustrated both by specimens and drawings. The collection of insects presents several species of remarkable beauty, the elytra or wing cases of some of the beetles in particular being very resplendent, and made by native artificers into extremely pretty ornaments. A notice of several insect products such as shellac, galls, honey, wax, etc., which have special interest for pharmacists, will be reserved for another article.

The whole of the upper gallery, including rooms No. 6 to 10, is devoted to the illustration of objects of art and manufactures. No. 6 contains specimens of richly coloured carpets, gorgeous embroidery and delicate muslins; the walls being decorated with sketches of the craftsmen of West India engaged in their various employments, and of the modes of wearing different styles of dress by the natives.

Room No. 7 contains some very pretty specimens of sandal wood, porcupine quill, ebony inlaid work, valuable vessels and ornaments carved out of rock crystals, jade, and soapstone, and a collection of musical instruments of most extraordinary forms.

In room No. 8 may be found illustrations of oriental jewellery and some very beautiful specimens of inlaid marble. In the central case are numerous specimens of gold and silver filagree and other work. The inlaid marble chess boards in this room are remarkably handsome.

In room No. 9 is exhibited a collection of murderous-looking weapons of most curious workmanship, and of every imaginable shape. One side of this room is occupied by a case illustrating the various articles of furniture to be found in the house of an Indian nobleman. Among these may be noticed a magnificent set of chessmen beautifully carved in ivory.

Room No. 10 is occupied by various articles manufactured from silk, and curiosities of a most miscellaneous description, including idols, coins, sculptures, etc. The walls are decorated with a large number of photographs, representing the cave temples of India and other illustrations of Hindoo architecture, some of these being of considerable beauty.

(*To be continued.*)

NOTES ON INDIAN BURSERACEÆ.

BY ALFRED W. BENNETT, M.A., B.Sc., F.L.S.,

Lecturer on Botany, St. Thomas's Hospital.

As a sequel to the "Notes on Indian Simarubeæ," in the *Pharmaceutical Journal* for April 12th and 26th, and May 10th, 1873, I propose in the present paper to give an account of the botanical characters and economical products of the Indian species of Burseraceæ, derived also from my knowledge of the order gained in working up the materials in the Kew Herbarium and elsewhere for Dr. Hooker's 'Flora of British India.' Although not furnishing so large a number of drugs as the Simarubeæ, the order is of great importance, as supplying a variety of valuable fragrant gum-resins, including a large proportion of those employed in making the incense used in the worship of the Roman Catholic and Greek Churches, as well as to a smaller extent medicinally. Notwithstanding recent researches, considerable doubt is still attached to the source of some of these resins which are imported in large quantities into this country. Further identification on the spot of some of the Indian species is also still required; this remark applying especially to the genera *Canarium* and *Santiria*, of which a number of species are described for the first time in the 'Flora of British India' from the rich stores sent over to the Kew Herbarium from the Malayan Peninsula by the late Dr. Maingay.

The species of Burseraceæ are almost always lofty trees, rarely shrubs, generally with small flowers, and large unequally pinnate or rarely trifoliolate alternate leaves, yielding spontaneously, or by incision in their stems, balsamic resinous substances often with stimulating properties. The number of genera is about 16, and of species from 160 to 180, distributed over the tropical regions of both hemispheres, the larger proportion in the New World. They have been included by several writers under the orders Amyrideæ and Terebinthaceæ, having very near alliance to the genera Amyris and Anacardium. Lindley, who adopts the former view, includes them in his alliance "Rutales" of Hypogynous Exogens; Bentham and Hooker place them along with Simarubeæ in the cohort "Geraniales" of the anomalous series Discifloræ. The following is a diagnosis of the order:—

ORDER BURSERACEÆ, *Kunth.*

Trees or shrubs, often lofty, abounding in resinous or oily secretions. Leaves alternate (very rarely opposite) unequally pinnate or trifoliolate (very rarely unifoliolate), stipulate[*] or exstipulate. Inflorescence racemose or paniculate. Flowers regular, small, hermaphrodite or often polygamous. Calyx free, 3—6-lobed, imbricate or valvate, often minute. Petals 3—6, distinct, rarely connate, imbricate or valvate. Disc annular or cupular, usually conspicuous, free or adnate to the base of the calyx. Stamens as many or twice as many as petals, inserted at the base or margin of the disc, equal or unequal; filaments free, rarely connate at the base, smooth; anthers dorsifixed, rarely adnate, 2-locular, dehiscing longitudinally. Ovary free, rarely 1—, more often 2—5-locular; style simple, stigma undivided or 2—5-lobed; ovules 2 rarely 1 in each loculus, anatropous, axile, usually pendulous, rarely ascending; micropyle superior; raphe ventral. Fruit drupaceous, indehiscent, containing 2—5-pyrenes, rarely pseudo-capsular and dehiscent. Seeds solitary, pendulous, exalbuminous; testa membranaceous; cotyledons usually membranaceous, contortuplicate, rarely fleshy and plano-convex; radicle superior.

The species of this order are described by Professor Bentley as "almost universally characterized by an abundance of fragrant resinous or gum-resinous juice; some are considered poisonous; others bitter purgative, or anthelmintic; and a few furnish useful timber." The following are the more important products, in addition to those named under the Indian species:—The Olibanum of commerce was long supposed to be of Indian or Syrian origin; partly from the fact of its being mainly exported to this country from Bombay; partly from an erroneous etymological derivation of the word from "*Libanus*" or Lebanon. It has, however, been thoroughly demonstrated by Dr. Birdwood in his exhaustive paper on the genus *Boswellia*, in the 'Transactions of the Linnean Society,' vol. xxvii, that the native countries of this gum are Arabia and the Somali country of Africa. Flückiger and Hanbury, in their 'Pharmacographia,' say:—"Olibanum is obtained from the stem of several species of *Boswellia* inhabiting the hot and arid regions of Eastern Africa, near Cape Gardafui, and of the southern coasts of Arabia. Notwithstanding the recent and elaborate researches of Birdwood, the olibanum trees are still but imperfectly known. *B. thurifera*, Coleb. (*B. glabra* and *serrata*, Roxb.), the 'Salai' tree of India, produces a soft odoriferous resin, which is used in the country as incense, but is not the olibanum of commerce. It is shipped from Arabia to Bombay, which is the great emporium. As a medicine it is nearly obsolete, at least in Britain; the great consumption is for the incense used in the Roman Catholic and Greek countries." This gum is described under the name of "koondar" by Avicenna, evidently referring to the λίβανος of Dioscorides, who mentions both an Arabian and an Indian kind. The myrrh or myrrha of the Pharmacopœia is derived from *Balsamodendron Ehrenbergianum*,[†] Bg., which Oliver considers identical with *B. opobalsamum*, Kth. The Myrrh of commerce is chiefly of Arabian origin. The substance known as Balm of Gilead or Balm of Mecca is probably procured from either *B. gileadense* or *B. opobalsamum*, natives of Arabia. Many species of the New World also yield economic products of importance. *Bursera gummifera* and *acuminata* of Guiana and Mexico yield fragrant resinous substances, the former known as Chibou or Cachibou resin, the latter as resin of Carana. The Mexican Elemi is yielded by *Elaphrium elemiferum*, and the resin known as Tacamahac by *E. tomentosum*. *Icica guianensis*, commonly called "incense-wood," is the source of a resin similar to olibanum. *I. altissima* gives the Carana gum or American Balm of Gilead, and its wood is the fragrant cedar-wood of Guiana: while *I. Icicariba* is supposed to yield the Brazilian Elemi. *Bursera altissima* is a very lofty American tree, of whose aromatic wood canoes forty-two feet long are made. *Hedwigia balsamifera* is a West Indian tree producing abundance of a resin called "baume à cochon," because the wild pigs, when wounded by hunters, are said to pierce the bark with their tusks, to rub their wounds with the balsamic juice which exudes. The following is a diagnosis of the Indian genera and species:—

1. BOSWELLIA, *Roxb.*

Balsamiferous trees frequently with papyraceous bark. Leaves alternate, exstipulate, unequally pinnate, deciduous, with opposite sessile usually serrate leaflets. Flowers small, white, hermaphrodite, in axillary racemes or panicles. Calyx small, 5-toothed, persistent. Petals 5, distinct, narrowed at the base, imbricate. Disc annular, crenate. Stamens 10, 5 long, 5 short, inserted at the base of the disc. Ovary sessile, 3-locular; style short, stigma 3-lobed; ovules 2 in each loculus, pendulous. Drupe trigonous, containing 3 1-seeded pyrenes which finally separate. Seeds compressed, pendulous.

Species about 6; natives of India, Arabia, and tropical Africa.

1. B. SERRATA, Roxb. ex Colebr. in Asiat. Res. ix. 379, t. 5; Colebr. in Trans. Linn. Soc. xv. 363, t. v., fig. 1. *B. thurifera*, Roxb. in Asiat. Res. xi. 158; Roxb. Fl. Ind. ii. 383; W. and A. Prodr. 174; Bird. in Trans. Linn. Soc. xxvii. 146; Brandis, Flor. For. 61; *Libanus thurifera*, Colebr. in Asiat. Res. ix. 382. A moderate sized tree of about 30 feet. Leaves of a large number of opposite or nearly opposite leaflets, very variable in size, shape, and degree of pubescence. Drupe ½ in. long., splitting into 3 valves subtended by the woody disc. VAR. *glabra; B. glabra*, Roxb. Hort. Beng. 90; Flor. Ind. ii. 384; DC. Prodr. ii. 76; W. and A. Prodr. 174; Bedd. Fl. Sylv. t. 124; with more glabrous leaves is scarcely a species.—Forests of the base of the Western Himalayas; Central India southwards to the Deccan, Circars, and Concan.

This is the tree which yields the "Salai" or "Saleh" already referred to. Dr. Birdwood says, (*l.c.*, p. 106):—"The natives of India recognize the two varieties of this plant, of which Roxburgh made two species, and distinguish between their gum resins. What I have seen of it has been either stalactiform, like the runnings of a wax candle, or in small tears, and always so soft that, when kept in a bottle, in a short time it has run into an oleo-resinous mass, with the smell of frankincense, but more turpentiny. I often and perseveringly tried to get regular tears of olibanum run from this plant, but never succeeded in getting anything else than soft oleo-resinous "runnings" from it, which, even after months' exposure on the trunk, still remained quite soft. In Khandeish the olibanum produced by this plant is sold under the name of 'Dup-Salai' (*i.e.*, incense of Salai) in the village bazaars. But I have never myself seen it exposed for sale. I have had samples of it sent to me from all parts of India, and all soft and always melting at last into a mass. The most remarkable character of this plant is the way in which its leaves and flowers vary. Sometimes the inflorescence is in loose cymes, sometimes gathered into a knotty head or capitulum. In a plant brought by my brother from Kattyawar, the petals were reduced to mere scales, the disc very fleshy, red, and prominent, and the stamens tending to abortion." Dr. Wight says that the resinous juice of both the species of *Boswellia* is collected, and is used partly as frankincense and partly as pitch. Dr. Royle, in his 'Illustrations of Himalayan Botany,' says:—"Colebrooke has proved the Indian olibanum to be the produce of *B. serrata*, Roxb. (*B. thurifera*, Colebr.), the salai or saleh of the Hindoos, common in Central India and Bundlecund, where I have seen it, especially about the Bisrumgunge ghaut. It is probably also produced by *B. glabra*, which has the same native name, and, though extending to a more northern latitude, is distributed over many of the same localities. It is common on the low hills above Mohun Chowkee, where I have myself collected off the trunks of the trees some very clear, pure, and fragrant resin, which burns rapidly away with a bright light, diffusing a pleasant odour. To this kind, according to Dr. Ainslie, the term 'googul' is applied by the Tellingoos. The resin of both species is employed as incense in India, and both might be much more extensively collected than they are at present, as there is reason to believe that Central India alone furnishes the greater portion of the Indian olibanum of commerce." Col. Beddome, in his 'Flora Sylvatica for Southern India,' states that *B. glabra* "is very common in many of the dry subalpine jungles, particularly on the eastern side of the Madras Presidency, on the Vellore, Cuddapah, North Arcot, and Kurnool hills, Mysore, Guzzlehatty Pass, etc. It does not occur in Ceylon. It flowers in January and February, generally when quite destitute of leaves; its gum-resin is the olibanum of commerce, and is known to the natives as 'koondricum.' It is much used as a fragrant incense, and, when boiled with oil, as pitch, and is also said to possess stimulant, astringent, and diaphoretic properties. It is largely used in some parts of India as an application to indolent sores, and is supposed to form the chief ingredient in Wroughton's ointment. It is well deserving of careful attention, and can be procured in almost any quantity. The substance is bitter and pungent, and is soluble in ether and spirits of wine. In Tamil the tree is called Kungli and Googoolu, and in Telugu Anduga. I am not acquainted with its timber, but it is said by the natives to be of little or no value." The most recent account of this tree is in Dr. Brandis's 'Forest Flora of North-West and Central India,' who says:—"Charcoal made from the wood is used for iron-smelting in Nimar. From wounds and cracks in the bark exudes an abundance of fragrant transparent gum-resin, diffusing, when burnt, an agreeable smell. It is used medicinally and as incense in India, and sold in the bazaars under the names of 'labanu,' 'kundur,' and 'kundura.' . . . I know only one species of *Boswellia* in Central India, well represented by Roxburgh's and Beddome's figures of *B. glabra*. There is, however, a difficulty in Roxburgh's description of *B. glabra* in the text of the 'Coromandel Plants.'"

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[*] Bentham and Hooker, in their 'Genera Plantarum,' and most other authorities, say "leaves exstipulate." The series of specimens in the Kew Herbarium shows, however, that at least some of the genera are normally furnished with stipules, though these are often early deciduous.

[†] Dr. H. Trimen considers that some doubt still attaches to this statement.

(*To be continued.*)

THE SYNTHESIS OF CAMPHOR.

Conversion of Laurel Camphor into Camphene, and of Camphene into Camphor.*

BY J. RIBAN.

Conversion of Laurel Camphor into Camphene.—To effect this transformation the author first converted camphor ($C_{10}H_{16}O$) into borneol ($C_{10}H_{18}O$) by the process of M. Baubigny. The rotatory power of the body obtained was but $[\alpha] = +2{\cdot}6°$, whilst the camphor from which it was generated possessed the normal rotatory power. By heating to 100° C. with fuming hydrochloric acid, the borneol was transformed into a hydrochloric ether ($C_{10}H_{16}$, HCl), the rotatory power of which was absolutely nul. The modifying action of the hydracid had produced this loss of power. The hydrochloric ether resembled in its appearance and properties the hydrochlorates of camphenes. It melted in hydrochloric gas at 145° C.; it yielded, although slowly, a portion of its hydracid to cold water; and it was rapidly decomposed by water at 100° C., with regeneration of a camphene ($C_{10}H_{16}$) which the author calls "borneo-camphene," in reference to its origin.

Borneo-camphene.—The decomposition of the hydrochloric ether of borneol by water yields only a small proportion of the carbide sought. The transformation upon a larger scale may be effected by heating for seventy hours the hydrochloric ether in a copper autoclave, or in sealed tubes, with an excess of alcoholic potash, to a temperature of 180° C. The carbide formed is precipitated by water, washed, fractionized, and pressed to remove traces of an oily body. About 50 per cent. of the weight of the hydrochloric ether employed may be thus obtained.

The borneo-camphene is a solid crystalline hydrocarbon, which boils at 157° C. (corrected), melts at 47° C., and corresponds to the formula $C_{10}H_{16}$. It yields, when treated with hydrochloric acid, monohydrochlorate of camphene, which possesses the characters of the hydrochlorates of camphenes, and melts in the hydrochloric gas at 145° C.

The reactions by which laurel camphor is thus converted into a hydrocarbon, represented by the formula $C_{10}H_{16}$, and like itself crystalline, are represented by the following equations:—

$$C_{10}H_{16}O + H_2 = C_{10}H_{18}O;$$
$$C_{10}H_{18}O + HCl = C_{10}H_{16}, HCl + H_2O;$$
$$C_{10}H_{16}, HCl + KOH = C_{10}H_{16} + KCl + H_2O.$$

Conversion of Camphenes into Camphor.—In 1832, Dumas indicated the relations which should unite camphor with the hydrocarbons $C_{10}H_{16}$. Berthelot, who discovered the first camphenes, showed that when oxidized by the action of platinum black they were changed into a volatile crystalline substance, possessing the odour of camphor. Later, he noticed the fact that camphene could be changed into camphor by the action of crystallized chromic acid moistened with water, but he did not closely investigate the action or determine the rotatory power. The author therefore thought fresh proofs were necessary to satisfy chemists on this point. The conversion of laurel camphor into camphene, by the analytical method above described, lent considerable support to the opinion that the camphenes could be used as generators of camphor. This view has been confirmed by the author in effecting synthetically the transformation of camphene into camphor and then into camphoric acid.

The plan adopted by the author was to oxidize the active levogyre camphene derived from French oil of turpentine,† by means of a mixture of bichromate of potash and dilute sulphuric acid, employing the latter in proportion insufficient to saturate the oxides formed during the reaction. The mixture was heated in a flask, surmounted by a wide tube. The oxidation was effected without violence, the hydrocarbon continually running back in the liquid state to the surface of the oxidizing bath. After some hours a crystallization of camphor appeared upon the cooler parts of the apparatus, this body being non-fusible at 100°C., no longer melted and ran back into the flask. After fifteen or sixteen hours the operation was terminated. A current of steam was passed into the flask, when the camphor distilled over with it and the acetic acid formed by oxidation. The camphor was washed with an alkaline solution, pressed, and then submitted to a series of fractional distillations, collecting each time the portions remaining in the retort at above 204° C. The unattacked camphene passed over in the more volatile portion. The residues of distillation, sublimed at 100° C. with lime, constituted the camphor sought. If it still contained traces of an oily body, having a boiling point superior to that of the camphor formed, these were removed by dissolving in nitric acid, precipitating by water, and subliming with lime. The body so obtained was true camphor, giving upon analysis :—

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* *Répertoire de Pharmacie* [N.S.], vol. iii., p. 385.

† [Obtained from Bordeaux turpentine, the product of *Pinus Pinaster* (Pereira, Mat. Med., vol. ii., p. 310).]—Ed. P.J.

	I.	II.	Calculated.
C . . .	78·58	78·63	78·95
H . . .	10·64	10·61	10·52
O . . .	10·78	10·76	10·53

It possesses the penetrating odour and appearance of camphor. It melts at 172° C. (corrected), other authors giving 175° C. as the fusing point of ordinary camphor. Its rotatory power is $[\alpha] = -13{\cdot}7^\circ$. This rotation is in an inverse direction to that of ordinary camphor, and in the same direction as that of the camphor obtained from matricaria, but not so intense. This direction of the deviation of synthetic camphor presents a certain interest. The addition of HCl to the molecule of levogyre camphene produced a dextrogyre hydrochlorate, and it might have been expected that the addition of O to this molecule would produce a change of direction, but it does not. This would appear to indicate that, to obtain a camphor deviating in the same direction as the laurel camphor, it would be necessary to operate with the dextrogyre camphene derived from English oil of turpentine* rotating in the same direction.

Finally, the author converted the camphor thus obtained synthetically into camphoric acid in the ordinary way. It was purified by changing it into anhydrous acid and then regenerating it by the action of a boiling alkali. After several crystallizations from water it yielded upon analysis—

Experiment	C 59·93 . .	H 8·10 . .	O 31·97
Calculated	C 60·00 . .	H 8·00 . .	O 32·00

The rotatory power of this camphoric acid is $[\alpha] = -6{\cdot}5^\circ$. Its fusing point lies between 197° and 198° C. (corrected), 175° C., the point given by other authors, M. Riban considers to be much too low.

RECOLLECTIONS OF A VETERAN IN CHEMISTRY.

At a meeting of the German Chemical Society, on the 14th June, the President (Dr. A. W. Hofmann) read a manuscript in which Professor Wöhler had recounted some of the incidents of his life. The paper is not to be published in the Society's Transactions, but a correspondent has forwarded to *Nature* the following interesting details from it :—

"On the 2nd of September, 1823, Dr. Wöhler had finished his medical studies at Heidelberg, and, yielding to the advice of L. Gmelin, he abandoned the plan of practising medicine, took up chemistry as the aim of his life, and repaired to Stockholm as a pupil of Berzelius. Choosing the route from Lübeck by sea, he was obliged to wait six weeks for the departure of a boat. The tedious stay in that harbour was shortened through the acquaintance of a mineral dealer already known to Wöhler from the Frankfort fair, where he had exchanged hyaliths for other minerals, and where Wöhler had met Goethe bent upon a similar errand. He also made the acquaintance of a pharmaceutical chemist, Mr. Kind, at Lübeck, and with him prepared potassium in quantities hitherto unknown in Germany, and which, later on, Berzelius made use of in his studies of boron and silicium. Arriving after a stormy passage, he managed to find his way, by the aid of a Swedish student, with whom he had to talk Latin, the only language they had in common. He trembled almost at the first interview with the celebrated chemist, but was soon put at ease by his genial manner. Berzelius's laboratory was of the simplest. It consisted of two bare rooms and of a kitchen, which served at the same time for cooking the meals of the bachelor household. This was the time when Berzelius had just adopted the chlorine theory. An old maiden cook who reigned supreme at the hearth complaining one day of the smell of 'oxidized muriatic acid,' Berzelius exclaimed, smiling, 'There is no longer any oxymuriatic acid, Anna ; you must say it smells very badly of chlorine.' To try his pupil's patience, he put him to the analysis of lievriete, demanding great exactness. When the analysis did not come up to the mark, he said : 'Doctor, that was quick, but bad.' But soon he took the greatest interest in his pupil's researches on cyanic acid, for which the ferrocyanide of potassium had to be sent for from Lübeck. Berzelius kept his simplicity in his intercourse with the courtiers who sometimes visited the laboratory, and for whom some interesting experiments had to be performed. He was an excellent narrator, and Wöhler listened with the greatest interest to his recollections of Gay Lussac and of Sir Humphry Davy. Wöhler passed a very busy winter, spending his evenings in translating Berzelius's annual reports and Hisinger's treatise on mineralogy. When the spring came he enjoyed walks in the beautiful neighbourhood of Stockholm, studded with the last oaks of the northern zone, and he became intimately acquainted with the Swedish philosophers Caro, Mosander, Retzius, Arfvedson, Hisinger and others who have now all left the scene of life. At last the time arrived when he had to take his departure from Sweden, and he did so, accompanied by Berzelius himself, who had invited him to take a journey through Sweden and Norway. Many mineral treasures were collected on the road, and the great mines and industrial establishments were visited. At Helsingborg the travellers stopped for several days to wait for the arrival of Brogniart, father and son, the French geologists, and of Sir Humphry Davy. The latter was then salmon-fishing in Norway, and announced his arrival to Berzelius in a letter commencing, 'My dear sir and very honoured brother in science.' He had some kind and encouraging words for young Wöhler, not forgotten by the latter in his celebrity and his old age. Sir Humphry soon left for Copenhagen, where he had an engagement to shoot snipe with Forchhammer. Oerstedt arrived also to pay Berzelius his respects, and so did several professors from the neighbouring university of Lund. In fact, Berzelius's celebrity was so great that an official in the passport office refused to take any fee from the pupil who had come to study under such a master. Messrs. Brogniart had taken their comfortable travelling carriage over from Paris. Their comfort, however, was disturbed by the arrival of a French courier, the bearer, as they feared, of news of Louis XVIII.'s death. Putting the question to the courier, they received the answer, 'Messieurs, vous savez, qu'un courier doit être aveugle, sourd et muet.' The journey to Norway was continued in common, the elder Brogniart and Berzelius occupying the carriage of the former, Wöhler and the younger Brogniart following in Berzelius's carriage. They often had to stop all night in their carriages ; for it so happened that the Crown Prince preceded them on their road with a numerous suite, and the inns were overcrowded. We cannot enter into the details of this interesting journey.

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* [Obtained from American turpentine, the product of *Pinus palustris* and *P. tæda*, (Pereira, *l.c.*).]—Ed. P.J.

When it came to a close at Helsingborg, Wöhler had to take leave of his master, and the feelings of regret were mutual and deep. Translating Berzelius's reports and his handbooks became henceforth a duty to Wöhler, by which, regardless of the time it demanded, he tried to repay a debt of gratitude."

ELIXIR OF HOPS.*

BY J. B. MOORE.

Hops are a favourite remedy with many physicians in various nervous disorders. Both alone and in conjunction with other remedies, it is much employed in the United States in the treatment of delirium tremens and the general nervous disturbance and morbid vigilance so often the result of inebriation and debauch.

In the form of elixir, as prepared by the formula presented in this paper, a number of my medical friends have employed it for several years, in the class of cases just referred to, with the most gratifying results.

When carefully prepared by skilful hands, the tincture and fluid extract of hops (the latter not officinal) are both good preparations of the drug; but owing to the bulkiness of hops, which renders their percolation difficult unless great care be taken, both in reducing them to a powder of sufficient firmness and also in packing them preparatory to percolation, they will be only partially exhausted. These preparations are, therefore, often liable to be of very uncertain strength. Besides, the very unpleasant taste of the tincture and fluid extract of hops, as that of the same preparations of lupulin, prevents their general use. Many delicate persons cannot tolerate the use of any of these preparations on this account. This fact evidently calls for a more palatable preparation of the drug.. An elixir of hops, therefore, when well made and of sufficient strength, is a very desirable and important preparation. It will enable the physician to avail himself of the use of the drug in many cases where he would otherwise be compelled to forbear its employment.

It is the opinion of many that lupulin is the *only* active portion of hops; but this I believe to be a very great mistake. Lupulin may be the chief, but not the only active part of hops. There are other active and valuable medicinal virtues in hops that are not represented in lupulin.

I here offer a formula for the elixir of hops which I have used for a number of years; it affords an excellent preparation:

℞. Pulv. Hops, No. 20	℥ii, troy
„ Cloves, No. 60	
„ Canella, „	āā ʒi
„ Cinnamon, No. 60 . . .	grs. lxxx
Oil of Orange (fresh)	fʒiiss
Sugar	℥xii, troy
Alcohol	
Water	āā q. s.

Mix the powders. Then to twenty fluidounces of a mixture, consisting of ten parts of alcohol and twelve parts of water, add the oil of orange, shake well and moisten the powders with two fluidounces and a half, or a sufficient quantity of the mixture. Set it aside in a closed vessel to macerate for twenty-four hours; then pack it firmly in a *cylindrical* glass percolator, and pour upon it, first the remainder of the menstruum, and when this has all been absorbed, continue the percolation with a menstruum consisting of ten parts of alcohol and twelve parts of water, until twenty-four fluidounces of percolate have been obtained. To this, in a bottle, add the sugar and shake the mixture occasionally until the sugar is dissolved, then filter through paper.

In the elixir, as thus prepared, the aroma and peculiar bitter taste of the hops are very strongly marked; but the latter so nicely blended with the flavouring ingredients as to be quite agreeable to the palate.

Each fluidounce contains the active properties of thirty grains of hops, which is very nearly half the strength of the officinal tincture.

The usual dose for an adult would be from a dessertspoonful to a tablespoonful every two or three hours, or as necessary.

It is, I presume hardly necessary for me to say that it is *absolutely* essential that the oil of orange used in making this elixir should be of the *very best* quality and *fresh.* There is hardly an essential oil more unstable than the oil of orange. To keep it sweet for any length of time is almost an impossibility, unless mixed with a portion of alcohol. I am always very careful to select a first-rate oil, and mix it *at once* with an equal bulk of stronger alcohol (as this is a convenient proportion for use) and set it aside in a dark, cool place, and, in this way, I have no difficulty in keeping it a long time unchanged.

When measured for use, it should be vigorously shaken and poured out very quickly to insure exact proportions.

In making this elixir, I have tried various strengths of alcohol, but have found the one adopted to be the most satisfactory. It is of sufficient strength to exhaust the hops of their activity, being nearly as strong as the menstruum employed in making the officinal tincture. Besides, the hops are percolated in the proportion of two troyounces to twenty-four fluidounces of menstruum, and also with the additional advantage of a twenty-four hours, preliminary maceration, while in making the officinal tincture the hops are percolated in the proportion of five troyounces to thirty-two fluidounces of menstruum.

It is of paramount importance, in all preparations of those drugs which, like hops, are so often prescribed in diseases of the nervous system, when the stimulus of alcohol is so frequently injurious, that their alcoholic strength should be kept down to the minimum.

CULTIVATION OF CINCHONAS IN THE ISLE OF BOURBON.*

Although the French Government has hitherto shown itself indifferent to the acclimatization of this invaluable febrifuge in its dependencies, private enterprise has not been wanting to effect so desirable an object. Bourbon, in spite of its character for salubrity, has experienced very severe visitations of fever, which has induced private individuals to attempt a task which the State has neglected. Dr. Vinson, one of the first to try the culture of Cinchonas in Bourbon, recently addressed a report of the progress made, and the probabilities of success, to the French Acclimatization Society. The first seeds were received from Dr. Hooker in 1869, and trees raised from cuttings of the first seedlings have attained a height of 12 to 18 feet in four years. Both *C. Calisaya* and *C. officinalis* are under trial. Dr. Vinson's plantation at Salazie numbers 300 subjects, of which about one half are not less than 10 feet high. Leaves of the species named, measuring 15 inches long by 13 broad, were sent to Europe. Bark of *C. officinalis* grown in the island has been analysed, and gave the following result:—Quinine 14·3 grammes, and cinchonine 0·5 grammes, in a thousand grammes of bark. "It was to be expected" Dr. Vinson observes "that some native insect enemy would appear, but we were not prepared for it at all in the form in which it came, and were not a little surprised one fine morning to find the large leaves of some of our trees completely riddled and destroyed by the enormous blue-green caterpillar of the Oleander sphinx, *Deilephila Nerii.*" In view of the success achieved in the trials yet made, Dr. Vinson thinks that the Cinchona may be profitably cultivated in the Isle of Bourbon, although the English have failed in the Mauritius,† because the climatal conditions and altitude of some parts of the former island are more favourable, and approach more closely to the requirements of the plant. In the localities where the trials are being made, the cyclones have not seriously damaged the trees, and there would be little risk, and probably great profit, attending their cultivation on a large scale on a commercial basis. Formerly the island was in a prosperous state, and supplied Mauritius with a large proportion of provisions, but of late it has been declining, and some fresh and remunerative industry alone can save it from sinking lower.

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* From the *American Journal of Pharmacy* for July.

* From the *Gardeners' Chronicle.*

† See, however. the report printed before, p. 21.

CONTRIBUTIONS TO THE THEORY OF SOLUBILITY.*

BY ISIDOR WALZ, PH.D.

(*Continued from page 46.*)

Although the specific gravities attributed to one and the same sulphide by different observers differ sometimes very largely, sometimes by as much as 1, although the determinations for the different compounds have sometimes been made at temperatures so widely apart that strict comparison is out of the question, and although for many of these compounds the specific gravities are known only with approximate accuracy,—and these considerations are true for the following tables also,—the table of normal sulphides, as given before, shows some interesting regularities. The sulphides with the highest and lowest specific volumes are insoluble in water, while the specific volumes of the soluble sulphides stand midway between them, thus showing that solubility depends, to a great extent, on the relation of the specific volumes of solvent and solute. The sulphides insoluble in strong acids, the sulphides soluble in acids, the sulphides soluble in water, the sulphides soluble in alkaline sulphides, fall together almost into regular groups, when arranged according to their specific volumes, as in the table on p. 46.

There are some exceptions to this regularity; but in this we recognize the operation of another principle alluded to before, namely, that for substances of approximately equal specific volumes, the solubility is a function of the molecular weight. Thus, Ag_2S, molecular weight 248, and spec. vol. 34·42, is about three times as dense as Na_2S, mol. weight 78, and spec. vol. 31·56. The one is soluble in water, the other insoluble. Bi_2S_3 and As_2S_3 are of nearly equal specific volumes; but the molecular weight of the former is more than twice that of the latter. The one is soluble in alkaline sulphides, while the other is not.

It is remarkable that CS_2, though in some respects so totally unlike the other sulphides cited, has certain properties analogous to those of the group of sulphides with which it is associated by its specific volume. Like arsenic and antimony sulphide, it is insoluble in water, but soluble in alkalies and alkaline sulphides, and capable of forming the "double sulphides" with the latter. We may trace a further analogy between its liquid condition and the ready fusibility of As_2S_3 and Sb_2S_3, and between its volatility and that of As_2S_3 at higher temperatures. All these considerations, moreover, hold good when we compare it with realgar As_2S_3, the specific volume of which is very nearly the same as that of CS_2, viz., 61·14 (mol. weight 214; spec. grav. 3·5). These and similar facts, with which we shall become acquainted, point to relations between the specific volume and physical properties of substances other than their solubility, with which we are at present principally concerned.

In the above table tin disulphide has an abnormal position. We should expect to find it after CS_2, which would bring the well-known group of As_2S_3, Sb_2S_3, and SnS_2 together, and cause the table of sulphides to show a further regularity, as the members of the typical groups $M''S$, M'_2S, $M''''S_2$, and M'''_2S_3 would be grouped together according to their specific volume; a regularity shown in the most decided manner when the specific volumes of the normal chlorides are tabulated. Further investigations will undoubtedly rectify or explain this anomaly.

Chlorides.

Formula.	Molec. weight.	Spec. grav.	Spec. vol.	
$LiCl$	42·5	2·036	20·87	I.
$AgCl$	143·5	5·4599	26·28	
$NaCl$	58·5	2·154	27·15	
HCl	36·5	1·27*	28·74	
$[CuCl]$	99	3·526	28·07	
$[HgCl]$	235·5	6·891	34·17	
$[TlCl]$	239·5	7·01	34·16	
KCl	74·6	1·944	38·37	
*$HgCl_2$	271	6·233	43·54	II.
*$MgCl_2$	95	2·177	43·64	
*$CuCl_2$	134·5	3·354	44·04	
*$CoCl_2$	129·7	2·937	44·16	
$ZnCl_2$	136	2·753	49·40	
$CaCl_2$	111	2·241	49·53	
$PbCl_2$	278	5·58	49·82	
$FeCl_2$	127	2·528	50·23	
$CdCl_2$	183	3·625	50·47	
$NiCl_2$	129·7	2·56	50·66	
$MnCl_3$	126	2·478	50·74	
$HgCl_2$	271	5·301†	51·01	
$[CrCl_3]$	158·7	3·03	52·37	
$[VCl_3]$	157·8	3·00	52·60	
$[TlCl_3]$	310·5	5·9	52·62	
$BaCl_2$	208	3·855	53·95	
$SrCl_2$	158·5	2·881	55·01	
$BiCl_3$	316·5	4·56	69·42	III.
NCl_3	120·5	1·653	78·94	
$AsCl_3$	181·5	2·204	82·35	
$SbCl_3$	228·5	2·675	85·42	
BCl_3	117·5	1·35	87·03	
PCl_3	137·5	1·55	88·70	
CCl_4	154	1·60	96·25	IV.
$TiCl_4$	192	1·76	109·09	
$SiCl_4$	170	1·52	111·84	
$SnCl_4$	260	2·24	116·07	

In this table we find the analogously constituted chlorides ($M'Cl$,$M''Cl_2$,$M'''Cl_3$, etc.) coming together in groups when arranged in the order of their specific volumes. As the same regularity appeared in the table of sulphides, we are justified in assuming a relation between the atomic structure and the specific volumes of these compounds; and this may perhaps be applied as an aid in determining the correct molecular formula of a substance.

In this table we do not find the same regularity with regard to solubility as in the table of sulphides. It begins with the most deliquescent salt known, lithium chloride, and ends with silicium and tin tetrachloride, which are also deliquescent and soluble in water.‡ Though the degree of solubility varies considerably between these limits, it may be pointed out that among the *normal* chlorides—by which I understand the *highest* chloride any element can form—there is only one, silver chloride, which can be called absolutely insoluble, and that the tendency of chlorides is toward solubility in water, while among the sulphides it is toward insolubility. We shall find certain regularities, however, if we examine the different groups separately.

In the first group we have only three normal chlorides—LiCl, NaCl, and KCl—that can be compared as to solubility; for hydrochloric acid, being a gas under ordinary circumstances, must be left out of account. For these the solubility seems to decrease in inverse proportion to the specific volume; NaCl at 0° C. is more soluble than KCl, 100 parts of water at 0° C. dissolving about 85 parts of the former and only 29 of the latter. In this group we find AgCl of almost the same specific volume as NaCl, though its molecular weight is two and a-half times greater; and the corresponding difference in solubility again illustrates a principle which we have repeatedly pointed out.

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* From the *American Chemist* for February.

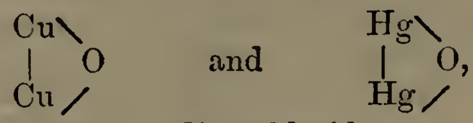
* Liquid.

† Mean of all except Playfair and Joule's determinations.

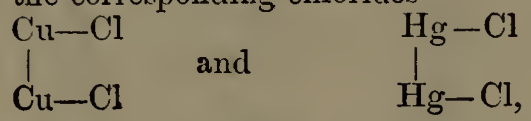
‡ See observations on p. 10.

I have placed in this group, in brackets, the lower chlorides of copper, mercury, and thallium, though to the first two the doubled formulas Cu_2Cl_2, and Hg_2Cl_2, are generally assigned. These formulas, however, have no better basis than the theory that the "valency" or "atomicity" of an element is constant and invariable, and the consequent necessity of constructing such formulas for the lower chlorides, oxides, etc., that the metals shall still appear divalent.

Hence the structure of Cu_2O and Hg_2O is assumed to be—

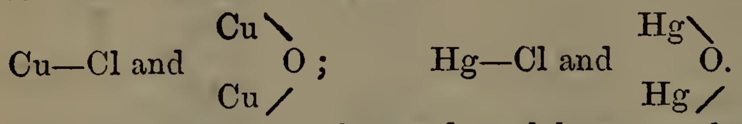


and that of the corresponding chlorides—



$$\begin{matrix} Cu\text{—}Cl \\ | \\ Cu\text{—}Cl \end{matrix} \quad \text{and} \quad \begin{matrix} Hg\text{—}Cl \\ | \\ Hg\text{—}Cl, \end{matrix}$$

and the unvarying diatomicity of copper and mercury is vindicated. But on the view that the atomicity of an element is variable, we may assume that Cu and Hg are monads in the lower and dyads in the higher series of their compounds, just as we must assume carbon as a tetrad in CO_2, and as a dyad in CO. According to this view the structural formula for cuprous and mercurous chloride and oxide become—



These formulas have been adopted by many chemists, and I would cite, as additional confirmation of their correctness, *the near coincidence of the specific volumes of these four most insoluble of all chlorides,* AgCl, CuCl, HgCl, *and* TlCl, if these formulas are adopted. If we write Cu_2Cl_2 and Hg_2Cl_2 their specific volumes become 56·14 and 68·34 respectively, and their positions in the table would become utterly anomalous.

If we adopt these formulas, it might seem as if the *solubility of the members of this group was inversely* proportional to the molecular weight of the chlorides (or *to the atomic weight of their metallic elements),* viz.:—

HCl	molecular weight	36·5
LiCl	„	42·5
NaCl	„	58·5
KCl	„	74·6
CuCl	„	99.
AgCl	„	143·5
HgCl	„	235·5
TlCl	„	74·6

But, although, in groups of similarly constituted bodies, whose specific volumes do not differ much, the molecular weight undoubtedly determines the solubility, as we have already seen in a number of instances and shall continue to find, it must be borne in mind that from the above list RbCl (molecular weight 120·9), and CsCl (molecular weight 168·5) are necessarily omitted, as their specific gravities have not yet been determined, and their insertion would destroy this seeming regularity; for we know that they are more soluble than KCl. For the present we are, therefore, compelled to assume two groups, one containing KCl, RbCl, and CsCl, in which the solubility increases directly as the molecular weight, and another in which the solubility decreases with increasing molecular weight. The metals of the first series have proportionately much lower specific gravities and higher specific volumes than those of the second, a fact that is probably closely connected with the different variation of the solubility of their chlorides within the two series.

In the next group, which embraces the dichlorides we find a much greater regularity. With regard to $MgCl_2$, $CuCl_2$, and $CoCl_2$, which are marked with asterisks, the only determinations of specific gravity accessible are those made by Playfair and Joule, and as their determinations are in many other cases much higher than those found by other observers, and seem in fact to have been affected by some uniform error, we may well assume that this anomaly is only apparent, and will disappear when their specific gravity shall be better ascertained. If, *e.g.*, the specific volume of $HgCl_2$ is calculated from the specific gravity found by Playfair and Joule, it takes its place with the three chlorides named; but if the mean of five other determinations is taken, its specific volume becomes 51·01, which is very nearly the normal specific volume of the dichlorides. Omitting then the three chlorides mentioned, because the specific volumes are not sufficiently determined, we find eight out of ten dichlorides whose specific volumes fall within 49·40 and 51, forming a remarkable *isosteric** group, with a mean specific volume 50·2, of which all members but one are most readily soluble, and even deliquescent; besides, they are all easily soluble in alcohol. By the side of this series $PbCl_2$, $BaCl_2$, and $SrCl_2$ seem to form a side-group in which the solubility increases with the specific volume of the members, lead chloride being the least and strontium chloride the most soluble of the three. The members of this series differ also from those of the other in that $PbCl_2$ and $BaCl_2$ are insoluble, $SrCl_2$ difficultly soluble in absolute alcohol.

Assuming, for reasons stated before in the case of HgCl and CuCl, the formula $CrCl_3$, we have next another isosteric group $TlCl_3$, $CrCl_3$, and VCl_3. The two latter are especially interesting. They have nearly identical molecular weight, specific gravity, and specific volume; and connected with these is a most remarkable similarity of physical characteristics, such as colour, crystalline form, solubility, etc.

In the higher groups, 3 and 4, the regularity is less striking, partly perhaps because their specific gravities are less definitely known, and perhaps because all the members are liquids (or gases, like BCl_3, $SiCl_4$), and the specific volumes, calculated from the specific gravities at ordinary temperatures, yield less conformable and comparable results than if they would be compared at temperatures near their boiling points. Probably we ought to separate the group also into two series, like the lower ones, viz.: $BiCl_3$, $AsCl_3$, $SbCl_3$; and NCl_3, BCl_3, PCl_3. Yet we find the group of trichlorides definitely separated from that of the tetrachlorides. We also find, connected with these higher specific volumes, as a rule, quite ready solubility in alcohol, ether, benzine, and other organic solvents, volatility and deliquescence, coupled with decomposition, when they come into contact with a larger quantity of water, into oxides or oxychlorides of the metals on the one hand and hydrochloric acid on the other. I may point out in this connection that the members of the first group, including $PbCl_2$ of the second, are anhydrous, and those that are soluble in water are left behind as anhydrous chlorides when their aqueous solution is evaporated; the members of the second group form crystallized hydrates when their aqueous solution is evaporated, and, if the heat is carried further, tend to decompose according to the formula $M''Cl_2 + H_2O = M''O + 2HCl$. In the third and fourth group this tendency to chemical decomposition with water is still more strongly and decidedly marked, taking place, as it does, already at ordinary temperature; CCl_4 forms, however, an exception to this general statement.

Altogether, the higher chlorides with their comparatively high molecular weights and low specific gravities, taken in connection with their ready solubility in the lighter organic solvents, form good illustrations of the principles of the relation of the specific volumes of solvent and solute as previously discussed.

(*To be continued.*)

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* As Schroeder has anticipated me in publishing his discovery of this isosteric series, I beg to state that I discovered it in October, 1873, and addressed a note to Dr. Bolton on the subject on the 13th of that month.

The Pharmaceutical Journal.

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SATURDAY, JULY 24, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF VERMIN KILLER BY A GROCER.

WE have much satisfaction in reporting that the unregistered seller of vermin killer referred to in these columns last week, Mr. JOHN CORNER, grocer, of Gainford, has shown a prompt appreciation of the position in which he had placed himself by his breach of the Pharmacy Act, 1868. Immediately upon the circumstances of the case becoming known to the Registrar, he instructed Messrs. FLUX and Co., the Solicitors to the Pharmaceutical Society, to make an application to Mr. CORNER for the penalty of £5 which had been incurred, and if necessary to take proceedings for its recovery. The result, however, was that Mr. CORNER immediately sent a cheque for the amount, accompanied by a promise that he would not sell poison in future.

During the past week also two other cases of breach of the Pharmacy Act have been brought to a satisfactory termination without it becoming necessary to appeal to a Court of Law. Evidence having been obtained by the Solicitor that a Mr. DYSTER WILLIAM SCOTT, of 283, Old Kent Road, and a Mr. CHARLES WAYTE, of 571, Old Kent Road, unregistered persons, were in the habit of selling oxalic acid, they were informed that they had by such sales exposed themselves to criminal prosecution and also to proceedings for the recovery of a penalty of £5. Upon receiving satisfactory assurances, however, from Mr. SCOTT and Mr. WAYTE, that they had been so acting in ignorance of the law, and that they *bonâ fide* intended to discontinue the sale of poisons, the Solicitor considered himself justified in staying proceedings on condition that the offenders would sign a memorandum to that effect, and pay the costs, amounting to half-a-guinea in one case and fourteen shillings in the other. This was done on the following day.

The record of these three cases affords an apposite answer to the somewhat energetic letter which appears in our correspondence columns this week, and also to many others that have been received on the same subject. The evidence given by Mr. CORNER, at the Durham assizes, which appeared to our correspondent so conclusive did not, as he assumed would have been the case, escape the notice of the officials of the Pharmaceutical Society, but was at once acted upon; with what promptitude may be estimated from the fact, that the cheque representing the penalty reached the office in Bloomsbury Square on the fourth day after the receipt of the newspaper containing a report of the trial.

It is therefore evident, from the result in these and previous cases, that where such specific evidence of a breach of the Pharmacy Act is forthcoming as can be produced in a Court of Law, there is comparatively little difficulty or delay in enforcing the provisions relating to the sale of poisons. As a rule, the information forwarded is not of this nature, but of so vague a character that to carry it into court would be to invite failure and bring the Pharmacy Act into discredit. The supplementing of this information, however, is not an easy mattter. The *rôle* of common informer is so distasteful, that local secretaries and others who are appealed to for assistance in carrying out the proceedings against offenders naturally recoil from taking any step that might lead to such a character being imputed to them by their neighbours. On the other hand, the sending of a person specially from London has on more than one occasion resulted in a futile expenditure of money, either through the appearance of a stranger having given an untimely warning to habitual offenders, or from the reports of breaches of the Act having had their origin only in the too credulous reception of untested statements.

We do not mention this fact with the object of favouring delay in grappling with what is an admitted grievance, but because the opportunity is afforded of reminding some of our correspondents that the law can only be appealed to against individual offenders, and that the cases must be supported by specific evidence, which is not afforded by strongly worded anonymous letters written to this or any other journal. Of course, now that it has become so manifest that persons living in the neighbourhood of offenders are reluctant to act, the problem of obtaining the necessary evidence lies with the Council of the Pharmaceutical Society to solve, and we have little doubt that the various suggestions which have been made by our correspondents, as well as the advisability of making a more free use of local solicitors, will receive its careful consideration.

It is to be hoped that every conviction will tend to render the necessity for prosecution more infrequent, by helping to make the law relating to the sale of poisons more widely known, so that at last a knowledge of it may extend even to the bench. But it must be confessed that experience in France, where the law protecting pharmacists is much more stringent than in this country, is very ominous. For there, in one department only, that of the Seine, the *avocat* to the Société de Prévoyance des Pharmaciens has just reported that he obtained no less than fourteen convictions between May 7 and June 16.

THE POTATO DISEASE.

For nearly thirty years the potato disease has baffled all efforts to discover the manner in which it is kept alive from year to year. Two methods of its reproduction have long been known, viz., by conidia and zoospores; but these serve only to propagate the disease during the summer months, since the delicate mycelial threads to which they give rise perish before the winter. It had for some time been supposed that the potato fungus, *Peronospora infestans*, Mont., was propagated like other species of the same genus by means of what are known as resting spores, which are furnished with a thicker coat and are thus enabled to remain in a state of vitality throughout the winter. These resting spores are the result of the conjugation of sexual organs known as antheridia and oogonia, which are analogous in some degree to the pistils and stamens of flowering plants; the resting spores themselves may be likened to seeds. The resting spores remain quiescent during the winter, but early in the following summer (in other species) they germinate and form a mycelium which finds its way into the tissues of plants, and thus the disease is propagated anew. It has fallen to the lot of Mr. Worthington G. Smith to discover the resting spores of the potato fungus which had been so long sought in vain. This eminent fungologist has detected the antheridia and oogonia, has seen them in a state of conjugation, and has found the resting spores in potato plants from the gardens of the Horticultural Society, at Chiswick. A very lucid descriptive account, illustrated by engravings of the resting spores, etc., is given by Mr. Smith, in the *Gardeners' Chronicle.* Of such high importance was this discovery considered that the Council of the above Society, unanimously and within a week of the discovery, awarded him the Gold Banksian medal. What Mr. Smith has now identified appears to have been noticed before, but to have been considered a distinct fungus under the name of *Protomyces.* This discovery, in Mr. Berkeley's opinion, will probably lead to the identification of all the species of *Protomyces* as resting spores of other fungi. Thus Mr. Smith's discovery has a double interest. The resting spores appear to be developed only in presence of much moisture and are found in the last stage of the potato disease, when the tubers have become putrid. It now only remains to discover a means of destroying the resting spores during the period at which they are produced, and the life history of the potato fungus during the winter being known, there is no apparent reason why the potato disease should not be made to succumb to chemical and agricultural skill, especially if the precaution be taken of destroying the diseased plants before the resting spores have been deposited in the earth to any extent. In connection with this disease, it must be remembered that the *Peronospora infestans* is by no means confined to the potato plant, but is frequently found on the dulcamara, tomato, and other plants of the Solanaceæ, which may thus become propagators of the disease. From Mr. Smith's experiments upon mushroom spores, it appears that a considerable degree of heat is required to destroy the spores of some fungi. It seems probable also that further researches upon the potato disease may prove that the *Saprolegnieæ*, plants at present occupying an intermediate position between algæ and fungi, are only submersed forms of various species of *Peronospora.* For further interesting particulars the reader is referred to the papers by Mr. Smith, in the above-mentioned journal.*

IRISH PHARMACY BILL.

This Bill was read a second time in the House of Lords on Thursday. Earl Granville gave notice that he would move, in Committee, an amendment in reference to the qualification for the title of Pharmaceutical Chemist in Ireland.

THE SALE OF FOOD AND DRUGS BILL.

A deputation consisting of the President of the Pharmaceutical Society, the Vice-President, the Treasurer, and Mr. Sandford accompanied by the Secretary, waited on the Duke of Richmond on Saturday the 10th inst., to represent the objections of the Council to the omission of the word "knowingly" from the 3rd and 4th Clauses of the Food and Drugs Bill.

The Duke of Richmond acknowledged the force of the objections and read to the Deputation a clause the insertion of which he proposed to move when the Bill again came before the House of Lords. We understand that the clause was considered satisfactory by the deputation. The new clause, which with other amendments will be found at p. 76, was adopted, and the Bill read a third time in the House of Lords on Thursday.

"OFFICINAL" AND "OFFICIAL."

The proper application of the words "officinal" and "official," which has recently been the subject of comment in this Journal, has also been discussed in the editorial columns of the *Tennessee Pharmacal Gazette.* Our contemporary expresses the opinion that since the Pharmacopœias of Great Britain and other European countries emanate authoritatively from legally constituted bodies, it is quite correct to refer to such medicines as are mentioned in them as "official"; but that as the United States Pharmacopœia is not issued by a legally constituted body it is more correct to designate the articles contained in it "officinal."

LEGACIES TO FRENCH PHARMACEUTICAL INSTITUTIONS.

The *Bulletin Commercial* states that M. J. Lebeault, a pharmacien recently deceased, has left one legacy of ten thousand francs to the Société de Prévoyance des Pharmaciens de la Seine, and another to the Paris School of Pharmacy. It will be remembered that the latter institution was the recipient of a similar legacy rather more than twelve months since.

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* *Gardeners' Chronicle*, July 10, p. 35, 44, and July 17, p. 68.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

July 14th, 15th, 16th, and 21st.

Present (14th) Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Hills, Linford, Martindale, Moss, Schweitzer, Southall, Taylor, and Umney.

(15th and 16th) Messrs. Allchin, Barnes, Benger, Bottle, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Southall, Taylor, and Umney.

(21st) Messrs. Allchin, Benger, Carteighe, Corder, Gale, Haselden, Hills, Linford, Martindale, Moss, Schweitzer, Southall, Taylor, and Umney.

Dr. Greenhow was present on the 14th and 21st, on behalf of the Privy Council.

MAJOR EXAMINATION.

Twenty-four candidates were examined, *eleven* failed. The following *thirteen* passed and were declared qualified to be registered as Pharmaceutical Chemists:—

Basker, John Anthony	Grantham.
Green, George	Thetford.
Edward, William Wales	Aberdeen.
Anderson, Alexander	Elgin.
Cardwell, Ernest	Lytham.
Atkinson, John George	Horncastle.
Long, Theophilus Henry Beavan	Brighton.
Blake, Charles Alexander	London.
Balchin, Edward Samuel	Devizes.
Wyles, William	Grantham.
White, Charles	Southborough.
Hefford, Charles	Sydenham.
Metherell, Kinneard	London.

The above names are arranged in order of merit.

MINOR EXAMINATION.

Fifty-one candidates were examined. *Twenty-seven* failed. The following *twenty-four* passed, and were declared qualified to be registered as Chemists and Druggists:—

	Andrew, Frederick William	Falmouth.
	Park, Charles James	Devonport.
	Hunt, Arthur	London.
Equal.	Knight, George James	Newark.
	Phillips, Charles Lloyd	Tredegar.
	Green, John Alfred	Lincoln.
Equal.	Galloway, James Barker	Liverpool.
	West, John Leaver	Ashby-de-la-Zouch.
	Minnitt, Walter	London.
	Keer, Thomas Henry	Sudbury.
	Jackson, Richard	Carlisle.
Equal.	Downing, Frederick	Falmouth.
	Elliot, Joseph	York.
	Fox, Charles James	Witney.
	Radley, William Gibson	Newton Abbot.
	Andrews, Henry Albert	Harrogate.
Equal.	Hodgson, Ralph	Brixton.
	Jones, George Marsh	Heeley, Sheffield.
	Rogers, Oliver	Upper Norwood.
	Howe, Oliver George	Stony Stratford.
	King, Edward Albert Godfrey	Southsea.
	Ison, Francis	Penrith.
	Barker, Alfred William	Saffron Walden.
	Holl, Edmund	Scarborough.

The above names are arranged in order of merit.

MODIFIED EXAMINATION.

Fourteen candidates were examined. *Four* failed. The following *ten* passed and were declared qualified to be registered as Chemists and Druggists:—

Bache, William	Bridgnorth.
Emsley, Joseph	Scarborough.
Hester, Charles	Northampton.
Martin, Richard	Marlborough.
Moverley, Robert	Lowestoft.
Osbourne, Nicholas Twigg	Louth.
Ryott, Robert Charles	Newbury.
Snape, Edward	Prescot.
Thompson, Alfonso de Lamartine	Dublin.
Warrington, Charles Bower	Woolwich.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination:—

Certificate of the College of Preceptors.

Webber, James Ricketts	Taunton.

Certificates of the University of Cambridge.

Cardwell, Augustus	Derby.
Esam, William Wills	Eastbourne.
Taylor, Edward	Wakefield.

PRELIMINARY EXAMINATION.

The following is the result of the Preliminary Examination held on the 5th inst.:—

ENGLAND AND WALES.

Two hundred and two Candidates presented themselves for Examination, of whom *ninety-three* failed. The following *one hundred and nine* passed, and have been duly registered as Apprentices or Students:—

	*Turnell, Tom	Postland.
	*Morgan, Thomas	Cardiff.
	*Gibbs, John	Worcester.
	*Quincey, Benjamin	Glinton.
	*Gilbert, William John	Ventnor.
	*Baker, Albert	Hitchin.
	*Moody, Thomas Sullivan	Lowestoft.
	*Foggitt, William Crossley	Thirsk.
Equal.	*Cracknell, Herbert	London.
	*Fielder, Sidney	Titchfield.
	*Orange, Edward Henry	London.
	*Wilson, Robert Appleton	Sheffield.
Equal.	Bascombe, William	Nottingham.
	Bays, James Thomas	Peterborough.
	Brampton, Howes	Stanion.
	Topham, Albert Stocks	Halifax.
	Usherwood, Thomas	Liverpool.
	Parker, James Herbert	Littleborough.
Equal.	Bown, John Quinton	Nottingham.
	Brown, Harold	Cockermouth.
	Coles, John George	Kettering.
	Smith, Harry James	Newbury.
Equal.	Freeman, Frank	West Dulwich.
	Newling, Arthur John	Croydon.
	Portlock, Henry Octavius Blake	Wotton-under-Edge.
	Jary, Joseph James	South Shields.
	Seward, George Halifax	London.
	Watson, Walter	London.
Equal.	Dutton, George Frederick	Kidderminster.
	Garland, Thomas William	Acock's Green.
	Godfrey, Henry	Godalming.
	Groves, Richard Henry	Blandford.
	Kettlewell, Harry	Beverley.
	Macaulay, William Henry	Rotherham.
	Portway, Albert	Bury St. Edmunds.
	Richardson, Arthur	Epworth.
	Robinson, William	Turnham Green.
Equal.	Charlesworth, George Henry	Leicester.
	Faraday, George	Stroud.
	Frost, Frederick Philip	Bury St. Edmunds.
	Hoad, Frank	Rye.
	Perry, Allan	Chatham.
	Ridgley, George Stevens	Gillingham.
	Thomas, Samuel Rees	Merthyr Tydvil.
	Woolcott, John Newton	Sidmouth.
Equal.	James, William Edward	Stonehouse.
	Sutton, George Curtis	Salisbury.

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* Passed in the First Division.

	Stobbs, Robert	North Shields.
Equal.	Ashton, Frederick William	Market Harborough.
	Miles, Thomas	Dartford.
	Neal, William	Chatham.
	Wastie, Francis	London.
	Wooldridge, Elijah	Cradley Heath.
	Cunningham, Oscar William	Norwich.
	Pinchen, William John	Norwich.
Equal.	Austin, Harold Keyworth	Reading.
	Barnett, John Arthur	Salisbury.
	Charlick, Alfred John	London.
	Fairweather, Frederick Harry	Tavistock.
	Grant, Thomas	Bristol.
	Mackereth, George Hemsworth	Thorparch Grange.
	Morson, Albert Robert	London.
	Naftel, Hannibal Sheppard	St. Leonards.
	Robson, William Stubbs	Scarborough.
	Thornton, Charles Hopkinson	London.
	Warman, Henry Thomas	Ramsgate.
	Pexton, John Frederick	York.
	Potter, John Henry	Nottingham.
Equal.	Boor, Jonathan	Manchester.
	Brereton, John	London.
	Davies, Llewelyn	Newport, Mon.
	Dulley, David	Wellingborough.
	Fairbank, George	Rochdale.
	Jenkinson, Joseph	Frizington.
	Lane, Frank	West Cowes.
	Mitchell, Joseph Samuel	London.
	Pearson, William Jackson	Little Gonerby.
	Thomas, John Henry	Chester.
	Wilkinson, William	Whittlesey.
	Hall, William George	London.
Equal.	Blacklock, Philip Walton	Brighton.
	Bake, Arthur John	Birkenhead.
	Baldwin, William Henry	Much March.
	Barker, William Alfred	Bristol.
	Bell, John Waller	Todmorden.
	Bentlif, Philip Barnett	Salisbury.
	Blamey, Edward Parr	Hayle.
	Burn, James William	Flintham.
	Cook, William Richard	Bath.
	Dadson, Herbert William	King's Lynn.
	Dadson, Horace Charles	King's Lynn.
	Davies, John	Haverfordwest.
	Francis, Matthew Robert	London.
	Holding, John	London.
	Holt, John	Aislaby.
	Ives, Robert Hanworth	Norwich.
	James, Tom	London.
	Lawton, Charles William	Redmarley.
	Mart, Oliver George Russell	London.
	Massingham, Hugh Mortimer	Royston.
	Phillips, John	St. Clears.
	Powell, John	Bridgend.
	Ramsey, William	Pocklington.
	Shearcroft, Walter Fred	Long Sutton.
	Sheldon, William Thomas	Liverpool.
	Slogg, Andrew	Liverpool.
	Temple, Charles Herbert	Winchester.
	Wallis, John Webb	Thame.
	Wolstenholme, Abel Joseph	Southport.

SCOTLAND.

Twenty-six candidates presented themselves for examination. Of these *ten* failed. The following *sixteen* passed and have been duly registered :—

	*Cairnie, Robert	Perth.
	*Craighead, Adam	Aberdeen.
	*Lyle, William	Kelso.
	*Stewart, Kennedy	Kilmarnock.
	Davidson, James A. M.	Aberdeen.
Equal.	Chisholm, Alexander	Edinburgh.
	MacMillan, Colin	Glasgow.
	Westwater, George	Lochgelly.
	Thomson, Andrew	Selkirk.
	Simpson, Alex. Henderson	Rubislaw.
	Scott, George	Aberdeen.
	Berry, Andrew Wales	Aberdeen.
	Milne, Charles Johnston	Aberdeen.
	Brown, Thomas Alexander	Dunfermline.
	Miller, George	Arbroath.
	Boyd, Samuel	Dumfries.

The following is a list of the Centres at which the examinations were held, showing the number of Candidates examined at each Centre, and the result :—

ENGLAND AND WALES.

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberystwith	2	0	2	London	40	24	16
Birmingham	6	2	4	Manchester	5	4	1
Boston	3	0	3	Newcastle-on-Tyne	5	2	3
Brighton	2	2	0	Northampton	7	4	3
Bristol	6	4	2	Norwich	6	4	2
Cambridge	3	2	1	Nottingham	7	4	3
Canterbury	3	2	1	Oxford	3	1	2
Cardiff	7	4	3	Peterborough	5	5	0
Carlisle	3	2	1	Plymouth	2	2	0
Carmarthen	6	2	4	Portsmouth	2	1	1
Carnarvon	1	0	1	Preston	1	1	0
Cheltenham	3	2	1	Reading	4	2	2
Chester	1	0	1	Salisbury	4	4	0
Colchester	1	0	1	Scarborough	2	1	1
Darlington	1	1	0	Sheffield	2	2	0
Doncaster	2	1	1	Shrewsbury	1	0	1
Dorchester	1	1	0	Southampton	3	3	0
Exeter	1	1	0	Stafford	1	0	1
Hull	10	2	8	Taunton	2	0	2
King's Lynn	6	2	4	Truro	2	1	1
Leeds	4	1	3	Worcester	6	3	3
Leicester	3	1	2	York	3	2	1
Lincoln	1	1	0				
Liverpool	13	6	7				

SCOTLAND.

Aberdeen	11	6	5	Edinburgh	9	5	4
Dumfries	1	1	0	Glasgow	3	2	1
Dundee	1	1	0	Perth	1	1	0

The questions for examination were as follows :—

Time allowed: Three hours.

LATIN.

Cæsar—De Bello Gallico, Lib. I.

1. Translate into English :— Divitiacus multis cum lacrimis, Cæsarem complexus obsecrare cœpit, ne quid gravius in fratrem statueret: scire se, illa esse vera, nec quemquam ex eo plus, quam se, doloris capere, propterea quod, quum ipse gratia plurimum domi atque in reliqua Gallia, ille minimum propter adolescentiam posset, per se crevisset: quibus opibus ac nervis, non solum ad minuendam gratiam, sed pæne ad perniciem suam uteretur. Sese tamen et amore fraterno, et existimatione vulgi commoveri.

Grammatical Questions on the Preceding Passage.

2. Give the nominative, accusative, and ablative cases of *doloris, domi, vulgi.*

3. Give the principal tenses of *cœpit, scire, crevisset, uteretur, commoveri.*

4. In what case is measure of space put? Give an example.

ARITHMETIC.

5. Divide fifty-seven millions, three hundred and eighty thousand, six hundred and twenty-five, by seven thousand, five hundred and seventy-five.

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* Passed in the First Division.

6. Find the difference between $\frac{17}{18}$ and $\frac{11}{12}$; also between $50\frac{1}{16}$ and $47\frac{1}{24}$.

7. Simplify $\frac{4\cdot255 \times \cdot032}{\cdot00016}$.

8. Reduce to a decimal: $\frac{1}{2}+\frac{1}{5}-\frac{1}{8}$.

9. Convert 10 cwt. into *grammes*, and 100 gallons into *litres*.

ENGLISH.

10. What is the difference between Etymology and Syntax?

11. Parse the lines:—

> "But oh! what art can teach,
> What human voice can reach,
> The sacred organ's praise?"

12. Write a short account of any important event that has occurred during the present century.

Proceedings of Scientific Societies.

ROYAL INSTITUTION OF GREAT BRITAIN.

On Accidental Explosions.*

BY F. A. ABEL, F.R.S.

The winter of 1874–5 has been unusually prolific in so-called accidental explosions. On Christmas Eve a colliery explosion entailed the sacrifice of seventeen lives, and on one day last January the *Times* published accounts of no less than six fatal explosions; two in collieries involving the loss of eleven lives; three boiler explosions, by one of which seven persons were killed and twenty injured; and one coal-gas explosion, by which two lives were lost. All these were of the class ordinarily termed accidental, but in every case the casualty was traced to a cause which could have been foreseen and guarded against.

The term "accident," applied in its strict sense to disasters caused by explosions, would imply that these were due to some circumstance, or combination of circumstances, entirely unforeseen, and that they were consequently unpreventable. An explosion which occurs during the preparation or investigation of a compound, the explosive nature of which is as yet unknown, may be purely accidental, but if, after the properties of the substance have been thoroughly ascertained and made known, an explosion occurs during its production by some person who has not properly made himself acquainted with, or has neglected in some point or other those conditions essential to its production with safety, the knowledge of which is within his reach, the term "accidental" can certainly not be properly applied to it, although in all probability it would be so designated popularly, and even by those entrusted on behalf of the public with the investigation of its origin and results. The explosion occasioned by a person employing a lighted candle to search for a gas-escape in a room where there is a powerful odour of gas, or a gunpowder explosion resulting from the dropping of a spark into an open powder-barrel from a candle which is held over it, should properly have as little claim to be called "accidental" as a boiler explosion occasioned by a person tying down the safety-valve. There may be criminal intent in the latter case which is entirely absent in the two former; but the probability of an explosion could have been equally foretold in all three instances, and though ignorance may perhaps be pleaded as an excuse in the case of the gas explosion, and carelessness made to account for that of the powder, those pleas cannot be accepted as grounds for regarding the resulting disasters as legitimate accidents. Indeed, it is often impossible to forbear stigmatizing as criminal the carelessness or ignorance which gives rise to explosions of the kind popularly accepted as accidental.

In the present discourse it is proposed to accept the definition "accidental" in the loose sense in which it is popularly applied to explosions, with the object of examining into the nature and causes of such explosions, and, if possible, of indicating directions in which there may be hope of successful efforts being made for reducing the frequency of their occurrence.

The phenomena attendant upon an explosion are generally due to the sudden or very rapid expansion of matter, accompanied in most instances by its change of state from solid or liquid to gas or vapour. The most simple classes of explosions are those caused by the sudden yielding to force, exerted from within, of receptacles in which a gas is imprisoned in a highly compressed condition, or a liquid has been raised to a temperature greatly exceeding that at which its molecules have a tendency to fly asunder, or to assume the state of vapour or gas. The strength or elasticity of the envelope which confines them suddenly yielding to pressure, the liquid passes with great rapidity into vapour, violently displacing by this sudden expansion the surrounding air and any other obstacles opposed to the expanding molecules.

Similar explosive effects, less simple in their origin, are brought about by the sudden development of chemical activity in mixtures of gases or vapours, of solids and gases, or of solids only, or in chemical compounds of unstable character, the result in all such instances being the development of intense heat and the sudden or very rapid and great expansion of matter.

Examples of the most simple class of explosions are the sudden failure in strength at some particular point, or generally, of the material composing a vessel in which a gas has either been liquefied or highly compressed. Accidental explosions of this character take place chiefly, and happily not very frequently, in the laboratory or lecture room, yet instances occasionally occur of disastrous explosions resulting from such causes in manufacturing operations, or in the practical application of compressed air or other gases. The most recent illustration of a serious accidental explosion of this kind is that which occurred in the Arsenal at Woolwich, in January, 1874, with the air-chamber of a Whitehead, or fish-torpedo, when one man lost his life and several were seriously injured. In this instance, some part of the soft steel diaphragm closing the chamber in which the motive power of this self-propellant torpedo (air) was imprisoned under a pressure of about 800 lbs. on the square inch, suddenly yielded to the efforts of the gas to return to its normal condition. These air-chambers were invariably tested up to a pressure very considerably exceeding that to which they would be subjected in actual service, before they were allowed to form part of the torpedo; yet in this instance, some comparatively weak point in the plate in question, though it had successfully resisted the force exerted by the very highly compressed air for a short period, was eventually tried beyond the limits of its strength, by the continued strain exerted by the air confined at a lower pressure; the powers of cohesion of its particles were suddenly overcome, when the confined air, released at one point, expanded with irresistible rapidity, tearing asunder the splendid metal which composed the air-chamber, and consequently inflicting fearful injuries on the poor fellows who were preparing to launch the torpedo on its trial trip. Most careful steps have been taken to avoid the recurrence of an accident of this nature, the possibility of which, with the precautions already adopted, was quite unforseen.

Other explosions of this class, which are of more than weekly occurrence, and but too frequently result not merely in destruction of property, but in more or less serious loss of life, are due to the bursting of boilers at factories, mines, and collieries, to say nothing of those which occur in buildings, in connection with heating appliances and with kitchen ranges, and bath, or other heating arrangements. The explosion of a boiler may arise either from an exceptionally rapid development of steam, the pressure speedily exceeding that which the boiler, or some portion of it, can withstand; or from an absence, or failure in the proper operation, of appliances for relieving the pressure in a boiler by permitting the escape of steam, and giving warning when the pressure begins to exceed the limit of safety. The suddenly tumultuous evolution of steam may either occur from the boiler becoming overheated in parts, in consequence of the shortness of water, or from the sudden cracking or peeling of a non-conducting incrustation, or fur, on some part of the boiler, whereupon the water comes into contact with the overheated metal beneath it. But by far the chief causes of boiler explosions are defects in their construction, or repair, and the reduction in thickness of the metal in parts by corrosion, or oxidation, internally and externally, from long use, and neglect of proper measures for periodically cleaning the boilers.

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* Lecture delivered at the Royal Institution of Great Britain, Friday, March 12, 1875.

The accidents due directly to the deposits formed from water in boilers have been very greatly diminished of late years by the application of preparations called boiler-compositions, of which there are many varieties; their general action being to prevent, more or less effectually, the carbonate and sulphate of calcium and other impurities in water, which are separated by its ebullition and evaporation, from producing hard impenetrable crusts or coatings upon the inner surfaces of the boiler. The judicious employment of a good anti-fouling preparation, and the thorough periodical cleansing of the interior of boilers, go far to guard against that source of danger, though, in adopting measures to diminish the formation of incrustations, care must also be taken to avoid promoting internal corrosion of the boiler by the agents used.

The operations of the Manchester Steam Users Association for the prevention of steam-boiler explosions, founded mainly through the instrumentality of Sir William Fairbairn, twenty years ago, and of which Sir Joseph Whitworth has also been a warm supporter from its commencement, appear to have gradually succeeded in very importantly reducing the annual number of boiler explosions, by introducing among its members a system of periodical independent inspection, the efficiency of which is clearly demonstrated by the circumstance that no case of explosion has yet occurred with boilers under the regular inspection of the Association, while between six hundred and eight hundred boilers are examined monthly. The periodical reports prepared by the talented chief engineer of the Association, Mr. Lavington Fletcher, are full of interesting and valuable information, and throw great light upon the chief causes of boiler explosions, and the means by which they may be guarded against. The Association will not allow that the term "accidental," or mysterious, is applicable to steam-boiler explosions. Mysterious they certainly are not, as they are generally quite traceable to causes which may be obviated, such as inferior material or defective construction, or local injuries, gradually developing and increasing, which would certainly be discovered before they attained dangerous dimensions, by a proper inspection; it may therefore not be too harsh to maintain that boiler explosions are not accidental, as their prevention lies in the power of the steam users, though it is true the same view must equally apply to other classes of so-called accidental explosions which are referred to in this discourse.

The following statements, furnished to the speaker by the Steam Users Association, afford some idea of the number and nature of boiler explosions which have occurred in the last few years. The number of explosions recorded annually by the Association, from 1865 to 1874 inclusive, ranges from forty-eight to seventy-two; the average present annual number is fifty. The largest number of deaths recorded is eighty-seven, and the smallest thirty-two, the present average number being seventy-five. About double that number of persons are seriously injured annually. With respect to the causes of boiler explosions, 40 per cent. were due (from January, 1861, to June, 1870) to malconstruction of the boilers; 29 per cent. to "defective condition" of the boilers; 15 per cent. to the failure of seams of rivets at the bottom of externally fired boilers; 10 per cent. to overheating from shortness of water; and less than 3 per cent. to accumulation of incrustations.*

An examination into the particular nature of the services performed by boilers which have exploded shows that a considerable number of explosions have occurred at iron works, and a very large proportion at collieries, where plain cylindrical externally-fired boilers are much used. Many of the explosions of these particular boilers arise from places which remain for a time concealed in the overlaps of the seams of rivets, defying detection, but gradually extending from one rivet-hole to another, till some sudden strain causes them to extend throughout the entire seam, the boiler splitting in two. The particular description of boiler which gave rise to the largest number of fatal accidents during the year taken as illustration (1873) was the single-flued or Cornish boiler; and it was stated by Mr. Fletcher that all these explosions must have been the result of glaring neglect, as there is no boiler safer to use when well made and properly cared for. The simple precaution of strengthening, or giving internal support to the sides of the furnace-tube of these boiler, the importance of which was demonstrated many years ago by Sir W. Fairbairn, appears to be still greatly neglected, the result being the frequent collapse of the tube through weakness. This illustration will suffice to indicate the nature of the "defects of construction" which are fruitful of the so-called accidents with boilers. An examination of the details given in Mr. Fletcher's reports as to the cause of explosions reveals a really appalling state of things under the head of "defective condition" of the boilers. In one case, the plates are described as having been reduced by corrosion in places to the thickness of paper; in another, they were "in some places not more than from one-thirty-second to one-sixtieth of an inch thick;" in another, they were reduced at the primary rent to "the thickness of a knife-edge;" in another, the plates were in some places "eaten into holes which were roughly patched by means of bolted cement patches," while many of the rivet-heads were eaten off. These are merely examples of many similar descriptions. Very few explosions in 1873 appear to have been due to the neglect of the attendants, but by far the greater number to that of the boiler owners or the makers. The ignorance or criminal neglect, or worse, which appears occasionally to be displayed in the sale, purchase, and use of second-hand boilers is illustrated by the following two examples:—A boiler which burst in December, 1873, on a rag-puller and waste dealer's premises, scalding three persons to death and injuring five others, was found to have given way on its first trial by its then owners, simply from old age and decay. At the earliest period at which its history could be traced it was purchased second-hand, and worked for five years; it was then left exposed to the weather for five years and afterwards sold to a broker for £5, who re-sold it as old iron for £8. It was then sold for £18 to an engineer, who sold it to its last owners with the assurance that it was safe at a pressure of 60 or 70 lb. to the square inch. The jury at the coroner's inquest returned a verdict of "accidental death," but "desired to express their disapprobation of the conduct of the engineer who sold the boiler as in good working order when the flue-tubes were in some places less than one-sixteenth of an inch thick." The other illustration is that of a large boiler which is graphically described in a professional journal of high standing as having been worked to within an inch of its life, being only removed from its seat because it would hardly hold water. On this boiler there was a patch more than two feet long, covering a crack of the same length; the patch had only six bolts, three on each side, and was made tight with a piece of old carpet smeared with white lead. Had this boiler burst, the verdict would in all probability have been, as in the other case, "accidental death," though it was worked almost to the last to 35 lb. pressure.

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* These data are in part extracted from a Table submitted by Mr. Fletcher to the Select Committee on Boiler Explosions, in June, 1870, *vide* p. 118 of the Committee's Report.

(*To be continued.*)

Parliamentary and Law Proceedings.

HOUSE OF COMMONS.

Thursday, July 15, 1875.

THE IRISH PHARMACY BILL.

The amendments in this Bill were, on the motion of Sir Michael Hicks-Beach, considered.

Mr. Thomas Cave said: I have several amendments to propose in this Bill, but before doing so, I will state the course I am about to take with regard to this Bill. The chemists and druggists of this country have, through the instrumentality of the Pharmaceutical Society of Great Britain, succeeded in bringing into prominence two classes of chemists and druggists—the higher class are known as pharmaceutical chemists, and the other are known as chemists and druggists. This Bill which is promoted by the right hon. baronet, the Chief Secretary for Ireland, does not in the main meet with the opposition of the Pharmaceutical Society of Great Britain; but, on the contrary, the Society is glad the chemists and druggists of Ireland are about to enjoy, like those of England, the advantages of scientific training and a requisite examination. But the Society is rather jealous now that it has succeeded in establishing the confidence of the public in its examinations as to the fitness of persons who are chemists and druggists to dispense medicines, that another body in Ireland should be established, without passing the same examinations and without being qualified to the same extent to dispense medicines scientifically, to deal in poisons, and to properly carry out the provisions of the Acts of Parliament that have been passed for the protection of the health and lives of the people. I have on the paper a number of amendments for the purpose of substituting a lower name for the pharmaciens of Ireland than that accorded to pharmaceutical chemists of Great Britain, but after a personal appeal that has been made to the right hon. baronet, the Chief Secretary for Ireland, finding that he is not disposed to give way to the desire that, until they have obtained qualifications equal to those of the pharmaceutical chemists of Great Britain, the Irish chemists and druggists should be called by some other name, I feel I can do no other than withdraw my amendments. But I appeal to the right hon. baronet to accede to this, that there shall be two grades of chemists and druggists in Ireland—one by education, association by the extent of their business, and by other qualifications to occupy the same rank as those of Great Britain, and the other to occupy something like the lower rank of chemists and druggists in this country. In fact, that the pharmaceutical chemists of Ireland should undergo a major examination, and one worthy to be called a scientific examination, whilst others occupying a position similar to those chemists and druggists in small towns and villages, who sell other goods as well as drugs, should undergo an examination not of so high a standard. This could be done without interfering with the spirit of the Bill. In Clause 15 the change could be made. I ask the right hon. baronet the Chief Secretary for Ireland, on behalf of the Pharmaceutical Society of Great Britain, which has given careful and sympathetic attention to the Bill, to leave out "may" in Clause 15, and insert "shall," so as to remove the permissive character of the Bill, and render it compulsory on the chemists and druggists of Ireland who wish to obtain these titles to undergo some examination. If the right hon. baronet can confer that favour on the chemists and druggists of Ireland, whereby they would have to undergo a modified examination, he would call into existence in Ireland a much larger class of educated chemists and druggists than otherwise would be the case, and lead on to that most desirable object to be attained, the union of the two bodies at an earlier date, and thus obtain the same examinations by the same men, and that uniformity of education so essential and important to an educated body. I therefore move to leave out "may" and insert "shall."

Sir Michael Hicks-Beach: I am sorry that I cannot agree to the amendment, and I will shortly explain why. The amendment, if agreed to, will entirely change the framework of the Bill; the object for which it was brought in being to remedy in Ireland the deficiency of persons legally qualified to dispense medicines, and which, in the opinion of those connected with Ireland who had studied the subject, would be best attained by the institution of one grade of pharmaceutical chemists. The position of Ireland was different to that of England before the passing of the English Act, under which that body was constituted. Before that time, there were a very large number of persons in England legally capable of dispensing medicines, and their interests had to be considered in the alteration of the law; that is not the case in Ireland, where medicines are dispensed by persons who are licentiates of the Apothecaries' Society, and of higher qualification, and it was to remedy the deficiency of persons capable of doing so at present that this Bill has been introduced; but if the amendment is adopted there will be two grades of chemists and druggists in Ireland where one only is at present needed, and probably it would also be the means of persons taking the rank of chemists and druggists to whom it would not be to the public interest to entrust the compounding of medicines. I have introduced this permissive clause in the hope that, on some future day, the Irish pharmaceutical chemists of Ireland will have put themselves on a par with the pharmaceutical chemists of Great Britain, so as to obtain that reciprocity between the two countries which, I hope, when the Irish Society is regularly established, will result to the mutual advantage of both. I cannot therefore agree to the amendment.

Mr. T. Cave: After what the right hon. baronet, the Chief Secretary, has stated, it will be quite useless to put the House to the trouble of dividing, and I withdraw my amendment.

The amendment was then by leave withdrawn.

Mr. Whitwell: I propose to add to the end of the 15th Clause the following:—"Provided always that no person obtaining the designation of 'chemist and druggist' under this clause, shall be qualified to dispense medicines unless he shall have previously passed an examination equal to that prescribed by the Pharmaceutical Society." By the clause in the Bill the Council will have power to admit persons as properly qualified pharmaceutical chemists, leaving to a large class of persons who now sell drugs, as well as articles of the most ordinary character, such as grocery, paint, and the like, the option at any time to apply to be allowed to pass an examination to enable them to dispense medicines, and so to be placed in a higher position than those who are content to remain on as now. I hope the right hon. baronet, the Chief Secretary for Ireland, will be able to accept the amendment.

Mr. Errington: I beg to second the amendment, the object of which is to meet the special case of certain persons who have been in business as chemists and druggists for some time and are quite qualified and competent to dispense medicines and compound prescriptions. It was desirable that the Council, subject to the control of the Privy Council in Ireland, should have power to admit these persons on somewhat easier terms than the technical examinations would give. Under the provisions of the amendment, their interests and that of the public would be protected by the control of the Privy Council in Ireland.

Sir Michael Hicks-Beach: I am unable to appreciate the point which the hon. member for Kendal wishes to raise. I apprehend that the hon. member wishes to secure by this Bill, which relates only to Ireland, that the examinations in Ireland shall be equal to those in England. I hope it will be so, and I do not see any reason why it should not be so. I will point out that the best security for its being so will be found in the composition of the Council, under whom the regulations will have to be made. It was, of course, to their interest, and the interest of the public, that the standard of examination should be of the highest possible character consistent with the object to be attained, and in obtaining reciprocity between the two countries, the British Pharmaceutical Society will have ample security for it, because both societies will protect themselves by taking care to see that the respective examinations are sufficient for the purpose, and those who pass an examination in one country will be able to do so, and be equally qualified to pass it in the other country.

Dr. Ward: The right hon. baronet, the Chief Secretary for Ireland, is under a misapprehension with regard to the object of the amendment. The hon. member for Kendal does not propose that it shall be optional on the part of the board to admit persons to practise if they think fit, but that the applicant should pass an examination equal to that prescribed by the Pharmaceutical Society of Great Britain. This illustrates the true condition of the examination in this country. What security is there that the examinations by the Pharmaceutical Society of Ireland will be equal to that of the Pharmaceutical Society of England? No guarantee whatever. And when this Bill was introduced I think the Government should have taken some means to secure a certain guarantee that the examinations should be of a proper character. I think we should insist that some guarantee should be given in this Bill that the Irish Society shall not admit men unless they are specially qualified as in England.

Mr. Bruen: The object which the hon. member for Kendal has in view is best to be obtained by looking to the list of examiners. It is impossible to establish a rigid standard. You cannot lay down certain rules and standards to be passed unless you first trust to the examiners, and that is what this Bill does. It provides for a competent board of examiners, and it leaves to their high character the standard they will lay down that shall be attained by those who apply to become members of this Society. It is to the interest of the public that only properly qualified persons shall be admitted to this degree, and that it should be a good one, because this Society hopes in time to attain a reciprocity with that Society which the hon. member for Kendal points out as offering the proper standard, which we hope the members of the Irish Society will attain. I do not think that the amendment of the hon. member for Kendal will in any way increase the feeling that exists that a proper standard should be attained.

Mr. Sullivan: I submit that we ought not to be drawn into such a line of discussion as we should be if we follow up the personal qualifications of the gentlemen who are to form the Council, because it would impose upon us a most invidious and odious task, and therefore I decline to do so. What we complain of in Ireland is the facilities with which qualifications are granted in the three kingdoms; men defeated in one place start off to another, and, owing to the rivalry of these bodies, really inefficient men are allowed to practise. We in Ireland desire that there should be passed an Act that offers fair and reasonable ground for believing that the standard of qualification in our country shall not be below that of England.

Mr. T. Cave: The hon. member for Carlow has advocated a strictly high-class examination, and so far I am in sympathy with him. Some twenty years since, when the Pharmaceutical Society of Great Britain was founded, and commenced its work, there was the utmost difficulty to induce the chemists and druggists to come forward until the establishment of Major and Minor examinations, and then they were induced to enter the last, and gradually qualify themselves from the lower to the higher grades. The Bill does not intimate whether the examinations for Ireland are to be of the Major or Minor character, and if it is intended that it shall be the Major the Bill will defeat itself, because Irish chemists and druggists, who are only qualified to pass a Minor examination, will not expose themselves to a defeat on the Major. I suggest that the hon. member for Kendal shall amend his amendment by inserting the word "pharmaceutical" before chemist. However well intended, this Bill in its present form will not be useful as it otherwise might be.

Mr. Plunket: I think there would be great difficulty in carrying out the amendment proposed. I really must say, considering the large concessions that have already been made to meet what I will call the susceptibilities of the English Pharmaceutical Society, it becomes, I will not say injurious, but certainly unnecessary for those who represent it to press the matter further. All competition with the English Society has been got rid of, and it is a question now entirely as regards the well-being of the profession in Ireland alone.

Mr. Salt: I think very important amendments have been made in the Bill since it was first printed, and I rise to say that I hope the hon. member for Kendal will not press his amendment to a division.

The Speaker then put the amendment, which was rejected without a division.

Sir Michael Hicks-Beach then moved some verbal amendments, which were agreed to, and the third reading was fixed for Friday, at two o'clock.

On Friday, July 16, on the motion of Sir Michael Hicks-Beach, the Pharmacy Act (Ireland) Bill was read a third time and passed.

The Bill was at once introduced into the House of Lords and read a first time. The second reading was fixed for Thursday the 22nd inst.

Sale of Food and Drugs Bill.

Notice of the following amendments to be proposed on the third reading has been given by the Lord President.

Clauses 3 and 4, leave out "knowingly."

After clause 4 to insert the following clause:

"Provided that no person shall be liable to be convicted under either of the two last foregoing sections of this Act in respect of the sale of any article of food, or of any drug, if he shows to the satisfaction of the justice or court before whom he is charged that he did not know of the article of food or drug sold by him being so mixed, coloured, stained, or powdered as in either of those sections mentioned, and that he could not with reasonable diligence have obtained that knowledge."

To leave out clause 5, and insert the following clause in lieu thereof:

"No person shall sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding twenty pounds; provided that an offence shall not be deemed to be committed under this section in the following cases; that is to say,

(1.) Where any matter or ingredient not injurious to health has been added to the food or drug because the same is required for the production or preparation thereof as an article of commerce, in a state fit for carriage or consumption, and not fraudulently to increase the bulk, weight, or measure of the food or drug, or to conceal the inferior quality thereof;

(2.) Where the drug or food named is a proprietary medicine, or is the subject of a patent in force, and is supplied in the state required by the specification of the patent;

(3.) Where the food or drug is compounded as in this Act mentioned;

(4.) Where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation.

Clause 6, in the first paragraph after "food" to insert "or compounded drug"; and to leave out the whole of the second paragraph.

Clause 7, after "measure" to insert "or to conceal its inferior quality"; after the first "article" to insert "or drug"; after the second "article" to insert "or drug", and leave out the third "article" and insert "same."

The Sale of Laudanum in Ireland.

At the Belfast Police Court last week, Messrs. O'Donnell, R.M., and Browne, J.P., heard a summons issued at the instance of the Mayor, Aldermen, and Burgesses of Belfast, against a druggist named James May, for having neglected to affix a label marked "Poison" on a quantity of laudanum which he sold to a woman named Mrs. Arthur. The case is thus reported in the *Ulster Echo*:—

Mr. James M'Lean, jun., prosecuted, and Mr. M. Regan defended Mr. May.

Mrs. Arthur was examined, and deposed that she purchased two-pennyworth of laudanum from Mr. May. There was no label affixed on the cup in which she got it, nor did she see Mr. May make any entry in a book. He did not ask for her name, but she was well known to him.

Dr. Browne (to Mr. May): What quantity do you give for 1*d.*

Mr. May: A dram and a-half.

Dr. Browne: That is equal to four and a half drops of opium (*sic*), which would be sufficient to set me asleep for a couple of days.

Mrs. Arthur: I have often taken sixpence worth in a day, and have been in the habit of taking it for the past thirty years.

Mr. May, in answer to Mr. O'Donnell, said he was a regular druggist, and was aware of the conditions under which poisons should be sold according to the statute. He kept a book for entering the names of parties purchasing poisons, but it was not necessary to enter such quantities as pennyworths of laudanum. However, he should have labelled it, and very much regretted the oversight.

Mr. O'Donnell reminded the defendant that a fine of £5 could be imposed, but as this was his first offence, and, owing to the expression of regret which he made, the fine would be mitigated to £2 and costs. He hoped the occurrence would be a caution to him in future.

Dr. Browne said it was a very serious matter, inasmuch as the woman might have died from the effects of the dose, and then Mr. May would be liable to a charge of manslaughter.

Mr. May and Mr. Regan thanked their worships and the Court adjourned.

Failure of a Prosecution under the Adulteration Act.

Some days ago Mr. Joseph Holmes, wholesale jam manufacturer, was summoned before Mr. Bruce, at the Town Hall, Leeds, at the instance of Mr. Newhouse, superintendent of the sanitary department of the Leeds Corporation, for selling adulterated jam. The report of Mr. Fairley, the borough analyst, was to the effect that the jam was adulterated with turnips or some other vegetable matter. At the request of Mr. Malcolm, the defendant's solicitor, the case was adjourned, and in the meantime samples of the jam were forwarded by Mr. Newhouse to Dr. A. H. Hassall, London. Dr. Hassall has since forwarded the following report, which was read at the adjourned hearing of the case against Mr. Holmes on Tuesday, the 20th inst.:—

"Samples marked 'Leeds No. 47, gooseberry and raspberry jam,' and sealed with the seal of the borough of Leeds:—

"I have subjected this jam to a very careful examination, and I find that it consists entirely of a mixture of raspberry, gooseberry, and apple jams.

"I may state that portions of the epidermis or cuticle of the apple and apple pips were detected, proving conclusively the presence of apples.

"With regard to the acari, it is now well known that these are of common occurrence in the ordinary brown sugars of commerce.

"Samples marked 'Leeds No. 75, gooseberry and raspberry jam':—

"The results of the examination of this jam corresponded in every respect with those of the previous sample.—Arthur Hill Hassall, M.D."

The Town Clerk (Mr. Curwood), who appeared in support of the information at the previous hearing, now said that he attended to make the best amends he could. Dr. Hassall's report completely exonerated the defendant of any charge of selling anything but pure fruit, and he (Mr. Curwood) could only express his regret that the borough analyst had impugned Mr. Holmes's character as a tradesman.

Mr. Bruce said it was really a very serious matter. It was, in fact, almost ruinous to a tradesman to have his character thus impugned.

The Town Clerk said he had come to make the best amends he could. He was now prepared to admit that Mr. Holmes sold nothing but pure jam.

Mr. Malcolm complained that the borough analyst had not stated definitely what the adulteration consisted of.

Mr. Bruce reminded Mr. Malcolm that Mr. Fairley was not in court to answer for himself.

The Town Clerk then applied that the case might be withdrawn.

This was accordingly done.

Reviews.

The Potato Disease and the Curl Disease in Potatoes: their Causes and Prevention, with Strictures on the Potato Fungus (Peronospora infestans). By Eccles Haigh. London: G. Philp. 1875.

In 1873, a prize was offered by Lord Cathcart, for the best essay on the potato disease. The author of this little pamphlet was one of the competitors, and now makes public his theory upon the subject. It will be remembered by those interested in the matter that all the essays, ninety-four in number, were rejected on the ground that not one of the essayists had proved the truth of his theory, one of the conditions attached to the offer of the prize being that all information should be founded on experience or observation. The author has evidently taken great pains to ascertain the results of the experience and the observations of others, but has no experience of his own to bring forward. In the introduction he remarks that the cause of the disease must have existed prior to its appearance in 1845, and that therefore a reference to books and an application of observations made at that time must not be neglected if the origin of the disease is to be traced. His theory of the disease is that the potato fungus is the result not the cause of the disease. The disease itself he attributes to an excessive amount of nitrogenous matter in the tuber, owing to the use of strong manure, such as guano, sulphate of ammonia, nitrate of soda, etc., and to the non-development of fruit, which in his opinion causes the nitrogenous matter to remain in the tuber, and such matter being very prone to decay affords a *nidus* for the germination of the fungus. The curl disease, he considers had its origin in a deficiency of this nitrogenous matter, due to the abundance of fruit during the prevalence of that disease, the fruit using up the nitrogenous matter, so that there was not a superabundance of it in the tubers. In support of his theory the author states that the potato disease appeared soon after the introduction of guano into this country, that the disease only attacks the potato plant when it is approaching maturity and just when the nitrogenous matter should be used up by the fruit, that since the advent of the potato disease the fruit has been of rare occurrence, that the potatoes most free from disease are those which produce most fruit, and that the curl disease disappeared just when the potato disease commenced and soon after guano was first used.

The remedy proposed by the author is to regenerate through the seed two or three times and to abstain as much as practicable, not only from strong artificial manure, but also from rich farmyard manure. His theory is undoubtedly ingenious, but the potato disease only needs comparison with a similar disease which has lately attacked mallows, hollyhocks, and other malvaceous plants, viz., the *Puccinia malvacearum*, to show that the development of a fungoid disease is not entirely dependent upon manure or high farming. A few years ago this fungus was not known to occur in Britain, and now there is scarcely a district which is free from it. It has attacked wild and uncultivated plants equally with those in gardens.

Since this pamphlet was written a new form of potato disease has made its appearance at Chiswick and elsewhere, which by some was supposed to be the curl disease, but which has proved to be the long sought for form of the old potato fungus. So far from the disease commencing in the tuber, the tubers have been found unaffected, while two inches above the tuber the haulm was completely rotten. The discovery of the resting spore of the potato fungus, by Mr. W. G. Smith, has set at rest the long vexed question of how the potato fungus is kept alive through the winter. Now that the habits of the fungus are known, the first step has been made towards its destruction and the prevention of the disease. According to Mr. Smith's experiments, moisture and warmth, not manure, appear to be the chief stimulants to the growth of the fungus, and to cause it to grow with such rapidity that the potato plant succumbs in the struggle with it.

The Pharmacopœial Companion to the 'Visiting List' and Medical Diaries, etc. By R. T. H. Bartley, M.D., Surgeon to the Bristol Eye Hospital. Second Edition. London: Baillière, Tindall and Cox. 1875.

This is a neatly printed list of medicines contained in the Pharmacopœia, with red-letter headings of groups said to be arranged according to their therapeutical action. It is of a convenient size, and will no doubt prove useful to the medical practitioner who "finds his memory at fault as to the exact dose of a remedy he is about to prescribe."

The classification is, however, not quite precise, nor is the list as complete as it might be.

Veratria, for example, appears under the head of purgatives, while *Atropia* is altogether omitted.

On Defective Hearing: its Curable Forms and Rational Treatment. By James Keene, F.R.C.S., Assistant Surgeon and Surgeon to the Ear Department at the Westminster Hospital; Lecturer on Aural Surgery at the Westminster Hospital Medical School, etc. etc. Second edition. London: Robert Hardwicke.

This is a reprint of a paper read before the Harveian Society, in April of last year, and contains a brief *résumé* of the principal affections of the middle ear, which constitute the most frequent causes, as well as the most curable forms of defective hearing. The author's object has been to show that the study of ear disease is not only one of considerable interest, but one which, with a little pains, may be easily mastered. The pamphlet is full of useful hints on the diagnosis and treatment of the majority of ear cases met with in ordinary practice, and is well deserving the attention of all practitioners.

The Pocket Doctor for the Traveller and Colonist. By Harry Leach, M.R.C.P., Medical Officer of Health for the Port of London, late Senior Medical Officer "Dreadnought" Seamen's Hospital. London: S. W. Silver and Co., 1875.

A number of little popular medical guides have appeared from time to time expressly intended for emigrants and others, who often find themselves beyond the reach of medical and surgical aid. Mr. Leach's Pocket Doctor is one of the most practical handbooks of the kind we have yet seen for the purposes of the ship captain and colonist, and well calculated to meet most emergencies they are likely to experience.

Notes and Queries.

IODOFORM PENCILS.—M. Godin (*Arch. Belges de Thér.*) gives the following formula for iodoform pencils, which have been strongly recommended by Dr. Leblond for the treatment of uterine ulcerations:—

Iodoform, very finely powdered . .	10 grams.
Gum Arabic, powdered	50 centg.
Mucilage, q. s. for a pilular consistence.	

Divide into ten equal cylinders four centimetres in length, and dry in the open air. The pencils, which are hard and capable of being divided easily into pieces of any length, should be kept sheltered from the light.

SOLUBILITY OF BORATE OF SODA IN GLYCERINE.—M. Gandolphe states (*L'Union Pharmaceutique*, xvi. 18) that by trituration, especially if aided by a gentle heat, ordinary medicinal glycerine may be made to dissolve an equal weight of borate of soda, and that the salt is not deposited from such a solution in cooling. Distilled water, he has found to dissolve 8·33 per cent. in the cold. With heat distilled water will dissolve 58 per cent., but 41·67 of the borate of soda is deposited from the latter solution in cooling.

BENZOIN ODORIFERUM.—P. Gleine states (*Amer Journ. Pharm., June*, 1875) that by distilling the fresh berries of *Benzoin odoriferum* with water he obtained 5 per cent. of a colourless volatile oil, sp. g. ·87, possessing a very fragrant odour, resembling that of jessamine, which could be used with advantage in perfumery.

Obituary.

Notice has been received of the death of the following:—

On the 30th of June, 1875, Mr. Walter Beattie, Chemist and Druggist, of Bridge Street, Portobello, aged 29 years.

On the 11th of July, 1875, Mr. Evan Lewis, Chemist and Druggist, late of Cullum Street, London, E.C., aged 42 years.

On the 15th of July, 1875, Mr. George Kirby, Chemist and Druggist, of Trafalgar Road, Greenwich, aged 69 years.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE IRISH PHARMACY BILL.

Sir,—Many pharmaceutical chemists are probably aware of the fate of the Irish Pharmacy Bill upon its appearance in the House of Commons on July 15, being a stage beyond that reported in your last issue. I believe that there are few who will not regret to learn that the Government has adhered to its unfair appropriation of the title "pharmaceutical chemist" for the purposes of the new Act. But, I am afraid, that with the regret will be mingled a feeling that the mischief may have been a preventible one, even although one may not say with a modern authoress, "whenever I see an accident I always feel inclined to scold somebody."

Your own leaders and the letter signed "Pharmaceutical Chemist" have made the issue on this point so clear that one is astonished how the matter should have been given up by our Society without a contest. The labours of our Parliamentary Committee have undoubtedly been very onerous, and law-making that compelled them to oppose three bills before Parliament at one time, suggests that "harassing" legislation may be but changing its field of action, not ceasing to trouble the lieges. That our energetic representatives upon this Committee have achieved success in almost all that they undertook entitles them to our hearty gratitude.

But is not the secret of our non-success in a vital point contained in your report of the last meeting of Council, when a division took place upon the question of opposing the title to be given by the Irish Pharmacy Bill? The constituency cannot but observe how often a want of united action is arising from the allegation of individual members of Council that their hands have been tied by some of the negotiations in which they have been engaged, and that they cannot honourably follow the course which the majority deem needful for the interests of the Society. Why, this was the origin of the struggle of 1871, and since the Irish Pharmacy Bill has been under discussion, it has twice weakened the action of the Society by breaking out in quite different quarters. One asks oneself if the term "epidemic delusion" is not likely to become applicable to these manifestations if continued.

That the Irish Pharmacy Bill was utterly inconsistent with all modern legislation in relation to medicine was apparent from the first, and political expediency seemed needlessly strained by a strong Government in the introduction of such a measure. Of course, a mere negative could not be moved, and it was truly said by a member of Council at its last meeting "The position of a political committee varied from day to day, and it was obliged to act accordingly."

The Local Secretaries were not backward when called upon, and it was shown that whenever the Pharmaceutical Society had a good cause its organization would ensure its wishes being treated with respect by the Government. Until the chemists of Great Britain poured in their petitions, Sir Michael Hicks Beach had shown as much disposition to refuse our previous claims as he did in the question of title; and, had the Local Secretaries received instructions to ask their representatives for support to Mr. Cave's or any other definite amendment, the result might have been very different.

The Executive at Bloomsbury Square will bear witness that I am not now suggesting an afterthought, but that these views were brought forward a fortnight since as those of a Local Secretary.

May I venture to suggest that when the rights and privileges of the Society are concerned, doubting members of Council will find less difficulty if looking upon their functions in the light of trusteeship, they remember that its first duty is to protect what belongs to their constituents. I do not think this idea would detract from the dignity or legitimate independence of their position, and it may be the safeguard for our rights that has just been found wanting.

Mr. Tennyson makes Queen Mary say—

> "Suffer not
> That my brief reign in England be defamed
> Thro' all her angry chronicles hereafter
> By loss of Calais."

Our Society has saved its purse and lost its good—nay, its best name.

As to the future, the hope of the Irish Chief Secretary that the societies of Great Britain and of Ireland may, upon some occasion, be more easily assimilated, because he has forced upon them the same name, will probably prove a mischievous delusion.

Honest uniformity of examination has been and will continue to be our watchword. If the Irish Society can stand this test it is a thousand pities that its friends have now refused to face it.

RICHD. REYNOLDS.

Leeds, July 20, 1875.

THE ILLEGAL SALE OF POISONS.

Sir,—Of late much has been written respecting infringements of the Pharmacy Act. I fully agree with your correspondent "A North Staffordshire M.P.S.," who mentions the desirability of appointing a gentleman whose duty it shall be to travel about the country and obtain information from registered chemists as to where there are unqualified men practising as chemists. I think the funds of the Society would be much enlarged by so doing, and besides this, it would only be doing justice to those who have passed the examinations.

Though connected with the Society for six years myself, I cannot get others to join. I am asked such questions as these:—What good does it do for chemists, especially those living in country places? What are the advantages of joining? Any man may open a shop and call it a "drug stores," or "drug warehouse," and who can stop him? These are questions not easily answered. If the Society is appealed to by one of its registered chemists (which I know to have been done), the answer it gives is to this effect:—If you will give us proofs we will prosecute. The case I am alluding to is one in which a chemist is opposed by a man who shields himself under a name similar to one of the above, and who would (if he thought of being qualified) have to go to school to learn things which any child ought to know, before he could think of passing the Preliminary Examination. I think I may fairly ask what would the public think of a man who turned "informer" on a "brother chemist." It would be a position in which few men would like to place themselves, and I do not think there are many who would care to make themselves so unpopular (more especially in villages and places where everybody knows everybody), as such a proceeding would certainly make them. It would probably be a means of making the "brother chemist" more popular than before, as he might be fined a few pounds, and afterwards be looked on as a man to be pitied, and therefore supported in preference to the man who informed—no matter how many letters he might be able to put at the end of his name. A "brother chemist," I say, and to the general public a man who puts carboys in his window, sells red and white precipitate, paregoric *cum opii*, such he certainly is; and, until the public are taught the difference between the qualified and the unqualified man, I think the Society will only be doing its duty by prosecuting the unqualified chemist-shop-keeper, and thus clearly mark the distinction between those who have spent years to make themselves efficient in the manipulation of drugs and chemicals, and the ignorant shopkeeper who has never studied at all. Then the discussion about adding long tails to the end of our names, which we read so much about, might be worth noticing, which at present it certainly is not.

I have observed that chemists in London and large towns are to a great extent safe from such men. The former have the Society near, and many large towns have their local associations, which appear to act as a terror to men who think of breaking the law. We village chemists have not these advantages, and therefore look to the Society from whence ought to come our aid, and it is to us that a gentleman who would prosecute usurpers would be a great boon. I must apologize for intruding on so much of your valuable space. I hope that this question will soon have many more supporters in our Council chambers, besides Mr.

Hampson and a few others, and also that the time will come when they will exercise the power so rightly given to them by the Legislature. By so doing they will no doubt increase the funds of the Society, and also give their supporters some encouragement to get others to join.

A YOUNG CHEMIST.

July 15, 1875.

A GRIEVANCE.

Sir,—In my humble opinion, it is quite time something was done to put a stop to the flagrant violations of the Pharmacy Act as that brought to light in the poisoning case, reported in your last issue. Here, a grocer sells vermin-killer containing strychnia, and not being a registered chemist, renders himself liable to a penalty of £5. Yet we find it passed over by both judge and jury without a word of comment. Again, he admits having sold one packet without registering the sale of the same, and this,—another wilful violation,—is passed over with the same unconcern.

Now, I would ask, what is the use of a Society pretending to protect the interests of its members and yet allowing such things to go unpunished?

The case at point is not an isolated one—indeed the same open defiance of law is taking place all over the country, day after day; but as no accidents occur to bring it before the public, it goes on unmolested; the very silence and indifference of those in authority appearing to encourage it.

I do not object to any one selling poisons or dispensing medicines, providing he goes through the required *curriculum* of study and by passing the examinations proves himself qualified; but that one should be compelled to go through this ordeal at an expenditure of time and money and then have no greater privileges (excepting the empty title of Chemist and Druggist) than one who has not, is unjust in the extreme, and demands immediate attention.

A deal has been heard of the necessity of increased subscriptions to the Benevolent Fund; but I am afraid that unless something is done to protest our rights, the requirements for the Fund will soon be very much greater, for who can live honestly as a chemist and druggist if your neighbour is permitted to carry on your trade in addition to his own, without any outlay at all comparable with that of a qualified man.

I trust this subject may not be allowed to drop, but be agitated until something is done, and if the Society's funds are insufficient to carry out such a prosecution, let a subscription be raised and I am sure money will not be found wanting.

I must apologize for the length of this letter, but as I am one of the examined "tradesmen" I feel that I am

ONE OF THE AGGRIEVED.

PHARMACEUTICAL TITLES.

Sir,—I cannot venture, with the imperfect knowledge I have of the peculiarities involved in the question, to offer anything more than by way of suggestion, as to titles for the designation of the members of the highly important class of the community who are "matriculated" on the Register of the Pharmaceutical Society. I think Phar. Ch. would be most intelligible to the public, as M.P.S. may mean Member of the Philological Society, of the Philosophical Society, and others. I principally write to offer a suggestion arising out of the correspondence, viz., that to avoid using such circumlocutory and not very grammatical terms as "my tail," and the tail after my name, the word "glyphics" should be adopted. I have used it for years (from γλυφή, an incised character). Hieroglyphics (sacred letters) is well understood, and when I add my titles after my name I describe them as the "glyphics."

JOHN FREDERICK STANFORD,
M.A., etc. (my glyphics).

Forest Lodge, 5, North Bank,
July 12, 1875.

G. D.—We do not think it lies within the province of this Journal to furnish a recipe for "Mock Port Wine," especially in the present state of the law as to adulterations.

J. Gray.—(*a*) *Senecio Jacobæa*, or *aquaticus*, neither leaf nor fruit sent; (*b*) *Knautia arvensis;* (*c*) *Torilis anthriscus;* (*d*) *Gnaphalium uliginosum;* (*e*) *Lastræa filix-mas;* (*f*) *Lepidium campestre;* (*g*) *Asperula odorata;* (*h*) *Ononis arvensis*, or *campestris*, the specimen sent had no pods; (*i*) *Hieracium pilosella;* (*k*) *Chærophyllum temulum;* (*l*) *Lactuca muralis.*

"*Lex.*"—Probably as the bill represents the powders to be a medicine which can be had genuine only of one person, a stamp would be required. Consult the Inland Revenue authorities,

"*Crinis.*"—The following recipe for "Brilliantine" has already been quoted in this Journal:—

Honey	℥j.
Glycerine	℥ss.
Eau de Cologne	℥ss.
Rectified Spirit	℥ij.

"*Leander.*"—We believe that copies of the Price Lists may be obtained by application to the Secretaries of the different associations by which they have been issued.

G. Dobson.—(1) *O. maculata;* (2) *Campanula rotundifolia;* (3) *Polygonum amphibium;* (4) *Matricaria inodora;* (5) *Ligustrum vulgare;* (6) *Crysanthemum leucanthemum;* (8) *Daucus carota;* (7) *Bartsia Odontites;* (9) *Galium palustre;* (10) *Hypericum pulchrum;* (11) *Galium cruciatum;* (12) *Prunella vulgaris;* (13) *Medicago lupulina;* (14) *Rhinanthus Cristo-galli;* (15) *Viola sylvatica;* (16) *Jasione montana;* (17) *Lathyrus pratensis;* (18) *Geranium molle;* (19) *Chærophyllum temulum;* (20) *Sinapis arvensis;* (21) *Veronica officinalis;* (22) *Lapsana communis.*

"*Dispenser.*"—(1) We believe that a "Sp. Nucis Jugland," prepared by Messrs. Corbyn, is sometimes described as a tincture. (2) Probably on the last occasion an extract of Chondodendron root was used, and on the three former an extract of Cissampelos root. (3) Powder the extract, and use with a little cacao butter; add and thoroughly incorporate about half-a-drachm of glycerine, then add the remainder of the oils and mix well. Lastly, melt *gently*, stir well, pour into mould, and cool by the aid of ice. If necessary the proportion of olive oil might be decreased and that of cacao butter increased to suit a summer temperature.

J. James.—No.

"*Valkyrie.*"—Bichromate of potash is not included in the poison schedule of the Pharmacy Act. Before repeating the experiment upon yourself, we advise you to become acquainted with the information given on p. 488 of the new edition of 'Taylor on Poisons.'

W. R. F.—We should think not.

T. G. Chaundy.—We believe that a cheap form of compound rhubarb pill is sometimes sold under the name mentioned.

"*Hibernicus.*"—We should imagine that the best plan would be to dissolve it with an alkali.

A Registered Chemist of 1862.—You, of course, ought to dispense it unless you are aware it is going to be put to an improper use. The Pharmacopœia dose is frequently exceeded to this extent. The physician would be responsible.

J. B., late T. G.—The mixture should not be black when dispensed. We cannot assign any reason why it should become black when kept.

J. Gibson.—The mixture cannot be dispensed so as to be clear without an unjustifiable addition.

G. H. P.—(1) Dissolve the salt in the water, add the tincture and liquor last, shake well, and label "to be shaken." (2) Tincture quiniæ ammoniata, in 'Additions to Pharmacopœia.'

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ.* A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Kemp, Mr. Barker, Messrs. Wright and Co., Mr. Pocklington, Mr. Rimmington, Mr. Metcalf.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

It does not fall within the scope of my purpose in writing these articles to give anything like a complete sketch of modern knowledge of polarized light or present theories respecting it. What I wish to do is simply this, to state as clearly as possible what I conceive to be the chief practical applications of which polarized light is capable, and to indicate the various methods by which it can be so applied. I will, therefore, ask such as desire to know more about what polarized light is, and how it differs from ordinary light in other respects than I indicate, to read either Mr. Spottiswoode's admirable treatise, or Professor Everett's chapter on polarization in the English edition of Deschanel's 'Physics.'* But there are certain things which must be clearly apprehended by him who seeks to follow any method of polariscopic analysis with intelligence and reasonable hope of success; fortunately they are not hard of comprehension and are capable of very easy experimental demonstration. Dr. Pereira in his justly celebrated lectures before the Pharmaceutical Society indicated them very clearly by drawing a fourfold comparison between common and (plane) polarized light. The first of these will answer our present purpose. It is well known that we can take a beam of common light and reflect it by mirrors in any direction. To place the matter under simple conditions and initiate a series of experiments that any one may perform (with or without the dark room we will suppose ourselves to possess), we will imagine that we admit a small ray of light into a dark room through a hole in the shutter. If we let it alone the ray or beam of light will fall upon the floor, where it will be seen as a luminous spot, but if we interpose in its path a piece of polished metal, or silvered glass, it will no longer fall upon the same part of the floor, but be directed to some other part, possibly to the wall or ceiling. Its new path and its old path will have for all positions of the mirror a definite relation, but at present we are only concerned with the fact, which we readily prove by experience, that we can throw the light into any direction we choose; and with the other fact that we can interpose a second reflector into the new path of the ray, and redirect the ray wheresoever we choose. We have so far used polished metal or silvered glass (silvered on the front surface), but we will now allow another beam of light to fall upon a piece of common plane window glass, backed with black velvet, placed in the path of the ray in such a position that the light strikes it at an angle of 54° 35′ (reckoned from the normal to the glass), as shown at (A) in Fig. 1. The light is reflected as before, according to the well-known law, whereby the angle of reflection precisely equals that of incidence. The glass in all appearance acts precisely as the other reflectors acted. Let us now introduce into the path of the new reflected ray a second plate of glass with its velvet back (or black glass may be used), taking care that the ray falls upon it at the former angle of 54° 35′, and that the glasses are parallel. We find the light is again reflected, and the reflectors again agree. But if we now pursue our experiment, and try to reflect the second ray in all directions by turning the second piece of glass, we shall immediately be conscious that it posesses quite different properties from the first; that it is no longer common light because it is no longer capable of being reflected in all directions; that there are in fact two directions in which it distinctly refuses to be reflected. The older physicists more or less aptly likened this to the power possessed by a magnet of choosing sides or positions, and called light thus affected polarized light. We may modify our experiment by substituting a number of thin plates of glass for the single plate with advantage. We may also take a bundle of such plates, and, removing the velvet backing, place them in the path of the immergent beam so that the light enters them at the complement to the former angle (35° 65′) and passes through the bundle. After emergence we shall find that the light has assumed a polar character, that it will not be reflected in all directions, but only in directions at right angles to those in which the previous beam was reflected, and that it will not pass through a second bundle except it be placed parallel with the first and at right angles to the position of the reflecting bundle. By the first of these methods we have obtained polarized light by reflection; by the second method we have obtained it by refraction. We may apply either method in practice as we shall soon see; the point to be noticed here and clearly remembered is the changed character of the light—its *polarity*. However obtained, and wherever found, light thus affected is polarized light. We must, nevertheless, not close our eyes to the possibility that the converse may not hold good. We may, and indeed shall, find that that light may possess qualities differing from those of common light; may, in fact, properly be said to be polarized, and yet may, so far as the phenomena of reflection be concerned, not be distinguishable from common light. The two kinds of polarized light here hinted at will require separate treatment and involve the use of somewhat different apparatus. For the present, therefore, I will confine myself to what is known as plane-polarized light, such as results from reflection and refraction in the way already pointed out. And before passing on to describe some more or less important uses to which it may be put, I will sketch as briefly as possible so much of two and other methods by which light may be plane-polarized and the processes (or theories) involved as may appear necessary.

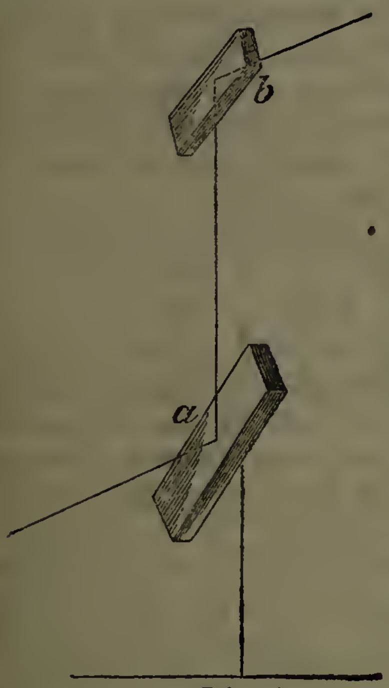

Fig. 1.

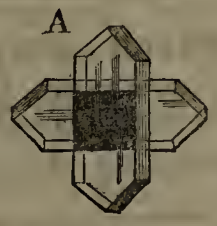

Fig. 2A.
Crossed tourmalines.

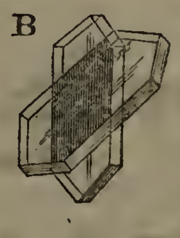

Fig. 2B.
Tourmalines half-crossed (45°).

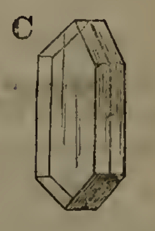

Fig. 2C.
Parallel tourmalines.

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* 1. 'Polarization of Light,' Nature Series; Macmillan. 2. Deschanel's 'Physics'; Blackie and Co.

If we take a crystal of tourmaline of good colour, other than blue, and cut from it a thin plate such as shown in Fig. 2c, in a direction parallel to what is called the optic axis of the crystal, we shall find that whilst common light will pass through it howsoever we hold it, polarized light will only pass through it when it is held in two definite directions. We shall notice also if we experiment with two such plates that a beam emergent from the first plate will only pass through the second plate when it is parallel with the first, and that the amount of light it allows to pass diminishes as it is turned, Fig. 2B, until it is placed at right angles to the first, Fig. 2A, and that if the turning be continued the light is gradually transmitted again until it attains its maximum when the plate has been turned 180°, and the plates are again parallel.

The light emergent from the first plate is readily proved to be in a state of plane polarization and to be essentially identical with the light reflected or refracted by the polarizing glass plate. Anything like a full explanation of the phenomena would take us too far into advanced optics, but some elements of optical theories must be understood if we wish to understand the processes immediately to be described, and I do not know that I can do better than quote Mr. Spottiswoode's statement of them:—"The vibrations producing the sensation of light take place in planes, perpendicular to the direction of the ray. The paths or orbits of the vibrating ethereal molecules may be of any form consistent with the mechanical constituents of the ether; but, on the suppositions usually made, and none simpler have been suggested, the only forms possible are the straight line, the circle, and the ellipse. But in ordinary light the orbits at different points of the ray are not all similarly situated, and although there is reason to believe that in general the orbits of a considerable number of consecutive molecules may be similarly situated, yet in a finite portion of the ray there are a sufficient number of variations of situation to prevent any preponderance of average direction. This being assumed, the process of polarization is understood to be the bringing of all the orbits throughout the entire ray into similar positions. In the case of the tourmaline plate, the orbits are all reduced to straight lines, which consequently lie in one and the same plane. For this reason the polarization produced by tourmaline as well as by most other crystals, is called rectilinear, or more commonly plane polarization." We must not attempt to follow Mr. Spottiswoode into the mechanical explanation he gives of the action of tourmaline, but pass on rapidly to notice the fourth and last method by which we obtain polarized light.* Although this is the last to be described it is really the most important; on the one hand, because the most generally applicable; and on the other, because the laws which govern double refraction are those by means of which we are enabled to make considerable practical use of polarized light thus obtained. No reader of this Journal can have failed to notice the phenomena of double refraction as seen in Iceland spar under the best conditions for observation. The phenomenon was first observed by Bartholin, in 1670, and has since been investigated by the leading physicists of Europe. If, as is well known, we place a small rhomb of spar, such as may be bought from any mineralogical dealer for a shilling, on a small black spot on a white card, we shall see, not one, but the appearance of two spots, one of which will appear much higher—*i.e.*, nearer the observer than the other. If we revolve the spar one of these spots will remain stationary, the other will revolve round it. If we examine the spots through a tourmaline we shall find that there are two positions in which we may place the analyser in which we cannot see the spot, that the spots agree in being extinguished by the analyser in each of two positions, but that these positions are not the same for both spots, but differ by 90°. In other words, the emergent light is polarized light, the two beams are polarized in opposite planes, and by the use of a suitable diaphragm either of the beams may be stopped off, and the other used in our experiment. But the use of a rhomb of spar is open to this objection, that the two pencils are but slightly separated, and, since they emerge in parallel paths, they do not more widely separate as they leave the rhomb. The objection, however, is easily met by cutting the crystal into a prism with its edge parallel to the optic axis and cementing to it a glass prism of similar angles to preserve its achromatism. By this means an angular separation of the images of from two to three degrees can be obtained, and such an arrangement, called a double-image prism, is of essential service in many experiments; but it is difficult to procure by its means a single beam of sufficient size for other experiments, and we have recourse to an extremely simple and effective device by a very ingenious optician, and called, after its inventor, the Nicol prism. The construction of the prism will be readily understood from Figs. 3 and 4. A rhombohedron of Iceland spar of at least twice its natural length has one of its natural faces P removed and a new face making an angle of 68° to the edge *k* ground on to it. The rhombohedron is then bisected through E at right angles to P (see Fig. 4). The faces of the cut are polished and cemented together with Canada balsam. The action of the prism is this:—A ray from *a* (Fig. 4) enters the prism at *b* and is birefracted. The two rays travel until they meet the Canada balsam uniting the severed surfaces, the one ray having a refractive index considerably in excess of the other (hence one spot appeared higher than the other in a late experiment). In consequence of the difference of the refractive indices of the spar and the balsam (in obedience to a law which we cannot here discuss) the ray having the higher index is totally reflected from the balsam, or perhaps more cor-

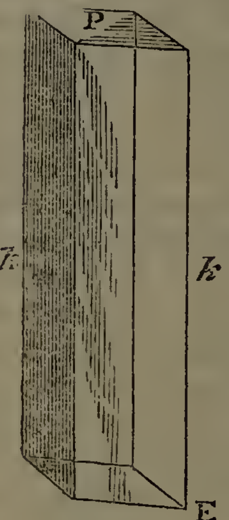

Fig. 3.

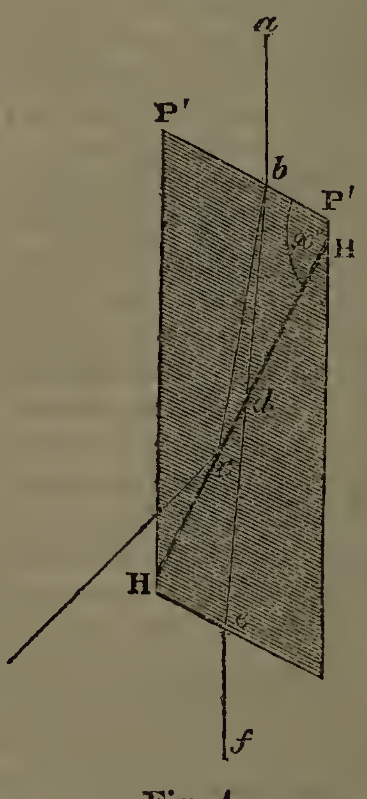

Fig. 4.

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* Scattering by small particles is sometimes included as another method, but for our work may be considered as a of species polarization by reflection.

rectly from the limiting surface of the crystal, as it cannot emerge therefrom into a medium of less refracting power at an angle beyond what is known as the critical angle, and the ray having the lower index emerges alone, in a state of perfect polarization and free from colour. Prisms of this kind can be constructed with so great accuracy and of such large size that for the purpose of analysers they have superseded tourmalines and glass plates in all save a few special cases, and they form the most efficient polarizers where their cost is not an insuperable objection.

(*To be continued.*)

NOTES ON INDIAN BURSERACEÆ.

BY ALFRED W. BENNETT, M.A., B.Sc., F.L.S.,

Lecturer on Botany, St. Thomas's Hospital.

Continued from page 64.

2. Triomma, *Hook. f.*

A tree with robust, pubescent branches. Leaves alternate, exstipulate, unequally pinnate, with opposite stalked leaflets. Flowers very small, in terminal panicles, polygamous (?). Calyx 5-fid. Petals 5, small, valvate (?). Stamens 10 (?), inserted at the base of the 5-lobed disc. Ovary trigonous, trilocular; styles short; ovules 2 in each cell. Fruit 3-valved, 3-winged, 2—2½ in. long.

Only one species; of no known useful properties.

1. T. MALACCENCIS, Hook. f. in Trans. Linn. Soc. xxiii. 171. *Arytera macrocarpa*, Miq. Fl. Ind. Bot. Suppl. 199. Leaflets oblique, ovate-lanceolate, acuminate, entire; drupe ovate-caudate, acutely cuspidate.—Malacca.

3. Garuga, *Roxb.*

Trees with pubescent branchlets. Leaves, alternate, exstipulate, unequally pinnate, crowded towards the ends of the branches, with opposite, subsessile, crenate leaflets. Flowers polygamous, in much-branched panicles. Calyx campanulate, 5-fid, valvate, clothed within by the ample disc. Petals 5, inserted on the tube of the calyx at the margin of the disc; filaments hairy at the base. Ovary sessile, 4—5-locular; style erect; stigma capitate, 4—5 lobed; ovules 2 in each loculus. Drupe globose, fleshy.

From 8 to 10 species, natives of tropical Asia, America, and Australia.

1. G. PINNATA, Roxb. Cor. Pl. iii. t. 208; Fl. Ind., ii. 400; DC. Prodr. ii. 81; W. and A. Prodr. 175; Bedd. Fl. Sylv. t. 118; Brandis For. Flor. 62. Leaflets ovate, obtusely acuminate, oblique. Flowers ⅙—¼ in. long, pubescent.—Generally distributed through India, and eastwards to Birma.

Dr. Brandis says that the wood seasons well, but is of doubtful durability; it is employed for indoor work, and as fuel; it has been recommended for cabinet work. The bark is employed for tanning. The shoots and leaves are lopped as fodder, and known as "kharpat." According to Col. Beddome, this is a very common tree in almost every dry jungle and forest in the Madras Presidency, and also in Bombay and Bengal, but is absent from Ceylon. The leaves are deciduous in the cold weather, and appear with the flowers early in the hot season; the fruit is eaten by the natives both raw and pickled. The tree is called "koorak" in the Bombay Presidency, and "kharpat" in Bengal. The timber is inferior, but is in use with the natives, and rather prized in some parts; the bark is collected by tanners, and the leaves are used as fodder. The Telugu name is Garuga, and the Tamil Karre Vembu.

4. Balsamodendron, *Kunth.*

Balsamiferous, often spiny, trees or shrubs. Leaflets alternate, unequally pinnate or rarely unifoliolate; leaflets sessile, oblique, crenate, or serrate. Flowers small, polygamous, fasciculate, sessile or shortly stalked. Calyx tubular, 3—4 toothed, persistent. Petals 3—4, valvate. Disc erect, cupular. Stamens 6—8, unequal in length, inserted on the margin of the disc. Ovary sessile, 4-locular, surrounded by the disc; style short; stigma obtuse, 4-lobed; ovules 2 in each loculus. Drupe ovoid, with from 1 to 3 divisions.

From 6 to 10 species, distributed over tropical Asia, and tropical and Southern Africa.

1. B. MUKUL, Hook. Kew Journ. Bot. i. 259, t. 8; Brandis For. Flor., 64; *B. Roxburghii*, Stocks, Dalz., and Gibs., not of Arn.; *B. Wightii* (?), Arn. in Ann. Nat. Hist. iii. 86; Wight, Ill. i. 185. A small tree, 4 to 6 ft. high, the branches generally ending in a sharp spine; leaves 1-3 foliolate, leaflets toothed at the end. Flowers nearly sessile, a few in each fascicle, unisexual. Petals 4—5, ligulate, brownish-red, recurved at the tip, three times as long as calyx. Stamens 8—10. Drupe red, ovate-acuminate, containing 2 2-celled stones.—Sindh; Rajpootana; Khandeish and Berar (*B. Wightii* in Mysore); and extending into Beloochistan, and possibly Arabia.

Dr. Brandis, in his 'Forest Flora,' says that several of the Indian species of this genus yield a fragrant gum-resin, which is an article of trade under the names "gugul," "gugal," and "guggur," and which is believed to be the bdellium of classic writers, and most likely furnishes part of the myrrh which is exported from Bombay. They are not important as forest trees, but merit attention as forming part of the scanty arborescent vegetation of the arid hills of Sindh and Rajpootana; and it is not impossible that a better knowledge of them, and increased attention paid to them, may eventually lead to increased production of a valuable article of commerce. Dr. Stocks gives the following account of the collection from *B. Mukul* of the gum known as "Indian bdellium," and in Sindh as "googul." It is collected in the cold season by making incisions with a knife in the tree, and letting the resin fall on the ground. It exudes in large tears, is soft and opaque, hardens and turns brownish-black very slowly. It is brought to the bazaars of Hyderabad and Kurrachee, where it sells at the rate of 2 rs. the maund of 80 lb.

2. B. ROXBURGHII, Arn. in Ann. Nat. Hist., iii. 86; Wight, Ill. i. 185; *Amyris Commiphora*, Roxb. Flor. Ind. ii, 244; *A. Agallocha* (?) Roxb. Branches spiny; leaves 3-foliolate, terminal leaflet very finely serrulate, lateral leaflets very small.—Eastern Bengal.

Very similar to the last, and probably confounded with it; but distinct according to Stocks.

3. B. PUBESCENS, Stocks in Bomb. Trans. 1847; Hook. in Kew Journ. Bot., i. 264, t. 9; Brand. For. Flor., 64. A small tree with pubescent branches not ending in spines. Leaves on long petioles, 3—5 foliolate; leaflets entire; lateral leaflets nearly orbicular, terminal one obovate-cuneate, stalked. Flowers small; stamens equal; drupe red, with two stones.—Sindh; Beloochistan.

According to Brandis, the young roots and buds are remarkably fragrant when bruised. In the cold season it yields a quantity of a tasteless inodorous brittle gum, almost entirely soluble in water.

4. B. BERRYI, Arn. in Ann. Nat. Hist., iii. 86; Wight, Ill., i. 185: Bedd. Fl. Sylv. t. 126; Brand. For. Flor., 65; *Protium gileadense*, W. and A. Prodr. 177; (not *B. gileadense*, DC.); *Amyris gileadensis*, Roxb. Fl. Ind., ii. 246. The lateral branches ending in very abrupt spines. Leaves 3-foliolate, stalked, glabrous, entire; leaflets obovate, sessile, the terminal being as large as the lateral ones. Flowers nearly sessile, solitary or fascicled. Calyx 3—4-cleft. Petals 3—4. Stamens 6—8, the alternate ones smaller.

Drupe oblong, apiculate.—Dry forests east of the Nilghiris and Sivagherry Hills, and cultivated for hedging throughout Southern India.

The following account is given of it by Colonel Beddome in his 'Flora Sylvatica':—"This is a good-sized tree in the dry jungles to the east of the Nilgiris, Guzzlehatty Pass, etc.; it is covered with flower and fruit in February and March. All over the (Madras) Presidency it is very common as a hedge-plant, but seldom flowering in that state, as the inflorescence is either attacked when young by some insect, or rendered abortive from an excessive propagation of cuttings. The whole tree has a grateful fragrance; and a gum-resin exudes from it. The plant makes an admirable hedge."

5. Protium, *W. and A.*

Small balsamiferous spiny trees. Leaves alternate, 3-foliolate or unequally pinnate, with entire or toothed leaflets. Flowers small, on long stalks, in much branched cymes. Calyx small, cup-shaped, 4 or 6 cleft. Petals 4—6, linear-oblong, valvate. Disc clothing the bottom of the calyx cup, with free margin. Stamens 8—12, inserted in the margin of the disc, unequal. Ovary sessile, 2—4-locular; style short; stigma 3—6-lobed; ovules 3 in each loculus. Drupe fleshy, globose, containing 1—4-pyrenes.

Species 3-4, natives of India, Java, and sub-tropical Africa. Dr. Wight states that they never exude resinous juices.

1. P. caudatum, W. and A. Prodr. 176; Bedd. Fl. Sylv. t. 125. Leaves 3—7-foliolate, on long stalks; leaflets more or less abruptly acuminate, the terminal one on a long stalk, ovate, entire. Cyme many times dichotomously branched, bracteate. Flowers small, polygamous. Calyx-lobes deltoid, acute, as long as broad. Petals about twice as long as calyx-lobes. Drupe about the size of a pea, nearly globular, subtended by the persistent calyx.—Western Peninsula. Ceylon.

According to Col. Beddome, "this green-barked tree is common in most of our dry subalpine jungles on both sides of the Madras Presidency, and is found in Ceylon. All over this presidency (Madras), it is very common as an avenue tree, and a very bad one it makes, as it is bare of leaves for some months towards the end of the cold season and beginning of the hot, the young leaves appearing with the flowers in March. It is curious that it is not mentioned by Roxburgh, as it is so abundant in some parts of the Northern Circars. It is called Kond à Mámidi in Teluga, and Kilevay in Tamil. The whole tree is very odoriferous, and the leaves and bark have a strong, grateful fragrance, something like mangoes. The tree grows most readily from large cuttings, which is the reason it is so often employed for avenue purposes; the wood is said to be worthless."

Var. Roxburghiana, W. and A. (sp.); *Amyris acuminata*, Roxb. Fl. Ind. ii., 246. Leaflets ending in a short abrupt point.

2. P. pubescens, W. and A. Prodr. 176. Leaflets about 7, ovate or obovate, entire, very shortly stalked. Cyme or panicle rather dense, branched many times, but not dichotomously. Flowers shortly stalked. Calyx-segments lanceolate, twice as long as broad. Drupe rather larger than in *P. caudatum*.—Western Peninsula.

6. Bursera, *Linn.*

Balsamiferous trees. Leaves alternate, unequally pinnate, or rarely unifoliolate. Panicles short, branched. Flowers hermaphrodite or polygamous. Calyx small, 4- or 6-cleft, imbricate. Petals 4—6, short, at length reflexed, usually valvate. Disc annular, crenate. Stamens 8—12, nearly equal, inserted at the base of the disc. Ovary free, ovoid or subglobose, 3—5-locular; style very short; stigma 3—5-lobed; ovules 2 in each loculus. Drupe globose or ovoid, with from 3 to 5 pyrenes.

About 40 species; the greater number natives of Tropical America.

1. B. serrata, Colebr. in Trans. Linn. Soc. xv. 361, t 4; Brand. For. Flor. 61; *Icica indica*, W. and A. Prodr. 177; *Limonia pentagyna*, Roxb. Fl. Ind., ii. 362. Leaflets about 7 or more, stalked and narrowed below, acuminate, serrulate, or quite entire. Panicles axillary, lax, much branched, shorter than the leaves, bracteate. Flowers very small, hermaphrodite, pubescent externally. Calyx obtusely 5-toothed. Petals 5. Stamens 10, shorter than the petals. Drupe globose, 1—3-locular, on a greatly thickened and elongated stalk.—Eastern Bengal; Assam; and the Circars.

Of no known use except that the timber is close-grained and hard, and much used for furniture. It is as tough as oak and much heavier.

(To be continued.)

CONTRIBUTIONS TO THE THEORY OF SOLUBILITY.*

BY ISIDOR WALZ, PH.D.

(Concluded from page 68.)

The bromides and iodides show similar regularities as the chlorides; but the tables are much less complete at present, the specific gravities far less numerously and accurately determined, and the comparison of the specific volumes, therefore, less reliable.

Bromides.

Formula.	Mol. weight.	Sp. gr.	Sp. vol.
AgBr	188	6·389	29·42
[CuBr]	143·5	4·72	32·52
NaBr	103	3·014	38·02
[HgBr]	280	7·307	38·31
KBr	119	2·592	45·91
$PbBr_2$	367	6·62	55·43
$CdBr_2$	272	4·811	56·53
$CaBr_2$	200	3·32	60·24
$HgBr_2$	360	5·920	60·88
$ZnBr_2$	225·2	3·643	61·81
$SrBr_2$	247·5	3·962	62·49
$BaBr_2$	297	4·23	70·21
$BiBr_3$	450	5·604	80·29
$AsBr_3$	315	3·66 at 15° C.	86·06
BBr_3	251	2·69 (liquid)	93·30
$SbBr_3$	362	3·641 at 90° C.	99·42
PBr_3	311	2·925 at 0° C.	106·32
$SiBr_4$	348	2·812 at 0° C.	123·78
$SnBr_4$	438	3·322 at 39° C.	131·91
$TiBr_4$	370	2·6	142·30

Iodides.

Formula.	Mol. weight.	Sp. gr.	Sp. vol.
AgI	235	5·551	42·33
[HgI]	327	7·697	42·48
[CuI]	190·5	4·41	43·19
NaI	150	3·45	44·11
KI	166	3·02	54·96
ZnI_2	319·2	4·696	67·97
SrI_2	314·5	4·415	71·23
HgI_2	454	6·19	73·34
PbI_2	461	6·158	74·85
BaI_2	391	4·917	79·92
CdI_2	366	4·576	79·98
SbI_3	503	5·01 at 10° C.	100·39
AsI_3	456	4·39 at 13° C.	103·87
BiI_3	591	5·652 at 10° C.	104·56
SnI_4	626	4·696	133·30

The specific volumes of the oxides show certain regularities when the oxides of analogous constitution are placed together in groups, as in the following tables:—

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* From the *American Chemist* for February.

Oxides.

Formula.		Molecular weight.	Spec. gravity.	Spec. volume.		
MO	GlO	25·3	3·05	8·29		Insoluble in water.
	MgO	40	3·592	11·12	Readily soluble in ammonia.	
	NiO	74·7	6·314	11·83		
	CuO	79·5	6 361	12·49		
	CoO	74·7	5·673	13·16		
	UO	136	10·15	13·39		
	MnO	71	5 065	14·02		
	Zno	81·2	5·594	14·51		
	CdO	128	8·149†	15·71		
	CaO	56	3·173	17·64	Almost isosteric; solubility inversely related to the molec. weight.	
	HgO	216	11·159	19·35		
	SrO	103·5	4·27	24·23	Same as above.	
	PbO	227	9·147	24·81		
	BaO	153	5·00	30·60	Most soluble oxide of this series.	
M_2O	Na_2O	62	2·805	22·10	Series very incomplete. The solubility of oxides, that are nearly isosteric, is intimately related to the molec. weight.	
	[Cu_2O]	143	5·879	27·34		
	Ag_2O	232	7·198	32·23		
	[Hg_2O]	416	10·69	38·91		
	K_2O	94	2·656	39·08		
	N_2O	44	0·937 (at 0° C.)	46·95		
M_2O_3	Al_2O_3	102·8	3·927	26·17	Soluble in potassa & soda.	Insoluble in water.
	Cr_2O_3	152·4	5·01	30·41	Close agreement of specific volumes; probable isosterism.	
	Co_2O_3	165·4	5·34	30·97		
	Fe_2O_3	160	5·149	31·07		
	V_2O_3	150·6	4·72	31·90		
	Mn_2O_3*	158	4·786	33·01		
	Ni_2O_3	165·4	4·83‡	34·24		
	Mn_2O_3	158	4·61§	36·44		
	B_2O_3	70	1·794	39·01	Solubility in water, alkalies, and alcohol decreases, as molecular weight, specific gravity, and specific volume increase.	
	As_2O_3	198	3·756	50·05		
	Sb_2O_3	292	5·354	54·53		
	Bi_2O_3	468	8·304	56·29		
MO_2	MnO_2	87	4·876	17·84		Insoluble in water.
	SnO_2	150	6·659	22·53	A probably isosteric group.	
	MoO_2	128	5·67	22·57		
	ZrO_2	121·6	5·193	23·23		
	SiO_2	60	2·475	24·24		
	PbO_2	239	8·91	25·70		
	NO_2	46	1·305	32·05	Condensible gases; readily soluble in water.	
	SO_2	64	1·4318‖	44·64		
	CO_2	44	0·9471¶	46·45		
MO_3	CrO_3	100·2	2·715	36·90	Isosteric group; solubility decreases as the molec. weight increases.	
	MoO_3	144	3·6	36·92		
	WO_3	232	6·515	35·61		
M_2O_5	Sb_2O_5	324	6 525**	49·65	Solubility in water increases with the specific volume.	
	V_2O_5	182·6	3·49	52·29		
	As_2O_5	230	3·998	57·53		
	P_2O_5	142	2·387	59·48		
	I_2O_5	334	4·487	74·43		

I abstain from further remarks on this table, beyond those I have made at the margin; else the relation between other physical properties besides that of solubility and the specific volume might, in many instances, be traced.

The data for the comparison of other salts, at present accessible, are too imperfect for purposes of comparison, but I believe that enough has been shown to render it highly probable that the solubility and some other properties of substances are, to a certain extent, functions of their specific volumes and molecular weights.*

III. *Relations between Chemical Constitution and Solubility of Substances.*

From the views of solution which we have adopted, it follows that not only the *size* of the molecules and intermolecular spaces, or, in other words, the specific volume, is influential in determining solubility, but that their *form* also must, to a certain extent, exert an important influence. Though we know nothing in the last instance of the form and shape of the molecules, which, in their turn, naturally determine the shape and form of the intermolecular space, there is every reason to believe that they are largely determined by the atomic structure of the molecules. The phenomena of isomorphism teach us that substances, which have a similar or analogous atomic constitution frequently have the same crystalline form, though they may differ widely in chemical composition. There are numerous instances of isomerism, on the other hand, which prove that the crystalline form of substances, having the same chemical composition, may differ according to the different arrangement of the components of the molecule. It would appear justifiable, therefore, to seek in similar or analogous atomic structure of solvents and solutes, and, consequently, in similarity of the form of their molecules and intermolecular spaces, the explanation of many cases of solution, which have long ago compelled the recognition of the principle that "like dissolves like." Among the innumerable cases which might be cited here, I would refer to the solubility of the insoluble oxides, chlorides, iodides, bromides, sulphides, cyanides, etc., in the corresponding soluble compounds of the alkaline metals, the solubility of organic compounds such as fats, oils, carburetted hydrogens in similarly constituted organic solvents, etc. These considerations seem to be applicable even to the so-called elements themselves and to point to a similarity of the ultimate structure of their atoms. Thus, the metals dissolve in each other, forming alloys and amalgams; boron dissolves in aluminum, with which it is probably isomorphous, and phosphorus in lead, with which it is also isomorphous; carbon and silicon dissolve in iron, aluminum, etc., with which they are isomorphous.†

The influence of both specific volume and similar chemical constitution in determining the solubility of substances, can, it seems to me, be very clearly shown by a comparison of the solvent action of water and alcohol on series of analogously constituted substances, such as the fatty acids and alcohols.

The structural formula of water is HOH. In the fatty alcohols one of the hydrogen atoms is replaced by the organic radical C_mH_{2m+1}, and in the fatty acids by the radical $C_mH_{2m-1}O$. The hydroxyl group appears to

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* As Braunite. † Average of 2.

‡ Playfair and Joule's determination rejected.

§ Mean of all determinations.

‖ At 0·25° C. D'Andreef. ¶ At 0° C. D'Andreef.

** Playfair and Joule's determination thrown out.

* It is a peculiar coincidence that the specific volumes of a number of substances which are exceedingly soluble in water, though differing greatly in chemical composition and physical properties, are found between 50 and 60, and not very far apart, *e. g.*,—

The remarkable group of isosteric chlorides,

$ZnCl_2$, $CaCl_2$, etc. mean specific vol.		50·2
K_2S		51·64
H_2SO_4	specific vol.	53·26
KI	,, ,,	54·96
Alcohol	,, ,,	57·7
As_2O_5	,, ,,	57·53
P_2O_5	,, ,,	59·48
$CaBr_2$	,, ,,	60·24

† It has been noticed as remarkable that the substances most frequently found in graphite as it occurs in nature, viz., SiO_2, Al_2O_3, Fe_2O_3, TiO_2, and Cr_2O_3 (which are *dissolved* in it?), crystallize, like graphite, in the hexagonal system.

determine the solubility in water and the analogously constituted caustic alkalies. As we rise higher in the series, however, the influence of the hydroxyl group is neutralized by the increasing influence of the organic radical; amylic alcohol and valerianic acid are only difficultly soluble in water; the higher members of both the alcohol and the acid series are insoluble in water, but still soluble in caustic alkalies, which are constituted analogously to water but possess greater specific gravity and higher specific volume; and soluble in alcohol, which is constituted analogously to themselves, though the highest members of the series are less soluble therein than the lower ones. In connection with these facts, it should be remembered, that, in the series of fatty acids, the specific gravity decreases as we rise in the series; and as the molecular weight increases it follows that the specific volume increases proportionately. In the alcohol series we find the specific gravity varying but little with the increment of molecular weight, and we find, therefore, a smaller, but none the less decided increase in the specific volume of the higher over the lower members. In the series which we have discussed there is only one "water-rest" or hydroxyl group, while the organic radical with which it is connected grows progressively larger, and the solubility in water diminishes accordingly. We may, however, construct a series in which the organic radical remains constant or nearly so, while the number of hydroxyl groups increases, and in such a series we shall find the solubility in water increasing accordingly. We may compare, *e.g.*, the principal acids containing four carbon atoms, viz.:—

*$C_4H_7O.OH$.	Butyric acid. Oily liquid, soluble in water, alcohol, and ether. Salts separate it from a watery solution as an oily stratum.
$C_4H_5O.OH$.	Crotonic acid. Oily liquid, soluble in water, but separated from it by the addition of salts. Soluble in alcohol and ether.
$C_4H_4O_2.(OH)_2$.	Succinic acid. Pretty easily soluble in water, difficultly soluble in cold alcohol and ether.
$C_4H_2O_2.(OH)_4$.	Tartaric acid. Easily soluble in water and alcohol, insoluble in ether.

Among inorganic compounds we have the series of hydrates of the elements corresponding to the series of fatty alcohols, the elements taking the place of the organic radical. In these hydrates, however, the solubility seems to be determined not so much by the *number* of hydroxyls combined with the element, as by the *firmness of their union*, measured by the degree of heat necessary to disassociate them into anhydrous oxides on the one hand, and water on the other. Such soluble hydrates as those of the alkaline metals, SO_4H_2,H_3PO_4,ClO_4H, and others, cannot be thus disassociated by any degree of heat; the less soluble hydrates of the alkaline metals still require a very high temperature to effect the disassociation; while the insoluble hydrates of silicon, iron, aluminum, etc., are dehydrated at much lower temperatures.

As another instance of the influence of chemical constitution on the solubility of substances, the fact may perhaps be cited *that explosive compounds*, such as nitrogen chloride and iodide, potassium carbide, the compounds of acetylene with copper and silver, the fulminates, the picrates, nitroglycerin, and other nitro-compounds, *as a rule, are difficultly soluble or insoluble in water*.

These few instances indicating some connection between chemical constitution and solubility may suffice for the present, as I hope to be able to resume the subject and present it more fully at some future time.

CINCHONA CULTIVATION IN CEYLON.*

Respecting the cultivation of the cinchona in Ceylon, we learn from Dr. Thwaites' report on the Botanic Gardens at Péràdeniya and Hakgala, for 1874, that no less than 826,000 plants of *Cinchona succirubra* and *Cinchona officinalis* collectively have been distributed from the Hakgala garden during the year 1874. So great an abundance is there of stock plants from which suitable cuttings can be taken that, with favourable weather for striking them, there is little probability of the supply falling short of the expected demand for young plants. "Many planters," says Dr. Thwaites, "are now forming on their own estates nurseries of young plants raised from seeds and cuttings, and every necessary information is given at Hakgala to enable them to do so. *Cinchona succirubra* and *C. officinalis* continue to be in most demand, as they are known to succeed so well, and are so easily propagated by cuttings. *Cinchona Calisaya* is not readily propagated by cuttings, and recourse must be had to seedlings, which are not likely to be so constant in character as cuttings, owing to the chance of their turning out hybrids. For those planters, however, who wish to try *Cinchona Calisaya*, plants are being raised from seeds of our own trees; and Dr. King, the superintendent of the Calcutta Botanic Garden, has promised any seeds that can be spared from a valuable variety of *Cinchona Calisaya* cultivated in the Darjeeling Government plantations."

GINSENG.†

(*Panax Schinseng of Nees*).

BY J. R. JACKSON.

The extraordinary properties reputed to belong to Ginseng by the Chinese is sufficient to cause a considerable amount of interest in the root, though we know British pharmacists look upon it as a delusion, and consider it to have no real effect. Notwithstanding this, a great deal has been written on the subject in many different languages, and though the Chinese article, which is the root of *Panax Schinseng*, Nees, has, we believe, never been used in European pharmacy, an allied species, *P. quinquefolium*, has been used in America, and appears in Wood and Baches' 'United States Dispensatory.' It is, however, there considered to be little more than a demulcent, and though kept in the shops it is chiefly to supply the wants of those who have acquired a taste for it, for it is not really employed as a medicine. The root has a sweetish-bitter taste, and is somewhat mucilaginous. It occurs in pieces usually about 3 or 4 inches long, often partially divided but joined together at the base; when clean it has a semi-transparent appearance. It is esteemed by the Chinese as a most valuable medicine, being given as a tonic in cases of debility, and, in fact, applied in almost all diseases, provided the patient is sufficiently wealthy to pay for such an expensive medicine.

By far the most detailed description of the characters and nature of Ginseng is to be found in the great Chinese botanical work or herbal, known as 'Pun tsáo,' or 'Plants of the Chinese Empire.' This extraordinary work, we are told by the late Mr. D. Hanbury in his 'Notes on Chinese Materia Medica,' was written in the middle of the sixteenth century, the design being to obviate the confusion often arising from the necessity of referring to several works for the same subject by bringing all such matters together. The complete work forms forty thin octavo volumes, and contains 1100 woodcuts. In a work of this kind, compiled by Chinese, we should expect to find a great deal that is fabulous; at the same time much of it is interesting.

A translation of the article Ginseng, from the 'Pun tsáo,' lies before us, and as the Chinese is a language not often translated into English, we propose to give some extracts. From a note at the commencement of the article it appears that the word "shên" often occurs in names of plants, and apparently corresponds to our word wort at the termination of plant names, such as Milkwort, Motherwort, etc. Ginseng should thus properly be *jen-shen.* It is stated to exist as a root underground many years before it rises gradually above it as a plant. The shape or form of the root, upon which so much has been said, is described as being that of a man, from which it is supposed to have a living principle, and from whence the name of Ginseng, which is literally Manwort, is obtained. The Chinese say there are five elements—wood, earth, water, fire and metal, and they say there are five species of Ginseng—one, the yellow kind, corresponds to the element earth. It is useful as a stomachic or emmenagogue, wherefore it is called Yellowwort (shên) or Bloodwort, and is said to absorb the subtle influences of the earth.

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* The formulas, as thus written, are, of course, not meant to express any theoretical views as to the constitution of these acids, but mainly to show the number of hydroxyls in the formula.

* From *Gardeners' Chronicle*, July 3, 1875.

† From the *Gardeners' Chronicle*.

The comprehensive 'Book of the Five Elements' relates as follows :—In the reign of Wen Ti, Emperor of the Sui dynasty, a man living at Shang-tang used every night to hear a human voice calling to him from behind his house, but could never find out who it was. One day, at a distance of some 600 yards from his house, he found a Ginseng plant with an extraordinary thick stem. He dug up the root ; it penetrated to a depth of 5 feet, and resembled the body of a man, with the head and limbs complete ; after this the nightly voice ceased. One of the names by which it is known to the Chinese, that of T'u-ching (literally, essential spirit of the earth), is derived from this story. In the astronomical book called 'Li tou wei vi,' it is said where Ginseng grows below the ground a purple vapour is seen to rise. In a work entitled 'The Revolution of Spring and Autumn Round the Pole Star,' it is said when the flickering stars fade away in the morning light they are changed into Ginseng. If the Emperor slights the precious products of the hills and streams the stars will shine no more, and Ginseng will cease to grow. On this account the plant is called Shêu-ts'ao, the spirit plant. Another Chinese author says Ginseng grows in the valleys of Shangtang, that is now known as Lias-tang (part of Corea) ; in the first ten days of the second, fourth, and eighth months it appears above the ground. Then the Ginseng gatherers take a knife made of bamboo and scrape the root dry ; it must be protected from the wind. Those plants which have a root in the shape of a man are the best. According to another Chinese writer the Ginseng produced at Lais-tang (Corea) is large but weak, and is far inferior in quality to that of Shang-tang. The stem is upright and straight, and the plants grow in groups of four or five, and bear a crimson flower. A superior and special kind of Ginseng is described as growing a foot or more in length ; it resembles a man in shape, and has legs and arms. It is packed for preservation or transit between deal boards, said to be the wood of *Pinus lanceolata,* and wrapped round with red silk. The roots of the best Ginseng are yellow and glossy in colour ; it is described as resembling that of Libanotis while the skin is still on, when peeled it is strong and white, like flour. The roots of many totally distinct plants have been proposed and used as substitutes or for adulterating Ginseng ; thus, for instance, are enumerated *Adenophora,* which, however, is said to be easily distinguishable from Ginseng ; also the root of a species of *Capsella,* which is hollow at the core and insipid to the taste, and that of *Platycodon grandiflorum,* which has a core somewhat like Ginseng, and has a bitter taste ; nevertheless true Ginseng has a characteristic look of its own, and its taste is sweet with a slight bitterness which lingers in the mouth.

The following is recommended as being the best method of distinguishing Shang-tang Ginseng from fraudulent substitutes :—Let two men set out walking, one chewing a piece of Ginseng, the other with his mouth open ; after going, say, a mile or a mile and a-half, he whose mouth was empty will be panting, whereas the chewer, if the drug be genuine, will be breathing regularly.

A work in two volumes by an officer of the Peking Medical Board treats of the whole subject of Ginseng with great precision. In another treatise much consideration is paid to the preparation and preservation of Ginseng and to its properties and effects. With regard to the former we are told that it is very liable to be attacked by insects, that the best way of keeping it is to hermetically seal it in new earthenware vessels, in which may also be placed a certain quantity of *Heterotropa asaroides.* As a preservative stored in this way it can be kept for a year. One author says :—"Growing Ginseng turns from the sun because it dislikes air and light. To prepare raw Ginseng for use, a piece should be bitten off and masticated. Prepared Ginseng should be put on a piece of paper and toasted from below. Ginseng which has been soaked in wine should be masticated and then dried by heat for use. On no account must it be touched with anything made of iron." With regard to its properties and effects, so much has been said by different Chinese writers that the shortest summary will be to say that it has been recommended for nearly every known disease.

It is said in an article on Ginseng in a Chinese botanical work, entitled 'A Treatise on Plants, with their Names and Faithful Representation in Plates,' that by the laws of the present dynasty all Ginseng dug up surreptitiously is confiscated, and, moreover, a fine is imposed on the culprit. Those wishing to seek for the root must be provided by the official in charge of the locality* with a permit authorizing them to pass the barrier. On returning, the Ginseng collected must be produced before the official, that he may determine by inspection the amount, and state the percentage which is the Emperor's due. The imperial share is sent to the Home Office at Peking, and is there separated according to its different qualities. The best is prepared for imperial use ; the inferior kinds are given as presents to the Court officials—namely, the highest military and civil officers of the second grade, and those mandarins who are the personal attendants of the Emperor.

A very interesting account, showing the value set upon this root by the Chinese, as well as the great care paid by them to its selection, appeared some time since in Lockhart's 'Medical Missionary in China,' from which we quote the following. He says :—"Presents of this root are frequently made, and accompanying this medicine is usually sent a small beautiful double kettle in which the Ginseng is prepared as follows :—The inner kettle is made of silver, and between this and the outer vessel, which is a copper jacket, is a small space for holding water. The silver kettle, which fits on a ring near the top of the outer covering, has a cup-like cover in which rice is placed, with a little water ; the Ginseng with water in the inner vessel, a cover placed over all and the apparatus put on the fire. When the rice in the cover is sufficiently cooked, the medicine is ready, and is then eaten by the patient, who drinks the Ginseng tea at the same time." A Shanghai Ginseng merchant who, it is said, gave his whole attention to the sale of this article, is described as having kept his stock in strongly bound boxes. When any one wished to see his stock "he deliberately fetched his keys and calling an attendant to shut the door, so that neither strangers from the outer shop nor damp air might enter his clean and beautifully furnished sanctum, which was also thoroughly dry, proceeded slowly to unlock the boxes. Opening the outer box, he removed several paper parcels, which appeared to fill the box, but under them was a second box (or perhaps two small boxes), which when taken out showed the bottom of the large box, and all the intervening space occupied with more parcels. 'These parcels,' he said, 'contain quick-lime for the purpose of absorbing any moisture, and keeping the boxes quite dry;' the lime being packed in paper for the sake of cleanliness. The smaller box, which held the Ginseng, was lined with thin sheet lead; the Ginseng, further enclosed in silk wrappers, was kept in little silken covered boxes. At last, after opening many receptacles, the actual medicine was displayed, each root sewn with silk to its silken wrapper. Taking up a piece, and requesting his visitor not to breathe upon it, nor handle it, he would dilate upon the many merits of the drug, and the numerous cures it had effected. The cover of the root, according to its value, was silk, either embroidered or plain, cotton, cloth or paper. Some of the root was worth not more than 6 to 12 dollars an ounce; other portions rose in the price to the most expensive, which was of the enormous value of 300, and even 400 dollars an ounce. This latter the merchant prizes of course very highly, and allowed only a glance at it, as he said 'it might be injured by exposure to the air.' The inspection finished, each root was carefully returned to its place in the box, and this to its position on the lime; the parcels of the latter were re-adjusted, and the outer box locked."

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* The imperial Ginseng enclosure in Manchuria is said to contain some hundreds of square miles.

So great was the demand for Ginseng at one time amongst the Chinese for their home consumption, that the Americans endeavoured to establish a trade with China in the root of the North American plant—*Panax quinquefolium.* The Chinese, however, did not value it as their own product, and it was consequently abandoned. At the present time the true Ginseng is not thought so highly of as formerly; but so late as 1859 a scientific expedition was organized in St. Petersburg to explore and report on the Mantchou territory and the frontiers of Corea, and to examine specially the Ginseng and the Chinese plantations, with a view of establishing plantations, in Russia for the purpose of trading with China.

ELIXIR OF PAULLINIA OR GUARANA.*

BY GEORGE W. KENNEDY, PH.G.

Guarana, which is prepared from *Paullinia sorbilis*, derives its name from a tribe of aborigines, called "Guaranis," who, it is said, used it as a corrigent of their vegetable diet. Within the last few years it has received considerable reputation for the cure of the various forms of headache, and the credit it has attained appears to be confined to a few places. There are but few physicians and apothecaries who know more of it than its name. I believe it is better known in the Southern and Western States than in other sections of the country. My attention was first attracted to it six or seven years ago in one of our Southern cities, where the writer then resided, and where it was used by the people for the cure of nervous and sick-headaches and other nervous disorders, with good success, the residents there regarding it as a specific for those afflictions. Unfortunately, the apothecaries were forced to sell what was called guarana, put up as a proprietary article by a firm known by the name of Grimault and Co., Paris, France, and sold at the enormous price of 1 dol. 50 cents. per box, each box containing about a dozen small powders. At that time guarana was very scarce in the American market, or, in all probability, it would have been sold in a different shape, and not as a proprietary article. Of late years, guarana or paullinia has been more plentiful, larger quantities of it have been imported, owing to the increasing demand; but still Grimault and Co.'s guarana sells at the exorbitant price of 1 dol. per box.

Paullinia acts as a nervine, owing to the large quantity of caffeina it contains. Dr. Stenhouse found caffeina to be more abundant in *Paullinia* than in any other vegetable. He obtained 5·07 per cent. from *Paullinia*; from good black tea, 2·13; from coffee, 1·00 per cent., and 1·2 per cent. from Paraguay tea (*Pharm. Journ.*, xvi, 213). My object here is to frame a formula for an elixir of guarana or paullinia, which has been prescribed in our town by a few practitioners with very good success for nervous headache. Frequently physicians are misled in their experiments for ascertaining the value of a remedy, by prescribing other medicines with the one under trial, and giving the credit of the cure to the new remedy, when it was, perhaps, due to the medicine associated with it. But the elixir of guarana was prescribed alone, and, in many cases, gave instant relief; it was made by the following formula:

Take of Paullinia	℥iv
Alcohol	f℥vi
Water	f℥vi
Glycerin (pure)	℥iv
Oil of Orange	gtt. viii
Oil of Ceylon Cinnamon	gtt. i
Diluted Alcohol, a sufficient quantity.	

Reduce *Paullinia* to a fine powder, mix $5\frac{1}{2}$ ozs. alcohol with the glycerin and water, moisten the powder with this mixture and pack in a glass funnel or a conical glass percolator; pour on the balance of the glycerin mixture, and, when this ceases to pass, add sufficient diluted alcohol, till the percolate measures $15\frac{1}{2}$ ozs., then add the oils to $\frac{1}{2}$ oz. alcohol, dissolve and mix with the percolate. This makes a beautiful reddish-brown coloured and very palatable preparation, each teaspoonful of which represents the active constituents of 15 grains of paullinia.

RELATION OF CHEMISTRY TO PHARMACY.*

At the late commencement of the Massachusetts College of Pharmacy, the annual address was delivered by T. Sterry Hunt, LL.D., a Professor in the Harvard University. The subject of the address was "The Relation of Chemistry to Pharmacy." After referring to the early history of pharmacy and chemistry, the author skethed shortly the labours of the early alchemists, and pointed out how, in their attempts to find the elixir of life and the philosopher's stone, they were busily laying the foundation of modern chemistry. He alluded to the Arab physicians and apothecaries, whose works made such an impression, that to this day their effect may still be found in many scientific terms belonging to medicine, chemistry and pharmacy. With the eighteenth century, he said, is connected the birth of modern chemistry, whose centennial was last year celebrated; and while Priestley and Lavoisier are honoured as having given a new impulsion to chemical theory, the name of the Swedish apothecary Scheele, will always be remembered as one who probably enriched the science with more discoveries than either of them, and perhaps contributed more to the progress of practical chemistry. Having traced the influence of pharmacy upon chemistry, Dr. Hunt continued—

"But if pharmacy in former ages had been the nursing-mother of chemistry, its help was not to be dispensed with when her child, the heir of all the traditions of the past, bearing the secrets which had been found out by centuries of toil in the laboratory, and equipped with a new philosophy and a new nomenclature, entered upon its new career. The three brightest names on its roll in our century have been gathered from the ranks of the pharmaceutical profession. Sir Humphrey Davy, whose wonderful chemical discoveries made him famous in the early part of this century, was trained as an apothecary in an obscure town in Cornwall, in England, until his skill in chemistry having become known, he was invited to assist by his knowledge in the direction of an institution at Bristol, where it was proposed to apply the discoveries of Priestley and Lavoisier to the treatment of disease by the inhalation of gases and vapours. To his early experiments in that direction, and to his discovery of the physiological effects of nitrous oxide, we shall again refer. These were followed by his promotion to the chair of chemistry in the Royal Institution, from which time his name becomes one of the glories of science and of his country.

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* From the *American Journal of Pharmacy* for July.

* From the *New York Druggists' Circular*.

"A quarter of a century later we find two other apothecaries, the one at Darmstadt, in Germany, the other, though a native of Provence, at Geneva in Switzerland. Their chemical studies in connection with their profession inspired them with desires to devote themselves to pure chemistry, and they met as fellow-students in the laboratory of Thénard in Paris. The subsequent career of these two henceforth inseparable friends is written imperishably on the pages of the history of chemistry. The one died in 1873, and the whole world lamented Justus von Liebig. In his life of seventy years he had done more to diffuse a knowledge of chemistry and of its practical applications than any one else who had ever lived. Not only in the mineral kingdom, but in the domains of animal and vegetable chemistry and physiology, his impress is everywhere seen. He may almost be said to have founded the school of modern organic chemistry by his own remarkable discoveries, and by the marvellous impulse which he gave to the hosts of students who during a period of thirty years gathered around him, and who learned to love and to reverence the name of Liebig.

"His early colleague still survives, full of years and honours, and has for more than a generation been the recognized chief of French chemists. It is only necessary to mention Dumas, the illustrious perpetual secretary of the French Academy of Sciences, for his name, though less familiar to the public than that of Liebig, is inseparably connected alike with the theory of his favourite science and with its most important practical applications. The future historian of the chemical philosophy of this century will, we can scarcely doubt, assign the place of pre-eminence to Dumas.

"But I have hitherto given but one side of the case. Putting myself in the position of the pharmaceutist, I have shown what his schools and those trained for that position have done for the science of chemistry. Assuming now the chemist's standpoint, Iam bound to declare that my favourite science has more than repaid the debt which she owed to pharmacy for its fostering care during the long centuries of her incubation, and for the great men which it has since given her. Nay, more than this, I will maintain that in no other way could Davy, Liebig and Dumas have so well served both the arts of healing and of pharmacy as by devoting themselves unreservedly to the study and the teaching of theoretical and practical chemistry. The results of the labours of these and of their great predecessor have transformed the pharmaceutical art: they have replaced the crude empiricism of the earlier times by truly scientific methods based upon sound theory, and have enriched the materia medica with a vast number of new substances, have devised novel and admirable processes, and, more than that, by their contributions to animal physiology, have given us rational explanations of the action of a great number of medicines, and have defined principles which will serve as guides to still further and greater discoveries in the healing art. We have only to look back to the pharmacopœias of one hundred, nay, of fifty years ago, to be satisfied of the wonderful advance which has been made in the resources and appliances of pharmacy. Thanks to the high scientific training of the masters of pharmacy at the present day, there are always found waiting men who are ready to take up every new discovery of the chemist which promises to be of advantage to their art, to consider its bearings and applications, and to bring out its true value, so that in no field of applied science are the discoveries of modern chemistry more quickly and more fully utilized than in the preparation of medicines and in the treatment of disease.

"Modern chemistry began its work for pharmacy by applying new methods of proximate analysis to the already known remedial agents. The old pharmacopœias were encumbered with numerous crude products of the vegetable and animal worlds, to which medicinal virtues were attributed. Some of these drugs, like coral and the shells of eggs, of oysters and of crabs, were soon shown by the chemist to have no other value than belongs to the calcareous salts of which they are chiefly composed. The same thing was made known with regard to the horns of the deer, being the volatile salt extracted from them by distillation found to be identical with that which is abundantly obtained from other and much cheaper sources. These and numerous other animal products were henceforth excluded from the materia medica. On the other hand positive results of great importance sometimes followed this mode of investigation. Thus, for example, sponge, which when calcined had been found to possess a special therapeutic action, was shown to contain a portion of the new and rare element, iodine, which had first been detected by a chemist in the ashes of seaweed. This was now discovered to be the active principle of the sponge, and henceforth took its place as one of the most precious substances of the materia medica. The skill of the chemist now concentrates from other and more abundant sources this wonderful curative agent, combines it in saline or in ethereal forms, and enables the physician to avail himself of the virtues of iodine without compelling the patient to ingest the crude and bulky residue from the burning of sponge.

"Not less striking than this are the numerous similar examples which are furnished by the vegetable kingdom. The active principles of cinchona, of nux vomica, and of a great number of the most precious drugs, are present in very small portions only in the bark; the leaves of the fruit of the plants being diluted, as it were, with a great amount of matter useless in the treatment of disease, and in many cases even irritating and noxious to the palate and to the stomach. The fevered patient who wished to avail himself of the curative effects of Peruvian bark would be obliged to swallow daily an ounce or more of this material. Here the old pharmacy came in, and by the aid of solvents made decoctions or tinctures or extracts, which gave in a more concentrated and potable form, it is true, the virtues of the bark; but still mingled with a large proportion of foreign and disagreeable elements. It was reserved for modern chemistry to show that the active principle of the cinchona, like that of the burnt sponge, was a distinct and definite substance, and henceforth the curative virtue of an ounce of the bark was represented by a few grains of crystalline and colourless quinine, an alkaline base combining with acids to form soluble combinations, in some of which its medicinal powers are modified and exalted. By the aid of these the physician is now enabled to avail himself of the specific powers of this curative agent in various ways which were before impossible.

"The compounds of iodine, with the alcohol radicles, have also been introduced into medical practice with the promise of precious results unobtainable by the saline preparations of this element. The iodides of methyl and butyl in solution, administered internally or by way of subcutaneous injection, not only exert a remarkable sedative power, but by their specific action upon the glandular system, which they share with other compounds of iodine, have been shown to possess a great value in cancerous affections. It is probable that these organic compounds may be decomposed in the organism, thus liberating in active forms the iodine which they contain.

"The discovery of the alkaloids constitutes, however, but one of the many important results which have been attained by the proximate analysis of vegetable substances. From many other drugs neutral crystalline or resinoid matters are separated, which present in a not less concentrated form their active principles. In other instances their virtues reside in a volatile acid or a neutral volatile oil, and in each case the skill of the pharmaceutical chemist enables him to separate these from the *caput mortuum*, and to give the medicinal powers of the plant in a form as concentrated as in the alkaloids of cinchona or of opium.

"In many cases where the medicinal virtues are not apparently lodged in a single principle capable of being isolated, pharmacy has recourse to other processes, and obtains by expression, percolation, and evaporation, and distillation, often *in vacuo*, concentrated extracts which enable us to dispense with the crude drugs. While the solvents or *menstrua* of the old pharmacy were confined almost exclusively to water, wine, vinegar and alcohol, modern chemistry has greatly added to these; ether, chloroform, sulphide of carbon, and the volatile hydrocarbons, like benzole, and the so-called petroleum spirits have now each their use, and enable the pharmacist to effect concentrations and proximate analyses, which a few years since would have been deemed impossible. Thus, for a single example, by means of the sulphide of carbon the subtle principles of the violet and the jasmine, which elude the ordinary processes of distillation, have been isolated. Nor should the extraordinary properties and uses of glycerine, the sweet principle extracted from oils, be forgotten in this connection, since it now finds a hundred applications in pharmacy and in medicine as a solvent and a vehicle for various remedies, both internal and external—a liquid sugar, neither evaporating nor consolidating, and a precious adjunct to the materia medica.

"Few subjects have within the past thirty years more occupied the attention of chemists than the transformation of the bodies of the carbon series, the so-called organic compounds. Possessed with the notion that the generation of these was the prerogative of life, they were at first content to follow the changes which the sugars, oils, resins, alkaloids, acids, and other proximate principles of plants and animals undergo by the influence of heat and various chemical reagents, discovering thereby new and unexpected combinations, until it was at length found that the chemist was enabled thereby to obtain products identical with those which nature produces in the animal and vegetable organisms. The artificial formation of urea, followed by that of valerianic and benzoic acids, and many other similar cases, opened up a new field for chemistry and for pharmacy. Still another step was soon made; no longer dependent on the proximate principles of plants as his point of departure, the chemist found it possible to make carbon, or its combinations with oxygen or with sulphur, unite with hydrogen or with water, and thus to build up, like the plants themselves, directly from the mineral kingdom, certain hydro-carbonaceous bodies hitherto supposed to be generated only in the mysterious laboratory of life. From these we rise to higher and higher forms, so that to-day it may be said that there is no known chemical compound of the organic world which it is not possible to generate in our laboratories from mineral matter. The wonderful impetus which discoveries such as these have given to organic chemistry is visible on every side. Many long and laborious researches devoted not directly to the imitation of the processes of nature, but rather to the object of finding out, if possible, the secret laws in obedience to which she builds up her marvellous combinations, have been undertaken, and with what fruitful results the discoveries of the last few years tell us. By a careful dissection, as it were, of certain organic principles, we have learned to reconstruct them, and the triumphs of this method are seen in the artificial production of indigo, orcine, and alizarine, the colouring principle of madder, which latter is now produced from one of the waste products of coal tar with more advantage than from the plant itself. One of the latest and most elegant additions to the list of these discoveries is that of the artificial production of the odorant principle of vanilla, by which we are henceforth made independent of tropical climes, and can produce this delicate flavour from the transformation of a substance contained in the bark of our northern pine trees. What wonder, then, that the chemist should now aspire by the marvellous resources of his synthesis to produce artificially the active principles of the poppy and cinchona, and render cheaper and more accessible those precious drugs, morphine and quinine? We may feel sure that these and similar problems are within the possibilities of modern chemistry, and are destined to be solved at no distant day. If we have hitherto reproduced few of the proximate principles of plants, it should be said that the vegetable kingdom has as yet yielded but a very small proportion of the organic compounds already known to chemistry. If our laboratories have as yet produced but a small proportion of the immense number of possible combinations which our science can foresee, it is not less true that large numbers of alkaloids, acids and other compounds analogous to those found in plants have already been produced, many of which have found important uses."

GENTISIN.*

BY H. HLASIWETZ AND J. HABERMANN.

By the action of fused potassium hydrate on gentisin having the formula $C_{14}H_{10}O_5$, the authors have obtained an acid. The product of the reaction, neutralized with sulphuric acid and exhausted with ether, gave a syrupy crystalline mass which was distilled with water to separate acetic acid neutralized with barium carbonate, and again shaken with ether.

The liquid now contains in solution the barium compound of gentisic acid, $C_7H_6O_4$, from which the new acid may readily be obtained by precipitating the barium with sulphuric acid, filtering, and extracting with ether. It crystallizes in long, colourless needles, or prismatic crystals, which are rather soluble in cold water, very easily in alcohol or hot water. It is deliquescent in ether, but insoluble in benzene. With ferric chloride it gives a deep blue colour, becoming dirty red on the addition of an alkali.

Gentisic acid melts at 192°, but at a more elevated temperature it evolves carbonic anhydride, yielding a new compound. When distilled, it yields an oily liquid, which soon solidifies to a crystalline mass; it may be purified by re-distillation, if it is coloured. Pyrogentisic acid, $C_6H_6O_2$, melts at 169°, and sublimes readily in flat needles, which resemble benzoic acid in appearance. It is readily soluble in alcohol, ether, or hot water. It reduces Fehling's copper solution in the cold, and silver nitrate when heated, quinone being simultaneously produced in the latter case.

The authors have also obtained compounds of gentisin with potassium and sodium, $C_{14}H_9KO_5$ and $C_{14}H_9NaO_5$, which crystallize as slender needles or short prisms containing water.

Acetyl-gentisin, $C_{14}H_8O_5 (C_2H_3O) O_2$, is obtained as a colourless crystalline mass, on treating gentisin with excess of acetyl-chloride. It crystallizes from boiling alcohol in hair-like crystals.

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The Pharmaceutical Journal.

SATURDAY, JULY 31, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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THE PHARMACEUTICAL CONFERENCE AND THE BRITISH ASSOCIATION.

NEARLY forty years ago, in 1836, whilst yet only in the sixth year of its existence, the British Association met at Bristol, under the presidency of the late Marquis of LANSDOWNE. Since that time the Association has, in the course of its wanderings, visited the neighbouring city of Bath, in 1864, and Cheltenham, a little further off but in the same county, in 1856. On the 25th of next month it will meet again at Bristol; this time, it is expected, under the presidency of Sir JOHN HAWKSHAW, F.R.S. The British Pharmaceutical Conference, too, after parting company with its elder sister for a short time, will this year gather in the Museum and Library of the same city, and hold its meetings on the two preceding days, the 23rd and 24th of August; the president for the year being Mr. T. B. GROVES, F.C.S., of Weymouth.

The central situation of Bristol with respect to railways,—the Great Western, Bristol and Exeter, and Midland railways converging there, and placing it in communication with all parts of England,—and the fact that it is within three hours' journey from London place it at an advantage when compared with some of the places visited by the two Societies. Moreover, on all these lines mentioned, return tickets from places more than fifty miles distant are available for one month from date of issue, and permission will be granted by the companies to holders of return and tourist tickets on the routes which pass through Bristol, to break the journey there, in order to attend the meetings. Information respecting hotel accommodation, lodgings, railway routes, etc., will be readily afforded by Mr. JOHN PITMAN, Local Secretary to the Conference, 50, Redcliff Hill, Bristol, and Messrs. W. LANT CARPENTER and JOHN H. CLARKE, Local Secretaries to the British Association, 28, Broad Street, Bristol, and these gentlemen request that intending visitors will communicate with them as soon as possible. With these facilities it would appear probable that so far as the attendance is concerned this year's scientific outing will be a success; whilst with regard to papers, without indulging in unwarrantably premature ovine calculations, there seems to be a prospect that at least the British Pharmaceutical Conference will show no signs of falling off.

It has been the just boast of the Conference that its meetings have always exercised a beneficial influence, and by making those who, although neighbours, had previously been comparatively strangers better acquainted with each other, have promoted the general cause of pharmaceutical progress which depends so much upon the co-operative action of pharmacists. At Bristol, however, there already exists a body which bears the reputation of being almost the *ne plus ultra* of pharmaceutical associations, an association that has for its president GEORGE FREDERICK SCHACHT, the Treasurer to the Conference, and whose programmes of papers have borne the names of GILES, REDWOOD, SHENSTONE, TILDEN, WILLS, and many others. Moreover, its materia medica classes have for some years enjoyed the gratuitously rendered services of one no less honoured among pharmaceutists, Mr. W. W. STODDART, a former president of the Conference and many years a member of the Council of the Pharmaceutical Society; and the privileges of Mr. STODDART'S pupils will be fairly estimated by those who have read in this Journal his notes on Bristol Pharmacology. But the tide of pharmaceutical activity appears to have been arrested at Bristol; for the country southward to Portland Bill, or westward to Land's End does not, so far as we know, boast of another pharmaceutical association. In 1870, Bath was reported to possess a Chemists' Association, which dated its existence from 1864, the year in which the Conference held its maiden meeting in that city; and there were then also Societies at Exeter, Taunton, and Plymouth. But all these appear now to be entirely things of the past, for we have failed to find any traces of their doings during the last four years. It is to be hoped therefore that some of the benign influences not required at Bristol may follow the alleged ordinary course of civilization westward.

It may be worth mentioning that the British Association has issued a sketch map of the country sixty or seventy miles round Exeter, in which the localities likely to be of special interest to its members are marked out. Thus, Hereford, Gloucester, Salisbury, Exeter, and Wells have their cathedrals indicated; Exmoor Forest its iron and silver lead mines; Cheddar its cliffs and caves; South Devon its fossils; and so on. There is also a special handbook, entitled 'Bristol and its Environs, Historical, Descriptive, and Scientific,' to be published under the sanction of the local executive committee at a subscription price of 4*s.*, by Messrs. WRIGHT and Co., of Stephen Street, Bristol. Advance sheets of this book, with which we have been courteously furnished by the publishers, already extend beyond the estimated quantity of 350 pages, and there appears every promise that when complete it will form not only a handsome but an unusually valuable and interesting handbook.

Bristol is rich in interest to men of every variety of taste. A record that stretches back to the commencement of the present millenium, and shows that five hundred years ago Bristol won its charter to rank as a county in itself, by sending twenty-two ships to aid the third EDWARD in his siege of Calais; which tells of King STEPHEN lying a prisoner in the donjon keep, of the surrender of RICHARD II. to proud BOLINGBROKE, and of an equal foretaste of death to his successor CHARLES I. delivered there by CROMWELL, the leader of rebellion in his time; must of necessity charm the historian. Once the seat of the slave trade in England, with burgesses and mayors who were reported to have gotten their wealth by the nefarious traffic, Bristol now affords to philanthropists a standard of what they may boast to have won for humanity by their exertions. But before Bristol was thus peccant it was pious, so far as we may judge by the outward sign of church building, and many beautiful specimens of early English architecture, notably the Cathedral (founded 1142), St. Stephen's Tower (1455), and the recently restored church of St. Mary, Redcliff,—the muniment room of which was once the scene of CHATTERTON'S forgeries,—still exist to delight the eye of the antiquary. At one time the secular architecture must have accorded but badly with the sacred, for MACAULAY tells of the streets being so narrow that if a coach or cart ventured into them there was no small danger of its becoming wedged between the houses; and of the wealthy citizens being therefore compelled to walk, and content themselves with trains of servants in rich liveries. More recently, Bristol has had the questionable honour of being ranked as the third most unhealthy town in England. But much of this has been altered, and in the modern parts of the town the streets are wide, whilst the suburb of Clifton—if it be correct to apply the term to a place holding such a lofty position—is stated to be pre-eminently healthy. From those streets of Bristol, however, have gone forth a SEBASTIAN CABOT, to discover Newfoundland; one poet, THOMAS CHATTERTON, to find starvation, an ignoble death, and posthumous fame; another poet, ROBERT SOUTHEY, to wealth, and the laureate's crown. In those streets, too, EDMUND BURKE has, with burning words, battled for the honour of representing the citizens in Parliament.

Bristol has been described in words we will not paraphrase as a "veritable epitome of all that is good in opportunities for the study of natural history, geology, mineralogy, or archæology. Fine downs, magnificent cliffs, contrasting with low marsh-lands; fine woods, abounding in ferns and mosses, lichens and algæ; ditches of fresh or brackish water teeming with Diatomaceæ, Desmideæ, and other endless work for the microscopist—all these offer their treasures with liberal hand. The mineralogist would be enchanted with choice of specimens of rocks and ores, some of great rarity. The brilliant pyrites or galena, the sober calamine, the chaste alabaster, the sparkling Gothite, and the delicate celestine, all combine to form a striking collection for the cabinet. The richness of the locality in plants and minerals is due to the variety of the geological formations, seven of which can be examined and easily studied within a radius of a very few miles." For an illustration of how such studies may be used as an antidote to the drudgery of pharmacy, we must refer to the before-mentioned papers by Mr. STODDART on Bristol Pharmacology, published in the first volume of the present series of this Journal.

Before concluding this rambling gossip it may be interesting to say a few words about the mineral springs of the locality, those stores where Nature herself competes with the pharmacist in concocting draughts for sick folk. At Bristol there is a hot well (80° F.), the water containing chiefly sulphates; and at Clifton one (74° F.) which is feebly saline. At Cheltenham, which owes most of its prosperity to its spas, besides saline springs there are several ioduretted, sulphuretted, and chalybeate waters. At Purton there is an iodide of sodium and bromide of magnesium spa, with sulphates of magnesia and soda. And last, but not least, there are the famous thermal springs at Bath, ranging from 112° F. to 116° F., and containing principally sulphate of lime; springs that were used by the Romans, and which in the early part of the last century became the focus of all that was fashionable in England.

With so much to tempt the tired pharmacist to plead the pursuit of the scientific portion of his calling as a subterfuge for a pleasant holiday, we anticipate, should there be sufficient fine weather left to the present year, a goodly gathering of the craft at Bristol next month.

PHARMACEUTICAL LEGISLATION.

AT the moment of going to press we learn that the Irish Pharmacy Bill has been read a third time in the House of Lords and passed. The discussions that have taken place in the House of Lords on this measure since our last issue are reported at pages 98 and 99, and they present but few features of interest to our readers. As regards the title of "pharmaceutical chemist" having been wrested from those who voluntarily graduate in accordance with the principle the Pharmaceutical Society has so long laboured to establish, we can now only express our regret that it is no longer the exclusive privilege of that Society to confer the title, and must content ourselves with hoping that our Irish brethren will not fail to sustain such good repute as the title has already acquired, and make every effort to enhance its value.

Those who have the interests of pharmacy at heart in this country will doubtless watch with eager interest the proceedings of our Irish friends, and for our own part we trust that they may be of such a character as to command the congratulations that we should be glad to offer whenever the occasion may present itself.

The Sale of Food and Drugs Bill has also been read a third time in the House of Lords and passed; but not before very considerable and necessary amendments had been made in the 3rd and 4th Sections in respect to the sale of articles of food or drugs containing admixtures of which the vendor was ignorant.

The omission of the word "knowingly" was calculated to make the operation of the Act unjustly harsh in cases that are easily appreciable by any one conversant with the nature of drugs and the modes in which they are obtained from all parts of the world. On the other hand there were reasons for omitting the word that could not be controverted, and under these circumstances it became necessary to urge the objections which the deputation from the Council of the Society laid before the DUKE OF RICHMOND last week. The force of those objections applying to special cases was fully acknowledged, and it is with much satisfaction that we are enabled to report at page 99 the purport of the new clause introduced by the DUKE OF RICHMOND.

On Monday night the Lords' amendments were considered by the House of Commons and agreed to. A further amendment was however made in Clause 6 and it is now waiting the consideration of the House of Lords. If this amendment be agreed to, Clause 6 will stand as follows :—

> "No person shall sell any compound article of food, or compounded drug which is not compounded of ingredients in accordance with the demand of the purchaser; *or in case of a drug which is not compounded in accordance with the* prescription presented *by the purchaser or with the prescription of a registered medical practitioner; or with the regulations prescribed by the British Pharmacopœia, issued by the General Medical Council, or in Great Britain, with a basis to be laid down by the Pharmaceutical Society of Great Britain, or the Privy Council, or in accordance with the Pharmacy Act*, 1868, *or in Ireland in accordance with the* 33 & 34 *Vict. cap.* 26, under a penalty not exceeding £20."

This amendment is virtually a restoration of portions of the Clause 6 that had been struck out by the House of Lords.

The Drugging of Animals Bill after having been reduced to reasonable proportions and aims was suddenly sacrificed to the exigencies of approaching holiday time, and on Monday night the order for its consideration as amended was read and discharged and the Bill withdrawn.

Proceedings of Scientific Societies.

ROYAL INSTITUTION OF GREAT BRITAIN.

ON ACCIDENTAL EXPLOSIONS.*

BY F. A. ABEL, F.R.S.

(*Continued from page* 75.)

The explosion, early in January last, of a boiler at North Shields, and of one at Sheffield, affords further illustration, if it were needed, of the fearful danger continually incurred, even by those well acquainted with the properties of iron and steel, and the limits of their powers of resisting strain or pressure, in the employment of boilers long after they had ceased to be trustworthy. At Shields, at a large manufactory of chain cables and anchors, the boiler which exploded had been worked beyond a pressure of 35 lb., while it was unsound, over-patched, and quite unsafe at that pressure. Seven people were killed and about twenty others injured, and a vast amount of property was destroyed, the buildings within 500 yards appearing as though they had been bombarded. At Sheffield, where the explosion of a boiler not many days afterwards killed two persons, injuring several others, a leakage had been observed in the boiler some time before the explosion, but had not been repaired, and a plate fractured by the explosion had been greatly reduced in thickness by corrosion. This boiler appears to have been worked up to the day of the explosion at pressure of from 40 to 50 lb., and the workmen employed are stated to have expressed fear at working in its vicinity.

The foregoing and other very numerous illustrations of the appalling display of ignorance, neglect, or recklessness in dealing with the application of steam-power, point strongly to the importance of legislation connected with this subject. A parliamentary committee of inquiry reported in July, 1870, that the introduction of compulsory independent inspection of boilers would interfere with the responsibility of the boiler owner; but it is somewhat difficult to realize where the responsibility lies, in the present condition of things. That a system of inspection may be made to work well has been demonstrated by the beneficial results of the now very widely applied labours of the Steam Users' Association; and that Government realizes these benefits is demonstrated by the fact that the boilers at the manufacturing establishments of the War Department are subject to the inspection of the Association. There can be no reason why the responsibility of the proper condition of boilers, and steam apparatus generally, should not be thrown upon inspectors, just as the proper fencing of machinery in factories, and the proper condition of steam-boilers in a passenger steamship, are secured by a system of responsible official inspection.

The explosions which are often recorded as occurring in kitchen ranges and in boilers used in connection with the heating of buildings are not unfrequently attended by fatal results. Much of what has been said with regard to boiler explosions, generally, applies to accidents of this class. Explosions in such boilers have repeatedly arisen from corrosion of the metal, and consequent great reduction of its thickness in places, due to the accumulation of hard incrustations or furs which in time exclude the water from contact with the metal, causing the latter to scale from overheating. The incrustations will crack or split from time to time, in consequence of inequality of expansion or contraction between them and the metal, and if the latter be heated at the time, pressure of steam may be suddenly generated which the worn boiler will not withstand unless provided with an efficient safety-valve.

As the water in kitchen boilers is often used for culinary and drinking purposes, the means employed in boilers used for steam purposes only, to prevent the formation of hard deposits, cannot be resorted to; therefore the only means of guarding against accidents to domestic boilers from these causes consists in frequent and thorough cleaning out, which is especially necessary where the water-supply is hard.

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* Lecture delivered at the Royal Institution of Great Britain, Friday, March 12, 1875.

Explosions also occur with household boilers of the ordinary circulating class, unprovided with safety-valves, through the stop-taps of the pipes which connect them with an overhead cistern being left closed by accident or negligence, in which case steam pressure must speedily accumulate to a dangerous extent, all outlets being closed. Accidents with such boilers are particularly liable to occur during severe frosts in consequence of the circulating pipes becoming plugged up with ice, whereby the outlet for steam pressure is as completely cut off as if the stop-taps were closed. Several accidents due to these two causes, some of them attended by fatal results, were recorded last year. The obvious and simple method of guarding effectually against such explosions is to have the boiler fitted with a reliable safety-valve, of the most simple form; a valve of pendulous dead weight construction is specially recommended for this purpose by the Steam Users Association as being inexpensive, certain of action, and free from any liability to get out of order. So simple a precaution for avoiding the possibility of a frightful accident surely only requires public attention being directed to it to secure its general adoption.

Explosions resulting from the ignition of mixtures of inflammable gas and air constitute even a more formidable class than that just described; for the number of explosions in coal mines which occur in a year is very considerably greater than that of boiler explosions, while the loss of life occasioned by the former is very considerable, and is occasionally appalling in its magnitude. Thus, in 1871, there were fifty-two fatal explosions, 268 men being killed; and 234 non-fatal explosions, by which it is estimated that 368 men were injured; and, as examples of specially calamitous explosions, may be mentioned that at Risca Colliery in 1860, when 142 men were killed, and those at Oaks Colliery in 1866, and Ferndale Colliery in 1867, when 334 and 178 men were killed.

If marsh-gas, or light carburetted hydrogen, which exists imprisoned in coal-beds and escapes into the atmosphere in the pit-working, either gradually or sometimes under considerable pressure, becomes mixed with the air to such an extent that there are about eighteen volumes of the latter to one of the gas, the mixture burns with a pale blue flame, which will surround that of a candle contained in such an atmosphere; the appearance of such a "corpse-light" round the flame of the pitman's candle or lamp-flame is a warning, too generally unheeded, of the presence of fire-damp in quantities likely to be dangerous; for if the proportion of marsh-gas increases much beyond that above specified, an explosive atmosphere will be formed, the violent character of which increases as the proportion of fire-damp approaches that of one volume to ten of air. Marsh-gas requires for its ignition to be brought into contact with a body raised to a white heat; fire-damp, or a mixture of marsh-gas and air, is therefore not inflamed by a spark or red-hot wire, but will explode if brought into contact with flame. The fact that this contact must be of some little duration to ensure the ignition of the fire-damp was applied by Stephenson in the construction of his safety-lamp; and a very philosophical application of the property possessed by good conducting bodies, such as copper or iron, of cooling down a flame below the igniting point of the gas, and thus extinguishing it, was made by Davy in the construction of his safety-lamp.

All the efforts of eminent scientific and practical men, for the better part of a century past, to diminish the number of coal-mine explosions, by improving the ventilation of the mines and providing the miner with comparatively safe means of illumination, appear to have had very little effect in reducing the number and disastrous nature of these accidents. Since the construction of safety miners' lamps by Davy, Stephenson, and Clanny, repeated and partially successful efforts have been made to reduce the loss of light consequent upon the necessary enclosure of the flame, and thus to lessen the temptation of the miner to employ a naked flame at his work in fiery mines. Yet investigations after mine explosions still frequently disclose instances of the employment of candles where they are undoubtedly dangerous; and the regulations which have been made law with the view of preventing accidents through the use of naked lights by miners, where there appears any likelihood of fire-damp escaping and lodging, are in many cases either habitually neglected or very carelessly carried out. One practice which appears to have become very general in mines where fire-damp is known to exist, that of sending *firemen* with safety-lamps to examine the mines, the men then proceeding to work with naked lights in all places marked as safe by those officials, is obviously a most dangerous one, the lives of many being made absolutely dependant upon the vigilance and trustworthiness of one or two; yet it appears to be one almost forced upon the managers of collieries by the men themselves, who often absolutely refuse to go to work with safety-lamps. Of the three colliery accidents which occurred between December 23 and January 7 last, by which twenty-eight men lost their lives, two afford sad illustrations of the fact that the overlookers and the miners themselves are chiefly to blame for the frequency of these accidents, and that the practice of employing "firemen" just referred to is a highly perilous one.

In the case of the explosion at Bignall Hill Colliery, North Staffordshire, the Government Inspector gave evidence to the effect that the explosion occurred in what was admitted to be *the most fiery seam in the North Staffordshire coal-field*, and in which *no naked light ought ever to be used*. The overlooker stated that, having found gas in the heading on the morning of the explosion, he told the men not to go to work there with naked lights; that "he had authority to order lamps, but *he had not done so*, because he had not seen any necessity for it. The explosion might have been avoided if the man whose light was believed to have fired the gas had done his duty and used a lamp." Another witness "had found gas on the morning of the explosion, but not sufficient to lead him to suspect danger. He found gas in the place after the fireman said he had cleared it away; . . . . the workings always were considered safe, and if he asked a man to use a lamp he would often be laughed at."

The Government Inspector deposed that "all the circumstances went to show that the firemen did not examine the place before the men went to work, and that one of the men walked into it with a naked candle and ignited the gas." At the second explosion (at the Aldwarke Main Colliery, near Rotherham) the fire-trier appears to have made his customary inspection and found all safe at the place where the explosion occurred, and had left his usual sign to indicate to the men that all was right. The opinion of the engineer was that a considerable fall of roof (of the workings) had occurred after he had left, and that, before the liberated gas had time to be carried away by the ventilating current, the men entered and met the gas, which immediately fired. "Had there been a delay . . . . . or *had the men been provided with safety-lamps*, the accident would in all probability have been averted." In the report of the accident it is stated that the men in that district will rather leave a colliery than be subject to the strict enforcement of the rules of the Act passed to ensure their safety, and that some such calamity was needed to enforce proper regulations for the safe working of the mine. There can be no question that the comparatively dim light afforded even by the best constructed lamps in general use is a cause of great temptation to the men to use uncovered lights; it is therefore much to be hoped that continued efforts may be made to apply the electric light to the illumination of mine workings. Some approach to success in this direction was already attained ten years ago, and one cannot but have great faith in the ultimate feasibility of some portable method of illumination by electric agency.

There are, however, causes other than the use of unprotected lights, which contribute to the production of coal-mine explosions. Efficient ventilation of workings, whether in use or not, whereby all dangerous accumulation of fire-damp is avoided and any sudden eruption of gas may be rapidly dealt with (the gas being largely diluted and swept away as speedily as possible) is indispensable to the safe working of the mine (without any reference to the health of the men) so long as there is any temptation for the use of naked lights. The original laying out of a working greatly affects the question of efficient ventilation, and explosions have been clearly traced to gas accumulations, which there was sufficient power of ventilation to reduce, if the nature of the working had admitted of its proper application. At the Bignall Hill Colliery, where the fearful explosion occurred on Christmas Eve last, the ventilation had been reported imperfect about three weeks before the accident, and the Government Inspector stated that the deficient ventilation was due to the improper laying out of the work. In arranging for the efficient ventilation of a mine, ample provision for rapidly applying extra artificial ventilating power should be made; and, in connection with this, the interesting and useful series of observations should be borne in mind which have been made public in communications to the Royal Society and the Meteorological Society by Messrs. R. H. Scott and W. Galloway. Those gentlemen have clearly established a connection between the occurrence of meteorological changes and colliery explosions; they have shown that explosions frequently occur at the time of considerable barometric disturbances, which must unquestionably affect the rate of diffusion of the fire-damp into air and the rapidity of air circulation in a mine. They also point out that when the external temperature rises very considerably, the natural ventilation due to the higher temperature of the air in a mine is liable to cease by the external atmospheric temperature becoming equal to, or perhaps exceeding, that in the mine. They consider that of 233 explosions which occurred in 1872, 58 per cent. were due to disturbances of atmospheric pressure, and 16 per cent. to excessive heat of the weather, and they have similarly traced the proportion in which the same meteorological changes have contributed to bring about explosions in other years.*

Since the employment of gunpowder as a means of rapidly removing coal, or overlying shale, has come into considerable use, there can be no question that an additional and a very serious source of danger has been imported into the working of collieries. That the explosion of a charge of powder in a blast-hole, or the "firing of a shot," has by no means unfrequently resulted in the production of a fire-damp explosion, has been clearly established by careful inquiry. This has been ascribed to two causes, one of them the direct ignition of the explosive gas-mixture by the flame from the shot, the other the dislodgment of fire-damp from cavities or disused workings by the concussion produced, and its ignition by some naked flame or defective lamp in the neighbourhood. If a shot takes effect properly (*i.e.*, if the force is fully expended in breaking the coal or rock at the seat of the charge), there is seldom flame produced; but if the tamping which confines the charge in the blast-hole is simply blown out of the latter like a shot from a gun (which not unfrequently occurs when the rock is very hard or the tamping is not sufficiently firm, or when the charge of powder is excessive), the powder-gas issuing from the blast-hole will produce a flash of fire as obtained with a gun; and if the fire-damp were in the immediate neighbourhood, it would no doubt be ignited thereby. But this combination of conditions is not likely frequently to occur; the second cause above given is therefore more likely to be fruitful of accidents: but the existence of a third cause, to which the majority of explosions connected with blasting in collieries is most probably ascribable, has been very clearly established by the careful inquiries, sound reasoning, and ingenious experiments of Mr. W. Galloway, Inspector of Mines. The fact has long been known that if an explosive gas-mixture be driven, in a current of sufficient force, through the gauze of a safety-lamp at right angles to the lamp, flame may be forced through the meshes, and may thus ignite the explosive mixture outside the lamp; but Mr. Galloway conceived, and has clearly established by experiments in the laboratory and in coalpits, that the sound-wave established by the firing of a shot (especially by the sharp explosion produced when the tamping is shot out of a hole) will by transmission, even to very considerable distances, have the effect of forcing flame through the meshes of the gauze of a safety-lamp, and will thus lead to the ignition of an explosive gas-mixture surrounding the latter. Safety-lamps may frequently be accidentally surrounded by (or purposely introduced, for purposes of inspection, into) an explosive atmosphere at the time that shots are fired in neighbouring workings; and the circumstantial evidence collected after the occurrence of some explosions has undoubtedly indicated that this is the most probable explanation of the cause of the accident. It is probably not to be expected that even in fiery coal-pits miners will forego the advantages derivable from the employment of gunpowder, and it appears next to impossible to enforce prohibitory regulations with respect to such pits; but it may perhaps at any rate be hoped that the miner may be trained to a knowledge of the danger he incurs by the incautious use of gunpowder, although the persistent recklessness with which he sacrifices safety to comfort in despising the use of the safety-lamp, forbids sanguine expectations in this direction.

Reference has not been made to another very possible source of accidents, due to the employment of gunpowder for blasting purposes, namely, carelessness in the keeping and handling of the explosive agent by the men. Personal observation by the speaker of the reckless manner in which powder is frequently dealt with in mines, leads him to believe that this contributes its quota as a cause of colliery explosions.

The accidents in collieries have their parallel in domestic life, in coal-gas explosions, which, though at first sight of comparatively small importance, if judged by the loss of life and property which they occasion, yet merit serious consideration on account of the great frequency of their occurrence, and the demonstration which they almost always afford of ignorance or culpable carelessness. Whether occasioned by defective gas-fittings or by want of care in dealing with the gas-supply, the escape of gas in a confined space, in any but very small quantities, must speedily result in the production of an explosive gas-mixture, by the rapidity with which the gas will diffuse itself through the atmospheric air surrounding the point of escape. The application of flame to such a mixture must inevitably result in an explosion, the destructive effect of which is regulated by the quantity of gas escaping, and the time which it has had to mix with the air.

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* Reference must be made here to an ingenious application, made by Mr. Ansell, of the laws of diffusion and osmose for detecting the presence of fire damp in coal-pits. Two or three forms have been given by Mr. Ansell to the detector apparatus; perhaps the most simple consists of a ball of thin india-rubber, filled with air and fixed upon a stand under a lever which slightly presses the upper surface of the ball. If from any cause the lever is raised it liberates a spring which sets a bell in vibration, or brings an electro-magnetic alarum arrangement into operation. If this apparatus is placed where fire-damp exists to an important extent, the light carburetted hydrogen passes through the pores of the india-rubber ball, and as the air in the latter passes outwards at a much lower rate, the ball soon distends, exerting sufficient pressure on the lever to bring into action the signalling arrangement, which, if electric, may be placed at any convenient distance from the fire-damp detector, being connected with the lever by means of conducting wires. It would appear as though a detector of this nature could be made of important service in fiery mines; but its employment does not seem as yet to have passed beyond the experimental stage.

The circumstance that the admixture of even minute quantities of coal-gas with air can be at once detected by the unmistakable odour of the gas, should serve as a safeguard against accidents; unfortunately, however, thoughtlessness or want of knowledge frequently causes this very fact to lead to the opposite result. Escapes of gas in comparatively small quantities often occur at the point of union (generally by a ball-and-socket joint) of a hanging burner or chandelier with the gas-pipe, or at the telescope-joint of such gas-fittings; the column of water required in the joints to confine the gas becoming very gradually reduced by evaporation. In such instances an explosive mixture will accumulate in the upper part of an apartment of which windows and doors are closed, while the air in the lower part will continue for a long time free from any dangerous admixture of gas; and instances are continually recorded in the public prints of the deliberate ignition of such explosive mixtures, by persons who, observing the smell of coal-gas upon entering the room, proceeded forthwith to search for the point of escape by means of a flame. It need scarcely be stated that such a test is a perfectly safe one in itself, and that if the acceptance of the warning given by the odour of gas in the lower part of the room were promptly followed by the simple precautionary operation of leaving open for some time all windows and doors, so as to afford ready ingress of fresh air, and thus speedily expel, or very largely dilute, the gas-mixture, the leakage could be looked for with no risk of accident.

Gas explosions, generally of a serious nature, do occasionally occur through no fault of those who are the direct agents in bringing them about, as by a person entering with a light a closed apartment in which there has been a very considerable escape of gas for some time, or a building into which gas has been entering from a leakage in the supply-pipe or the main. A very sad accident of the latter kind occurred in January last at Durham, resulting in the death of two persons. The occupants of a house had noticed on a Saturday afternoon a smell of gas, which was traced to a leakage in the main-pipe by the gas company's servants who stated that it could not be repaired until the following Monday. The man, being satisfied that the gas escape did not occur in his house, lighted a candle some time afterwards with the result that a terrific explosion nearly wrecked the house, which had become to a very considerable extent filled with explosive gas mixture. In another recent instance, the accidental ignition of an explosive coal-gas mixture issuing from a drain-pipe communicating to the sewer in which gas had leaked from the main, caused the demolition of one house and the partial demolition of another, the inmates, in both instances, escaping fortunately, with bad injuries. The first of these accidents, at any rate would not have occurred if prompt means had been taken for stopping the leakage when its source was discovered; and it may be confidently affirmed that a very large majority of the accidents resulting from coal-gas explosions might be avoided by the exercise of ordinary care and intelligence.

The employment of illuminating agents closely allied to coal-gas, namely, liquid carbo-hydrogen compounds obtained by the distillation of coal or shale, or derived as natural products from coal-bearing strata, gradually extended during the earlier part of the last quarter of a century until they became formidable rivals of mineral and vegetable oils and even of gas itself. Among the very earliest of these so-called mineral oils was paraffin oil, first obtained from a particular description of schist or coal, by Mr. Young; but some time before then, the most volatile products obtained by the distillation of coal-tar were employed in lamps without wicks, of such construction that the volatile liquid, flowing by gravitation from the reservoir to the source of heat, was converted into vapour as it reached the point where the jets of flame were produced. The great facility with which the more volatile portions of rock-oil or petroleum, and of the products of distillation from coal and schist, were applicable as brilliant illuminating agents in lamps of simple, cheap, and convenient construction, combined with the low price at which they could be retailed consequent upon the great development of the petroleum industry in America, soon led to their extensive employment by the general public, and the importation of the volatile oils or spirits attained in a short time a scale of considerable magnitude.

The several varieties of so-called petroleum spirit which are known as naphtha, benzine, benzoline, gasoline, japanner's spirit, etc., yield vapour more or less freely on exposure to air at ordinary atmospheric temperatures, and even in some cases below 50° Fahr. Their low specific gravity and volatility permit of their employment in very simple and inexpensive lamps—the commonest form now extensively used by the poorer classes all over the country being the "sponge lamp" in which a small strip of sponge or coarsely plaited wick serves the purpose of drawing the spirit up from the reservoir to the orifice, where it is vaporized and burned. Although much the largest proportion of the petroleum spirit employed is probably used in lamps of some form or other, there are additional important uses to which it is applied in large quantities, *e. g.*, as a detergent, by dyers, etc.; as a substitute for turpentine in paints and varnishes; as a means of imparting luminosity to non-luminous inflammable gas, or of rendering atmospheric air itself the vehicle for illumination by saturating it with benzoline vapour; as a solvent and purifying agent in connection with the manufacture of artificial alizarine, etc.

The statistics of the imports into London and Liverpool during the last three years show a very considerable increase in the consumption of petroleum spirit, as will be seen from the following numbers:

	1872.	1873.	1874.	
Barrels imported...	33,693	45,889	58,687	London.
	26,871	27,394	47,200	Liverpool.

The imports of the less volatile and properly refined petroleum products, known generally as petroleum oil, (also called kerosine, crystal oil, rock oil, astral oil, and incorrectly, paraffin oil), which do not yield vapour below a temperature of 100° Fahr., have fluctuated considerably during the last six years, but have increased lately to above five-fold into London, and four-fold into Liverpool, of what they were in 1872, as shown by the following numbers:

	1872.	1873.	1874.	
Barrels imported...	48,295	206,573	245,291	London.
	46,679	104,155	159,700	Liverpool.

The so-called paraffin- or petroleum-lamp *explosions*, of which in the earlier days of the employment of these illuminating agents there were so many recorded in the newspapers, and of which one still hears occasionally, were, with very few exceptions, not correctly designated as explosions; and when they were so, were not caused by the employment of the volatile oils or petroleum spirit. As these vaporize very freely at the slightly elevated temperature which a reservoir of a lamp soon attains, air is either entirely expelled from the latter by the vapour, or so diluted by it, that the mixture is not explosive. If therefore flame can have access to vapour escaping from any opening in the reservoir near the wick, in a badly-constructed lamp, it will merely burn as it escapes. If a lamp charged with petroleum spirit be carried incautiously, or accidentally jerked so that the liquid is suddenly brought into contact with the warmer portion of the lamp, near the flame, a very rapid volatilization may thereby be caused, resulting in a considerable outburst of flame. In either case, a nervous person, holding the lamp at the time, may drop it in alarm, or the reservoir, if of glass, may be broken by the sudden burst of vapour and the resulting large flame; in such instances, the spirit will be scattered and at once inflamed, inflicting injuries more or less severe on the instigator of the accident, or setting fire to the premises.* A so-called petroleum-lamp explosion which occurred, quite recently, at Gloucester, resulting in the death, from burns, of a woman, was evidently brought about by the cause last described.

If a petroleum oil which has been imperfectly refined, and which therefore contains some proportion of the very volatile products, or spirit, be employed in a lamp, a slight explosion may be caused by its yielding up a small amount of vapour at the temperature to which the reservoir becomes heated, and thus producing a feebly explosive mixture with the air in the latter, which may become ignited by the flame of the lamp. An explosion thus produced is not at all of violent character, being generally merely a feeble puff; it may, however, cause the cracking of the reservoir, and the consequent spilling and inflaming of the oil, and may at any rate lead to accident as already described, by the alarm which it occasions to nervous or ignorant persons.

There is no doubt whatever that a very considerable proportion of the accidents which occur to persons using petroleum-lamps are really traceable to the erroneous belief, which is still so very prevalent, in the *explosive* character of these liquids. The fact that they and their vapours are simply inflammable, and that the latter require to be mixed with a large volume of air before their ignition can be accompanied by explosive effects, is so slowly realized, that in public prints petroleum is still often spoken of as an explosive substance, although these very prints have recorded such events as the *burning*, in 1866, of warehouses at Bow containing 1000 barrels of petroleum, besides four barges laden with petroleum lying alongside the wharf, without any explosion; and the ignition at New Jersey (in August, 1874) of a petroleum tank in the Erie Railway Company's oil-yard, and the consequent *burning* of 70,000 barrels of petroleum. The popular belief in the explosiveness of these simply inflammable liquids contrasts strangely with the fact that many explosions have been brought about by the careless employment of candles or other naked flames in premises where the volatile varieties have been stored, or where the operation of transferring the liquid from one vessel to another for purposes of sale is carried on, the result being the ignition of the explosive mixture *produced* by the volatilization of the spirit and its diffusion through the air. This fact does indeed tend to discourage the hope that the proportion of accidental explosions of *gunpowder*, which are apparently due to ignorance, may become very greatly diminished by keeping its explosive properties before the minds of those using it.

Although those petroleum accidents which are the results of carelessness or ignorance are very difficult to attack, the community has unquestionably benefited very considerably in the matter of optional comparative security by the legislation of the last few years, in connection with the storage and sale of petroleum, imperfect though it still is. The prohibition of the sale of petroleum spirit of any kind, unless distinctly labelled so that the public may be alive to its specially dangerous nature as a very volatile liquid, and the limitation of its storage and sale, by properly licensed persons, to localities specially selected and inspected by responsible officials, have most certainly contributed greatly to the protection of the public against accidents entailed by the use of these materials. A still more important benefit which has resulted from legislation on this subject, aided by the zealous action of the Petroleum Association and of municipal authorities, is the almost complete exclusion from the market of such petroleum *oil* as yields inflammable vapour at temperatures considerably above the maximum atmospheric temperatures of Great Britain. The danger arising more especially from the transport and storage of oils bearing names which apply to the properly refined and therefore safe petroleum- or coal-oils which do not demand special precautions for their safe storage and use, and are consequently not subject to any restrictive or precautionary regulations, renders the application of the existing legal regulations to the inspection of petroleum *oils* imported into England of special importance. Such inspection, if efficiently conducted, must afford important protection to consumers and communities, by maintaining strictly the line of demarcation which it has been the object of legislation to establish between very volatile and therefore highly inflammable petroleum, or coal-products, and those liquid hydro-carbons of the same origin which are comparatively very safe illuminating materials, because they do not evolve vapour at any temperature below about 100° Fahr. A thoroughly trustworthy and sufficiently simple method of testing the oils is essential to the attainment of this result; and after much consideration and practical experience had been brought to bear on this subject, the so-called *flashing test*, described in the Act of Parliament, was adopted as the fairest and most reliable one which could be prescribed for general application; but there is no doubt that, when applied to oils which nearly approach in their flashing point the limit prescribed by the Act, the operation of the test is not sufficiently sharp, nor the prescribed method of conducting it sufficiently rigid, to preclude the possibility of its furnishing conflicting results in different hands, and thus leading to decisions, the justness of which may be legitimately open to dispute. It is therefore undoubtedly desirable, in the framing of any future Act, that this test should be carefully reconsidered, as well as the question whether some narrow limit below 100° Fahr. may not reasonably, and without incurring any increased risk, be fixed within which the flashing point of an oil, (*i.e.*, the temperature at which it evolves vapour) may range.*

Such accidents as the explosion of a mixture of petroleum vapour and air in a ship on the Thames (the 'Maria Lee'), laden with about 300 barrels of petroleum, and with other inflammable materials (in June, 1873), followed by her complete destruction by fire, in somewhat alarming proximity to the Purfleet powder magazines, and a similar accident in Glasgow Harbour, demonstrate the importance of the regulations which are imposed by the local harbour authorities, as directed by the existing Act of Parliament, upon all ships carrying petroleum spirit, with respect to their mooring and the landing of their cargo. The Act also gives to the municipal and other licensing authorities the very important power of including, as conditions of the licences, regulations with regard to the quantity of petroleum spirit to be stored in a particular locality; the nature and situation of the store with reference to inhabited buildings; the mode of storage, and the nature of the other goods to be stored with it. Very efficient regulations have consequently been adopted by the Metropolitan Board of Works—and some other local governing authorities—with regard to the stores themselves, the exclusion of any source of fire or artificial light from them, the nature of the receptacles in which the petroleum is kept, etc. The latter is a point of the utmost importance, as specially affecting the risk of accident in storing and *transporting* petroleum spirit, and one which it is very necessary that legislation should deal with more specifically than is at present the case. The existing Act specifies that limited quantities, for sale or consumption, may be kept without a licence, provided they are contained in small vessels of glass, earthenware, or metal, but it is silent on the subject of the vessels in which larger quantities are to be stored, or with respect to any regulations conducive to safety in the transport of petroleum spirit. As regards the first point, it certainly gives ample power to licensing authorities; but that legislation is urgently needed in regard to the second, was demonstrated by the recent fearful catastrophe on the Grand Junction Canal.

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* The Reports by Captain Shaw to the Metropolitan Board of Works of the causes of fires in London, show a generally steady increase in the number of fires caused by lamps: thus there were 20 in 1866, 30 in 1869, 49 in 1871, 56 in 1872, 47 in 1873, and 67 in 1874. These returns include fires from lamps of all kinds (many not defined); but it may be reasonably assumed that three-fourths of the totals noted were caused by petroleum-lamps. From one to seven fires annually are reported as caused by upsetting, "drawing off," or explosion of naphtha, paraffin, crystal oil, or petroleum. The proportion which fires from the above causes bear to fires caused by candles is small, but has been on the increase in the last few years. From 1866 to 1870 inclusive, the fires caused by candles were from seven to ten times more numerous than those caused by lamps; but in 1871 they were only about five times; in 1872 and 1873, four times; and in 1874 only little over three times more numerous.

* As the law at present stands, an oil, the flashing point of which is declared to be 99° by the official inspector, must be condemned; but another operator may make the flashing point of the same oil to be slightly above 100°. Practically, an oil with a flashing point of 97° or 98° would be quite as safe as one which answers to the test at 100°, in the hands of the same operator.

The liability of oil or spirit to leak from casks or barrels even of the best construction, consequent upon the rough usage to which these are unavoidably subjected when transferred from store to ship or carriage, and the reverse, need scarcely be pointed out. But even in the absence of leakage from the openings of the barrels, or from any accidental point of escape, evaporation or diffusion of the volatile petroleum will occur through the wood itself of which they are constructed, especially in the warm holds of ships or in stores exposed to the sun, even though the precautionary measure is frequently adopted of rinsing the barrel out before use with a solution of glue. It is evident that the object of imparting an impervious coating to the interior of the barrel can thus be only very imperfectly attained, and that, even if it were, the alternations of temperature to which the barrels must be exposed must in course of time open up places for escape by leakage or evaporation.

It is stated, on the authority of the manager of the extensive depôt for petroleum oil and spirit of the London Wharfing and Warehousing Company, at Plaistow, on the Thames, that in spite of the adoption of special arrangements for keeping down the temperature of the petroleum spirit stores, whereby it is made not to exceed 628 Fahr. in the very hottest weather, the loss of spirit by leakage and evaporation is very considerable, amounting to an average of 18 per cent. As the loss on petroleum *oil* from leakage at the same establishment amounts to about 9 per cent., it is evident that the limpidity and volatility of the spirit give rise to a loss as great again as that which is simply due to leakage from imperfectly closed vents or defects developed by rough usage.

(*To be continued.*)

Parliamentary and Law Proceedings.

HOUSE OF LORDS.

Pharmacy Act (Ireland) Bill.

In the House of Lords on Thursday, July 22, the Duke of Richmond, in moving the second reading of this Bill, said its object was to institute a Pharmaceutical Society and to regulate the qualifications of pharmaceutical chemists and of chemists and druggists in Ireland. At present no person could keep open shop in Ireland for the sale of medicines and the compounding of medical prescriptions unless he were a licentiate of Apothecaries' Hall, under an Act of Parliament passed in 1791. The examinations under that Act were somewhat severe, and the consequence was that few persons in Ireland had applied for licences, so that in many parts of the country there were places where medicines could not be properly compounded. In view of this state of things a Bill was introduced into the other House of Parliament by Mr. Errington last session. It was referred to a select committee, upon whose report the present measure was based. The Bill originally proposed that there should be reciprocity between the Pharmaceutical Society of England and the Pharmaceutical Society which it was intended to establish in Ireland, but in consequence of considerable objection being taken by the former society his right hon. friend the Chief Secretary for Ireland struck out that clause. The main provisions of the Bill were as follows:—It constituted a Pharmaceutical Society in Ireland; it named the first members of the Council, providing that the President should be Sir Dominic Corrigan, and the Vice-President Dr. Aquilla Smith; it empowered the Council to make rules and to regulate the examinations; and it provided that there should be two grades of chemists, one class to be called Pharmaceutical Chemists, and another inferior class to be called Chemists and Druggists. The Act would not come into operation until the rules had been approved by the Lord-Lieutenant and the Privy Council of Ireland. After providing for the registration of the persons who might be found after examination qualified for either of the two grades the Bill repealed so much of the Act of 1791 as prohibited keeping open shop in Ireland for the sale of medicines and the compounding of prescriptions except by Licentiates of Apothecaries' Hall. Further, the Bill provided that no person should keep open shop for such purposes unless he belonged to either of the two grades, or was a Licentiate of Apothecaries' Hall, or a duly qualified medical practitioner. It saved existing rights, however, and allowed persons of the grade of pharmaceutical chemist to fill the post of apothecary to the county lunatic asylums. The latter clause he should in committee propose to extend to the post of apothecary in county gaols. After referring to the circumstance that most of its provisions were taken from the English Pharmacy Act of 1868, the noble duke concluded by moving that the Bill be read a second time.

Earl Granville having had a good deal to do with the legislation on this subject in England, desired to express his general approval of the present measure. As, however, the standard of examination for the first grade might be lower in Ireland, it was possible that some damage might be done to the English title of Pharmaceutical Chemists. When the Bill went into Committee he would move an amendment with reference to this. By an arrangement between the two societies there might advantageously be reciprocity between them.

The Bill was then read a second time.

Friday, July 23rd, 1875.

Their Lordships went into Committee on this Bill, when the following amendments were proposed by the Lord President (Duke of Richmond), and agreed to without discussion:—

Clause 11, page 4, line 22, leave out "chairman" and insert "president." Line 23, leave out "council" and insert "society." Line 24, after the first "vacancy" insert "has been signified to the said president."

Clause 34, page 11, line 36, after "asylum" insert "or county gaol or prison."

Tuesday, July 27th, 1875.

On the motion of the Marquis of Salisbury, in the absence of the Duke of Richmond, moved that the report of amendments in this Bill be considered.

The motion was agreed to, and the Bill was ordered to be read a third time.

Thursday, July 29th, 1875.

On the motion of the Marquis of Salisbury, the Pharmacy Bill was read a third time and passed. It will have to go back to the Commons for that House to agree to the Duke of Richmond's amendments, chiefly relative to dispensers in lunatic asylums and gaols, introduced in this House.

Sale of Food and Drugs Bill.

Thursday, July 22nd, 1875.

On the Order of the Day for the third reading of this Bill,

The Duke of Richmond moved to insert a new clause, providing that no person should be liable to be convicted under the 3rd and 4th sections in respect of the sale of any article of food, or of any drug, if he satisfactorily showed that he did not know of the article of food or drug being so mixed, coloured, stained, or powdered as in either of those sections mentioned, and that he could not with reasonable diligence have obtained that knowledge.

The clause was agreed to.

The Duke of Richmond next moved the omission of clause 5, in order to substitute the following :—

"No person shall sell to the prejudice of the purchaser any article of food or any other drug which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding £20, provided that an offence shall not be deemed to be committed under this section in the following cases; that is to say,—

"1. Where any matter or ingredient not injurious to health has been added to the food or drug because the same is required for the production or preparation thereof as an article of commerce in a state fit for carriage or consumption, and not fraudulently to increase the bulk, weight, or measure of the food or drug, or to conceal the inferior quality thereof.

"2. Where the drug or food named is a proprietary medicine, or is the subject of a patent in force, and is supplied in the state required by the specification of the patent.

"3. Where the food or drug is compounded as in this Act mentioned.

"4. Where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation."

The new clause was agreed to.

The Bill, as amended, was then read a third time and passed.

HOUSE OF COMMONS.

Drugging of Animals Bill.

Monday, 26th July, 1875.

This Bill was withdrawn.

Prosecutions under the Adulteration Act.

Adulterated Tea.

Edward Payne, manager of the Waterloo Street Cooperative Society in Burton, was charged with selling as unadulterated 2ozs. of caper tea which was adulterated. The analyst's certificate stated that the tea was adulterated to the extent of over 4 per cent. with sharp sand, and further with a little plumbago or other foreign leaves. The sand made the tea probably injurious to health. The sample of tea had been purchased by Toy at the rate of 4*s.* per lb., and Mr. Fulford informed the Bench that caper tea of that quality could be purchased wholesale at 10*d.* per lb. The defendant asserted that the tea was sold in the same condition as it was received from the wholesale houses. They did not generally sell it alone, but mixed it with the other tea. Fined 5*s.* and £1 10*s.* costs.—*Burton Chronicle.*

Notes and Queries.

BORACIC ACID OINTMENT (LISTER'S) :—

℞ Boracic Acid in fine powder	1 part.
White Wax	1 part.
Paraffin	2 parts.
Almond Oil	2 parts.

The ingredients, after being mixed by melting the wax and paraffin, are stirred in a warm mortar till the mass thickens, and then set aside to cool, after which the firm substance is reduced in a cold mortar, in successive portions, to an uniform soft ointment.

Review.

Nordiskt Medicinskt Arkiv redigeradt af Dr. Axel Key. Sjunde Bandet, Första Häftet, 1875. Stockholm : Samson and Wallin.

The present number of this publication contains three original articles :—(1) On the Nature and Causes of Chlorosis, by Dr. Axel Lund; (2) On Davos as a Winter Resort, by Dr. Curt Wallis, and (3) On the Indication and Method of Transfusion, by Dr. Panum.

Dr. Lund sees no reason to limit Chlorosis to any particular age or sex. Oligœmia manifests itself in the same proportion of cases through all the months of the year, and its occurrence in Norway has no relation to geographical situation or height above the sea-level, nor does the difference in the circumstances of social position exercise any material predisposing influence on its prevalence. He thinks that it can be traced to an hereditary debility, and to causes impressing early infancy, and in this view he is supported by the discoveries of Virchow, who has demonstrated, by the dissection of Chlorotics, that there is an arrest of development of the vascular system, especially of the Aorta.

Further, the author believes that all chronic diseases, Phthisis, Cancer, Alcoholism, etc., act as predisposing causes in the parents; and, considering the prevalence and persistency of Anœmia in consumptive families, he is led to the opinion that there is a specific causative relation between Phthisis and Chlorosis.

But besides these predisposing causes, Dr. Lund thinks that other conditions, chiefly accidental, may likewise produce it. Thus he finds that a notable diminution in the number of cases is observable in the upper classes during summer, when the number of cases among the lower classes remains unaltered. And again, in the valleys, the malady is less prevalent than in the plains.

He finds an explanation of this difference in the fact that those who are comfortably off live a great deal more in the open air during summer, and that the inhabitants of the valleys make a more or less prolonged stay in the mountain *chalets* in that season. Hence the privation of fresh air is one of the causes of Chlorosis.

Dr. Panum's conclusions regarding transfusion may be thus briefly stated. We cannot expect to improve the nutritive condition of the blood of an invalid by means of transfusion, for we can only effectively transplant the red globules, and the nutrition of tissues is not affected by the consumption of this element of the vital fluid.

The only sufficient and rational indication for transfusion is therefore a deficiency of the red corpuscles, which are the carriers of atmospheric oxygen to the tissues. Human blood (defibrinated red globules) can only be used beneficially for the human invalid, for human blood acts as a solvent on the blood globules of other animals, and *vice versâ*, and the solution of red globules in the blood gives rise to capillary hæmorrhage and to serous affections of the kidneys. Transfusion can possibly be useful, therefore, in only extreme cases of Anœmia; in all others the practice should be abandoned and condemned.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Irish Pharmacy Act.

Sir,—My old friend, as I am sure he will allow me to call him, Mr. Reynolds, regrets that the Council was not unanimous in its vote on the Irish Pharmacy Bill. In this I most heartily agree with him. I only differ with Mr. Reynolds in regretting that the Council was not unanimous in taking my view on the subject and not that of Mr. Reynolds.

That my views on the questions are opposed to those alike of Mr. Reynolds and of my "constituents" is to me a matter of great regret. But, "as I thought so I spoke," and so I voted, as the only way in which I could maintain my own self-respect.

Daniel Frazer.

Glasgow, July 27, 1875.

Sir,—Now that the Irish Pharmacy Act has become law, allow me to suggest to, and entreat the Council of the English Society to intercede with Sir M. Hicks-Beach on behalf of those chemists on the English register in business in Ireland at the time of the passing of the Act. I imagine we are so few, that a claim made for us (by a deputation of the English Council or otherwise) to be placed on the Irish register would be acceded to.

Trusting our Society will come to the rescue of the few.

Associate in Business.

July 26, 1875.

Illegal Sale of Poisons.

Sir,—In your leading article on the County Durham poisoning case, in last week's issue of the Journal, you take an opportunity of defending the Pharmaceutical Society from the charge of negligence, implied by the letters of some of your correspondents.

While acknowledging the action of the Society in that case, and in the case of the other two offenders named, to have been in every respect prompt and proper, I fail to see that any thing has been done by the Society or its officials more than a very ordinary piece of duty, the performance of which both the public and the profession had a right to expect.

My object, however, in writing to you at the present time was not to criticize your article, but, through the medium of your Journal, to endeavour to direct attention, and particularly the attention of the Council, to another class of offenders, the conduct of whom is even more reprehensible and who do infinitely more injury to the trade—I should say profession—than grocers or hucksters, a class moreover, whom it would seem the Pharmacy Act as it at present stands is powerless to touch—I refer to those men, yearly increasing in number in this City, who, without subjecting themselves to any examination whatever, secure with little difficulty the co-operation of some needy medical man, and boldly open their shops in our leading thoroughfares, in haughty defiance of the Pharmacy Act, and the whole Pharmaceutical Society of Great Britain to boot.

The responsibility of the medical "gentleman" concerned in this fraud—for it is a fraud—may be, generally, of the very slightest nature; his name need not be printed on the dispensing labels of the establishment, nor, indeed, is it necessary he should cross the threshold, provided the rent and taxes are regularly paid; and as regards the public safety he might as well be resident at Timbuctoo. This, sir, is no fancy picture emanating from a "heat oppressed brain," but a truthful representation of matters pharmaceutical in this now salubrious Second City of the Empire in the year of grace 1875.

Seeing such a state of matters going on around us, one may be excused for doubting the efficiency of the Pharmacy Act, both in itself and in its application. As for the examinations of the Society, while such a state of affairs exists, we are quite justified in considering them optional, and undergone merely as a matter of honour.

In conclusion, I would humbly suggest to the Council the propriety and necessity of devising some means of putting an end to such a barefaced evasion of the law.

Apologizing for having occupied so much of your space,

"Juvenis Glasquensi."

Glasgow, July 27, 1875.

Sir,—Our average annual sale of hyd. perchlor. (chiefly used in this locality for dressing sheep struck with maggot) used to be 10 lb. previous to the passing of the Pharmacy Act; it is now 3 lb.

There is in this village a tradesman whose rule is, I believe, to sell anything he can get a profit out of—poisons among others. Knowing that he was infringing the Pharmacy Act I some time since gave him a printed list of what it was illegal for him to sell, at the same time telling him what were the penalties he incurred. More recently I had a woman apply for a packet of vermin killer. For an especial reason I declined serving her. She went direct to the above person's shop and I, suddenly remembering that I wanted a trifle which he kept, followed her. When I got in, the shopkeeper was behind his counter with a bundle of Battle's Vermin Killer in his hand and drawing a packet out. On seeing me he dropped the bundle, saying "Yes, it is very cold, Mrs. ——. What can I say for you to-day?"

In justice to the poachers on our trade preserves, I must say that several customers, whose word I can rely on, assure me they get the above-named and other poisons at a (registered) chemist's in an adjacent market town without having to sign any book.

I have penned the above for publication, as it shows that the law (owing, in this instance, to the objection the public have to signing their names) bears hardest on those who are most desirous of obeying it; also that if it should be considered advisable to prosecute such as my worthy neighbour it would not be an easy matter to get proof.

Having in mind a recent leader and correspondence in the *Pharmaceutical Journal* I will add, Why should an opprobrious epithet be applied to tradesmen for protecting their rights, even by becoming informers, more than to a (say) nobleman who should prosecute a person who presumed to kill game on his estate?

F. S. Holmes.

Brill, July 28, 1875.

F. O. Collins.—*Santolina Chamæcyparissus.*

(Lister's), see *Pharm. Journ.*, 439, Nov. 28, 1874.

R. J. M.—(1) *Galeopsis Ladanum;* (2) *Stachys palustris.*

R. B. H.—(1) *Sedum reflexus;* (2) *Eupatorium cannabinum;* (3) *Odontites rubra.*

G.—(1) *Allium oleraceum;* (2) *Allium vineale, β compactum.*

Geo. Watt.—(1) *Stachys palustris;* (2) *Epilobium hirsutum.*

L. Brown.—(1) *Æthusa cynapium;* (2) *Cannabis sativa.*

H. H. Pollard.—Reply will be sent by post.

Valkyrie.—Bichromate of potash is *not* a cyanide.

Tom.—(1 and 2) The questions should be put to your solicitor. (3) We do not know of such a work as you want.

Micros.—'How to use the Microscope' is by Dr. Beale, and it will give you the information you require.

Robt. Watson.—We will endeavour to ascertain for you.

George Dobson.—(1) *Polygonum amphibium;* (2) *Polygonum aviculare;* (3) *Lychnus Githago;* (4) *Chenopodium album,* probably; too young to determine; *Geranium sanguineum;* (7) *Erythræa centaurium;* (8) probably *Campanula rapunculoides,* send perfect specimens with lower leaves and fruit; (9) *Agrimonia Eupatoria;* (10) *Knautia arvensis;* (12) *Ononis arvensis;* (13) *Achillea Ptarmica;* (14) *Stachys Betonica.*

Communications, Letters, etc., have been received from Messrs. John Brereton, Senior Apprentice, G. A. C. Anderson, F. L. P., A. M., T. T., W. W. P., M. P. S. (Liverpool), Enquirer, H. K. Hebb.

THE INDIA MUSEUM AT SOUTH KENSINGTON.

(*Continued from p.* 62.)

The collection of articles of the materia medica in the India Museum is a very large one, and comprises an immense number of specimens of which only the more important or interesting can be noticed here. They are arranged in three principal groups, (1) those official in the Pharmacopœia of India; (2) those noticed in the Pharmacopœia of India, but not official; (3) those not mentioned in the Pharmacopœia, but used by the natives to a certain extent. The specimens are placed in the cases in the same order in which they follow one another in the Pharmacopœia, so that any one using that work as a guide will have but little difficulty in finding the specimens he may be in search of.

In the first group we notice among others, several specimens of Indian aconite or bish (*A. ferox*, Wallich) which occasionally comes over to this country under the name of Nepal aconite, and is said to be the source of some of the aconitine of commerce; for this purpose it is usually bought up, on account of containing three times as much alkaloid as *A. napellus.* The alkaloid of *A. ferox,* although equally powerful, has lately been shown to be chemically distinct. The root is official for making the alkaloid and liniment only. Judging from the variation of size and appearance it seems probable, as is stated by Hanbury, that other species are indiscriminately gathered under the name of Bish. One form of Bish has a black resinous fracture, and an extremely fetid odour from having been immersed in cow's urine to preserve it from the attacks of insects. Bish is also used by the natives as a poison. Another species of aconite called Atis, which is readily distinguished by its greyish-white colour externally and white mealy fracture, is the root of *A. heterophyllum,* Wall. It is quite free from poisonous properties, and is much valued in India as an antiperiodic in malarious and other fevers, and is there regarded and used as an efficient substitute for quinine.

Coptis Teeta, Wall., is remarkable for containing 8½ per cent. of berberine. It is used like calumba, as a pure bitter tonic. It appears to be identical with the Chinese drug Mu-lien, referred by Dr. Porter Smith to a species of *Justicia.* It is an interesting fact that many of the drugs of India are also used in China. Among other official articles following the above may be noticed star anise, calumba, cocculus indicus, podophyllum, and pareira brava—the specimen of the latter, however, being apparently not the genuine drug but the inert spurious variety free from bitterness, described in the 'Pharmacographia.' Another drug containing berberine, viz., the root bark of *Berberis Lycium,* Royle, is much used in debility resulting from fever, and is highly esteemed as a general tonic. A watery extract known in the bazaars under the name of Rusot, has been known for ages as a remedy for ophthalmia, and for restraining inflammatory and other discharges. It was the Lycium of the ancients, of which an interesting account will be found in *Pharm. Journ.* [1], xiii., p. 413.

The specimens of Indian opium include Candeish, Nimar, Malwa, Sinde, Benares, and Depulpore varieties. In one of the central cases a series of the apparatus used in its manufacture and the various stages in its production are fully illustrated, more particularly that of the Benares or "cannon-ball" opium. All of these are inferior opiums, the Malwa being the best.

The Chaulmugra seeds yield an oil which has been used with excellent effect in leprosy, and is much used in other skin diseases, especially in herpes and tinea. Close by may be seen the bright yellow tears of the Indian gamboge (*Garcinia pictoria,* Roxb.), which is used as a substitute for Siam gamboge; the curious Kokum butter, a solid fat derived from the seeds of *Garcinia purpurea,* Roxb., and which has been recommended as an excellent native substitute for spermaceti ointment; and Nim, or Margosa bark, a powerful bitter tonic and antiperiodic. The bitter oil of the seeds of this tree is much esteemed by the natives as an external application in rheumatism and as an anthelmintic. Among other curiosities may be noticed tamarind pods in their entire state, showing the hard epicarp of the fruit, the singular round grey bonduc seeds (*Cœsalpinia Bonducella,* L.), looking just like so many marbles, and remarkable for their excessively bitter taste and tonic properties; cowhage pods showing the hairs still attached to them, and Indian liquorice, the root of *Abrus precatorius,* L., so called because it tastes exactly like true liquorice root and is used as a substitute for it, and the plant of which yields the pretty scarlet seeds with the black spot at the end, known as prayer beads, and used for necklaces, etc. It is a curious fact that these seeds are sufficiently uniform in weight to be used in India as a standard of weight under the name of Rati. The weight of the famous Koh-i-noor diamond is said to have been ascertained by means of these seeds.

The specimens of catechu are numerous and varied, occurring in cubes, parallelopipeds, and lozenges. The series of specimens of assafœtida is also very instructive, giving the observer the impression that the several varieties are undoubtedly the produce of different plants.

Among the remedies for dysentery, alstonia bark (*Alstonia scholaris*) is worthy of notice. It is highly valued by the natives, and is well deserving of further investigation. It is a spongy bark of a pale-brown colour, and very bitter taste. The leaves of *Tylophora asthmatica,* W. et A., are regarded as one of the best indigenous substitutes for ipecacuanha, and are used in the form of powder for dysentery and all catarrhal affections for which ipecacuanha is generally used. An excellent substitute for jalap is afforded by the seeds of *Pharbitis Nil,* Choisy, which are used in the preparation of a tincture, compound powder, and extract. The native name of the seeds is Kaladana; in appearance they might be easily mistaken for those of the major convolvulus of the gardens. Of the aloes, scammony, and rhubarb, the less said the better, the samples exhibited being scarcely such as any English pharmaceutist would care to use. The curious little boat-shaped seeds of *Plantago Isphagula,* Roxb., known as spogel seeds, are remarkable for yielding an abundance of tasteless mucilage, and in the proportion of two drachms to the pint form a useful demulcent drink in catarrh and renal affections. In chronic diarrhœa they are taken in the entire state in doses of two and a-half drachms. Taken in this way they give out a bland mucilage during their whole course through the intestines. They seem well worthy of a trial in this country.

The specimen of Chiretta from Madras differs considerably in appearance from that of English commerce, having a much larger stem and leaves than the species official in this country.

NON-OFFICIAL.

Nigella sativa. These little black angular seeds possess carminative properties, and are remarkable for their very general use in Eastern countries as a seasoning for curries and other dishes. In Egypt they are used for comfits and cakes, as we use carraways, and are taken to produce obesity. They are also supposed by some to be the fitches spoken of by Isaiah.

Michelia champaca, L., is remarkable for the powerful fragrance of its flowers, which are used as a perfume. The bark is said to possess antiperiodic properties.

Argemone mexicana, L. The black seeds of this poppy yield a fixed oil, which is used in the West Indies as an excellent aperient, its action being first purgative and then sedative; hence it is found of use in colic. The smallness of the dose (half-a-drachm) and the mildness of its operation are special recommendations. An interesting account of its properties was given in the earlier numbers of this Journal,* but it appears worthy of a more extended trial than it has yet received in this country.

Hydnocarpus inebrians, Vahl. The seeds somewhat resemble the Chaulmugra seeds, to which they are nearly allied, and yield an oil in much repute among the natives as a remedy for leprosy.

The wrinkled little galls of the *Tamarix orientalis* occasionally come over to this country, and on this account are worthy of notice here. They yield about 30 per cent. of tannin; a similar product from *Tamarix gallica*, L., is used in the South of Europe. By the Hindoos they are used in dysentery and diarrhœa, and as an application to ulcers.

Among the resins may be remarked the green tinted Piney resin, the product of *Vateria Indica*, L., which burns with a clear steady light, giving off a pleasant odour and very little smoke. It readily mixes with wax and oil and forms an excellent resinous ointment, but does not answer for varnishes. *Hopea odorata*, Roxb., yields a fragrant white resin, which forms a clear white varnish very useful for photographic purposes. One of the most singular productions in this group is that known by the name of Múcherus, which has somewhat the appearance of a gall, and is hollow, knotted, and wrinkled, but shows no trace of insect life. It has a very astringent taste. Its botanical source is still a mystery, but it has been supposed to be an exudation from the areca catechu.

The baobab fruit (*Adansonia digitata*) has obtained some repute in India as a remedy for dysentery. The pulp or rind of the fruit is used. The bark has been employed as a substitute for quinine. The juice of the fruit is used in Africa as a specific in putrid and pestilential fevers. The bark furnishes an extremely strong fibre. The properties of the tree appear to deserve further attention.

(*To be continued.*)

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* *Pharm. Journ.* [1], vol. v., p. 23, ix., p. 129, xii., p. 292, xiii., p. 457.

NOTES ON INDIAN BURSERACEÆ.

BY ALFRED W. BENNETT, M.A., B.Sc., F.L.S.,

Lecturer on Botany, St. Thomas's Hospital.

(*Concluded from page* 84.)

7. CANARIUM, *Linn.*

Balsamiferous trees. Leaves alternate, unequally pinnate, stipulate* or exstipulate. Flowers bracteate, in terminal or axillary panicles, hermaphrodite or polygamous. Calyx cup- or bell-shaped; 3-, or rarely 5-cleft, valvate. Petals 3, rarely 5, imbricate below or valvate, usually exceeding calyx. Stamens 6, rarely 10, distinct, inserted on margin or outside of disc, or filaments united below and distinct from disc. Ovary 2—3-locular; ovules 2 in each loculus; style various, or stigma nearly sessile, capitate. Drupe usually ellipsoidal, more or less distinctly trigonous, with a 1-3 seeded stone.

About 30 species, distributed through Tropical Asia and the Malayan Archipelago. Our knowledge of this and the next genus has been greatly increased by the splendid series of specimens from the Malayan Peninsula in the Kew Herbarium, the greater part sent home by the late Dr. Maingay, which have furnished materials for the description of 11 new species of *Canarium* and 8 of *Santiria*. While on the one hand some might be disposed to agree with the authors of the 'Genera Plantarum' that the boundary line between these two genera is very indistinct; others might be more inclined to subdivide each of these into several genera. It seems, therefore, safest at present to retain the old genera. It is quite probable that many of the newly-described species may yield products similar to those afforded by the older species; but this can only be ascertained when the descriptions have been verified by resident botanists. The diagnoses of these new species are given in brief; for more detailed descriptions the reader is referred to the 'Flora of British India.'

Sect. I. Flowers 5-merous (*Scutinanthe*, Thw.)

1. C. BRUNNEUM, Bedd. Fl. Sylv. t. 127, *Scutinanthe brunnea*, Thw. in Kew Journ. Bot. viii. 266, t. 8 B. A tree 50—60 ft. high, with exstipulate (?) leaves, 10—20 in. long, and 5—11 stalked leaflets, 4—8 in. by 2—$2\frac{1}{2}$ in. Panicle much shorter than the leaves. Petals 5, scarcely exceeding calyx. Stamens 10, confluent in disc which is adnate to the calyx-tube. Drupe 1—$1\frac{1}{4}$ in. long, apiculate and unilocular, with thin bony stone.—Ceylon.

Sect. II. Flowers 3-merous.

* Stamens confluent in short disc around ovary or its rudiment. Buds clothed by deciduous bracts. Stone thick, bony. *Eucanarium.*

† Leaflets entire.

2. C. COMMUNE, Linn.; Roxb. Flor. Ind., iii 137; DC. Prodr. ii. 79; W. and A. Prodr. 175. Leaves $\frac{3}{4}$—$1\frac{1}{2}$-feet in length, with elliptic or rotundate auricled deciduous stipules, and 7—9 acuminate leaflets. Panicle very spreading. Flowers white, very variable in size, the female larger; buds enclosed in ovate or rotundate tomentose bracts. Calyx campanulate, broadly 3-lobed. Petals tomentose above. Ovary glabrous, thickened upwards. Drupe ellipsoidal, subtrigonous, with a bony 1—3-celled stone.

This well-known tree, a native of the Malayan Peninsula and Archipelago, is extensively cultivated throughout India. Dr. Wight states that it exudes a resin which possesses properties similar to copaiba, while the kernels afford on expression a bland edible oil. Colonel Drury, in his 'Useful Plants of India,' says that it is known as Elemi tree. The resinous exudation is imported into England from Manilla. It is of a yellowish-white colour and fragrant odour. The gum has balsamic properties, and is used as an application to indolent ulcers, prepared as an ointment. The tree is also cultivated in the Moluccas for the sake of its fruit, which resembles an almond in flavour. The oil is expressed from the nuts, which in Java is used in lamps, and when fresh is mixed with food. Bread is also made from the nuts in Celebes. If eaten fresh, or indulged in too freely, they are apt to bring on diarrhœa. Dr. Lindley says that the bark yields an abundance of limpid oil with a pungent turpentine smell, congealing into a buttery camphor-like substance; it has the same properties as balsam of copaiba. The resinous exudation is used in Amboyna for burning as a light.

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* The leaves are often described as "lower pair of pinnæ resembling stipules," a description I am unable to understand. A large proportion, and probably all of the species, are furnished with a distinct pair of stipules, which, however, are often lost sight of from being deciduous at an early period.

3. C. ZEYLANICUM, Blume, Mus. Bot. i. 218; *C. balsamiferum*, Moon; *Amyris zeylanica*, Retz; *Balsamodendron* (?) *zeylanicum*, Kunth., in Ann. Nat. Sc., 1st ser. ii. 349; DC. Prod. ii. 76; Thw. Enum. 79. Leaves about 1 foot long, with shortly stipitate rotundate-sagittate deciduous stipules. Very similar to *C. commune*, of which it may be only a variety; scarcely distinguishable except by the shorter stalks to the leaflets, and no doubt possessed of similar properties.—Ceylon.

4. C. SECUNDUM, A. W. Benn. Leaves apparently exstipulate; leaflets 7—9. Panicles with successively shorter branches. Buds subsessile, in bracteate sessile or stalked fascicles. Petals imbricate. Drupe $1\frac{1}{2}$—2 in., glabrous. —Singapore; Malacca.

5. C. PURPURASCENS, A. W. Benn. Extremities of branches tomentose. Stipules rotundate-cordate; leaflets 7—9. Buds and ovate or rotundate bracts tomentose. Petals imbricate.—Malacca.

6. C. NITIDUM, A. W. Benn. Extremities of branches glabrous. Stipules wanting, or early deciduous; leaflets 5—7. Drupe $1\frac{1}{2}$—1 in., glabrous.—Singapore; Malacca.

†† *Leaflets serrulate.*

7. C. RUFUM, A. W. Benn. Extremities of branches stout, closely rusty-tomentose. Leaves very coriaceous, 1—2 ft. long; stipules wanting or early deciduous; rachis tomentose; leaflets 7—11, rounded, denticulate-serrate, tawny tomentose beneath. Calyx very thick; lobes broadly ovate, obtuse. Petals coriaceous, narrowly imbricate. Drupe 2 in. long.—Malacca.

** Stamens united below, distinct from the disc. Buds cylindrical or clavate, without sheathing bracts. Leaflets entire or serrulate. *Pimela*, Lour.

8. C. GRANDIFLORUM, A. W. Benn. Extremities tawny pubescent. Stipules subulate; leaflets 7—9. Flowers hermaphrodite, $\frac{1}{2}$ in. long, in compound tawny-tomentose racemes, collected in a terminal panicle. Petals narrowly imbricate. Filaments glabrous. Ovary densely setose. Fruit $1\frac{1}{2}$ in. long, oblong-ellipsoidal, obtuse.—Malacca.

9. C. PILOSUM, A. W. Benn. Extremities of branches thinly hirsute. Leaves thinly hirsute beneath. Stipules subulate, hairy; leaflets usually 5. Petals tomentose, narrowly imbricate. Filaments glabrous.—Malacca.

10. C. HIRTELLUM, A. W. Benn. Extremities tawny tomentose. Stipules linear-subulate, $1\frac{1}{2}$ in. long; leaflets 7—9, acuminate, denticulate towards apex, shortly hirsute, pubescent beneath. Calyx teeth triangular. Petals narrowly imbricate. Drupe 1 in. long, glabrous.—Penang.

11. C. STRICTUM, Roxb. Fl. Ind. iii. 138; W. and A. Prodr. 175; Bedd. Fl. Sylv. t. 128. A tall tree with leaves 1—4 ft. long; leaflets 7—15, acuminate, denticulate-serrate or nearly entire, glabrescent above, more or less closely pubescent beneath. Panicles shorter than the leaves. Calyx tomentose, campanulate, shortly and broadly 3-lobed. Petals distinctly imbricate. Filaments confluent for half their length. Ovary glabrous. Drupe $1\frac{1}{2}$—2 in. long, tapering.—Western Peninsula.

Dr. Wight describes this tree as rather common in the alpine forests about Courtallum in the Tinnevelly district, where it is regularly rented for the sake of its gum. In Malabar it is known by the name of the "black dammar tree" in contradistinction to the *Vateria* or white dammar. Colonel Beddome gives the following account of it:—"This very beautiful tree is most abundant in the moist ghat forests on the western side of the Madras and Bombay Presidencies up to 4000-4500 feet; but it does not occur in Ceylon or elsewhere; and it is never seen in dry forests. Its brilliant crimson foliage makes it a most beautiful sight when in young leaf; the leaves of saplings and young trees are very much larger than those of adults. The tree is known as the black dammar, to Europeans, and is called Karapu Kungiliam in Tamil, and also receives the names of Googal and Dhap, and in S. Canara Mandâ Dhoop. A brilliant black dammar exudes from incisions in the bark, which is a considerable article of trade with some of our hill tribes. It is used medicinally and for various purposes. It is insoluble in cold, but partially soluble in boiling alcohol with the addition of camphor; when powdered it is readily soluble in oil of turpentine. It emits a more resinous smell and burns with more smoke than the *Vateria* resin; a small piece makes an excellent 'fire reviver.' The tree flowers early in the year, generally in January or February, but sometimes as late as April. I am not acquainted with the timber." The dammar is transparent and of a deep brownish yellow or amber colour when held between the eye and the light; but when adhering to the tree has a bright shining black appearance. It is partially soluble in boiling alcohol, and completely in oil of turpentine. Dr. Bidie speaks of it as a substitute for Burgundy pitch. Mr. Broughton gives the following account of it:—"This well-known substance offers little chance of usefulness, in Europe at least, when the many resins are considered that are found in the market at a far less price. It is used in India for many small purposes, as in the manufacture of bottling-wax, varnishes, etc. The colour when in solution is pale if compared with its dark tint when in mass. Thus, though insoluble in spirit, its solution in turpentine forms a tolerable varnish. When submitted to destructive distillation it yields about 78 per cent. of oil, resembling that obtained from common colophony; but I fear in the majority of its possible applications it possesses few advantages over ordinary resin at 7*s.* 6*d.* per cwt."

12. C. BENGALENSE, Roxb., Fl. Ind. iii., 136. Leaves 1—2 ft. long, with subulate stipules; leaflets 13—21, acuminate, glabrous. Calyx cup-shaped. Petals imbricate. Filaments confluent for half their length. Drupes the size of a large olive.—Silhet and adjoining districts.

Dr. Roxburgh says that this species exudes an excellent clear amber-coloured resin, not unlike copal, which soon becomes hard and brittle. The natives set little or no value upon it, and it sells in the Calcutta bazaar at from two to three rupees the maund of 80 lb.

13. C. EUPHYLLUM, Kurz in Journ. As. Soc. Beng. 1872, ii. 295. Leaves 2—3 ft. long, glabrous, exstipulate (?); leaflets apiculate, 9—11; calyx campanulate, broadly 3-lobed. Petals narrowly imbricate. Filaments confluent for half their length.—South Andaman Islands.

*** Stamens inserted below margin of fleshy disc; pedicels slender; endocarp thin.

14. C. LAXUM, A. W. Benn. Branches and inflorescence rufous-hairy; panicle elongated, 1—2 ft. long. Leaves 1—$2\frac{1}{2}$ ft., exstipulate (?); leaflets 7—9, acuminate, glabrous. Pedicels equalling or exceeding flowers. Petals obtuse, glabrous, very narrowly imbricate. Fruit about $1\frac{1}{2}$ by 1 in., ellipsoidal, rose-coloured —Malacca.

**** Stamens inserted outside margin of disc; buds small, globose; endocarp thin.

15. C. RUBIGINOSUM, A. W. Benn. Branches covered with a tawny pubescence. Leaves 1½—1 ft.; leaflets 5—7, shortly and obtusely acuminate, thinly pubescent beneath. Panicle pyramidal. Calyx subentire. Petals valvate, tawny tomentose externally. Fruit 1 in. by ½ in., bright yellow.—Malacca.

16. C. KADONDON, A. W. Benn. Branches nearly glabrous. Leaves 1½—1 ft., nearly glabrous, exstipulate (?); leaflets 7—9. Panicle corymbose. Flowers hermaphrodite. Calyx broadly 3-lobed. Petals valvate. Ovary glabrous. Fruit unknown.—Malacca.

***** Stamens inserted around and upon rudiment of ovary; buds elliptical, ¼—⅓ in. long.

17. C. PARVIFOLIUM, A. W. Benn. Branches glabrous. Leaves ½ ft. long; leaflets about 7. Pedicels very short. Calyx cup-shaped, subentire. Petals imbricate. Fruit unknown.—Malacca.

18. C. COCCINEO-BRACTEATUM, Kurz in Journ. As. Soc. Beng. 1872, II., 296. Branches slightly pubescent. Leaves 1—2 ft. long, glabrous; leaflets 7—9, acuminate, entire; stipules deeply divided and coarsely toothed. Panicle puberulous, with scarlet oblong acute bracts.—South Andaman Islands.

8. SANTIRIA, *Blume.*

Balsamiferous trees, with alternate stipulate leaves, consisting of 3, or a large uneven number of opposite, entire, slightly oblique leaflets. Flowers in axillary or rarely terminal panicles, branched at right angles; bracts usually obsolete; bracteoles minute. Calyx cup-shaped, 3-lobed, valvate. Petals 3, valvate, or subimbricate, much larger than the calyx. Disc annular, fleshy, adnate. Stamens 6, or rarely fewer, distinct, often unequal, inserted on the margin or outside of the disc. Ovary 3-locular, with 3 ovules in each loculus; style short; stigma capitate. Drupe ellipsoidal or sub-globose, more or less laterally compressed, unilocular, 1-seeded; style oblique.*

Probably about 25 species, confined to the Malayan Archipelago. There is little doubt that this genus, which is but badly discriminated from *Canarium*, is possessed of similar properties. All the Malayan species are, with one exception newly described in the 'Flora of British India.'

Sect. I. *Icicopsis.* Anthers adnate.

1. S. PLANCHONII, A. W. Benn. Leaves 8—12 in. long, with about 11 acuminate glabrous leaflets. Panicle 2—6 in. with slender ascending branches. Calyx-segments deltoid, acute. Stamens shorter than the petals; filaments broad, spathulate above. Drupe ½ in. long, ellipsoidal, gibbous on the dorsal side, purple, covered with a pale bloom; style very oblique.—Malacca.

Sect. II. *Eusantiria.* Anthers dorsifixed.

* Panicle branched nearly from the base.

2. S. COSTATA, A. W. Benn. Leaves 6—8 in. long, with about 7 obtusely acuminate leaflets, obliquely acute at the base, with prominent mid-rib. Panicle 3 in. long, pyramidal, pubescent; branches bracteate; pedicels as long as flowers. Flowers in fascicles, bracteolate. Stamens about equalling petals; filaments slender.—Malacca.

3: S. APICULATA, A. W. Benn. Leaves 6—8 in. long, with 3 obtusely acuminate leaflets. Panicle ½—3 in. long, narrowly pyramidal; pedicels twice as long as flowers; bracts obsolete. Stamens shorter than the petals; filaments slender. Drupe ⅓ in long, ovoid; style completely basilar in fruit.—Malacca

4. S. PUBERULA, A. W. Benn. Younger branches clothed with minute canescence. Leaves 6—8 in. long, with 7—9 glabrous, shortly acuminate leaflets. Panicle 2½—4 in. long, pyramidal, lax, few-flowered, canescent, pedicels as long as flowers; bracts obsolete; bracteoles minute. Stamens rather shorter than petals; filaments and buds. Fruit unknown.—Malacca.

5. S. CONFERTA, A. W. Benn. Leaves 12—18 in. long, with about 13 glabrous oblong or broadly lanceolate leaflets with obliquely rounded base. Panicle 3—4 in. long, pyramidal, rather compact; pedicels shorter than leaves; bracts obsolete; bracteoles minute. Stamens shorter than the petals. Drupe as in *S. apiculata*, but a more reddish purple when dry.—Malacca.

** Panicle pedunculate.

6. S. LÆVIGATA, Blume, Mus. Bot. i. 211; *Canarium lævigatum*, Miq. Fl. Ind. Bat. i. pt. ii. 648. Leaves 10—18 in. with 7—15 glabrous, elliptic-lanceolate or oblong-acuminate leaflets. Panicle 6—9 in., shorter than the leaves, branched pyramidally; pedicels as long as flowers. Calyx minutely hispid; stamens about as long as petals; filaments dilated at base. Drupe 1 in. diam., subglobose; style nearly basilar in fruit.—Malacca; Sumatra.

7. S. MULTIFLORA, A. W. Benn. Leaves, 6—12 in., with about 7 shortly acuminate leaflets, ferruginous pubescent beneath, and with prominent tomentose midrib above. Panicle 4—6 in., shorter than the leaves; pedicels as long as flowers; bracts caducous. Stamens about as long as petals; filaments slightly dilated at base. Drupe ½ in. long, globosely cylindrical, pruinose; style nearly terminal.—Malacca. Perhaps identical with *S. tomentosa*, Bl., of Sumatra.

8. S. MAINGAYI, A. W. Benn. Leaves, 10—22 in., with 7—9 glabrous shortly acuminate leaflets. Panicle 10—12 in. long, shorter than the leaves, cymosely dichotomously branched; pedicels rather longer than flowers. Stamens shorter than petals. Fruit unknown.—Malacca.

9. S. FASCICULATA, A. W. Benn. Leaves about 1 ft., with about 7 cordate-acuminate leaflets. Panicles rather longer than the leaves, with long slender branches, bearing small distant fascicles of minute flowers. Calyx-lobes ovate acute. Stamens shorter than the petals. Fruit unknown.—Malacca. Very near *S. virgata*, Bl.

9. TRIGONOCHLAMYS, *Hook. f.*

A tree with pustulate tomentose branches. Leaves alternate, unequally pinnate, with opposite stalked leaflets. Flowers polygamous. Calyx large, 3-partite, valvate, persistent. Petals 3, valvate, about equalling calyx. Disc annular. Stamens 6, inserted in the margin of the disc; filaments very short. Ovary 3-locular, nearly globose; style straight, short; stigma 3-lobed; ovules 2 in each loculus, axile. Drupe obliquely globose, unilocular, 1-seeded.

Only one known species, a native of Malacca, of unknown properties.

1. T. GRIFFITHII, Hook. f. in Trans. Linn. Soc. xxiii. 170, t. xxvii. Leaflets about 13—15, elliptic-acuminate. Panicle axillary, shorter than the leaves. Flowers rufous-tomentose, with 2 spathulate bracts at base of pedicel. Drupe glabrous, about the size of a cherry.

10. FILICIUM, *Thwaites.*

A lofty tree, often with scaly branches. Leaves unequally pinnate, with opposite sessile leaflets and broadly winged rachis. Flowers polygamous. Calyx 5-partite, imbricate, deciduous. Petals 5, small, imbricate. Disc 5-lobed, tomentose. Stamens 5, inserted within the disc, equal; filaments subulate, free. Ovary globose, 2-locular; style bent; stigma simple, or 2-lobed; ovules solitary in each loculus, pendulous. Drupe fleshy, usually unilocular, 1-seeded. Only one known species.

1. F. DECIPIENS, Thw. Enum. 408; Bedd. Fl. Sylv., i. t. 129; *Pteridophyllum decipiens*, Thw. *l.c.* 59, and Hook. Kew Journ. Bot. vi. 66, t. 1 B; *Rhus decipiens*, W. and A. Prodr. 172; Wight, Ill. i. 184, t. 75. Leaflets about 15, narrowly elliptical, glabrous or glaucous; wing of rachis spathulate between each pair of leaflets. Drupe about the size of a large pea, nearly globose, glabrous.—Western Peninsula, throughout the Western Ghats, and Ceylon.

Colonel Beddome says that this very elegant fern-leaved tree is found more or less throughout the western ghat forests of the Madras Presidency and in Ceylon, and has been introduced into gardens. It is very abundant in moist forests on the Annamallays, at about 4000-4500 feet elevation, and also at much lower altitudes. The timber is strong and valuable for building purposes. It flowers in December and January, and ripens its fruit in March. In Ceylon it is called Pelimbia.

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* Not truly basilar, as stated in Bentham and Hooker's Genera Plantarum.'

PHARMACY IN RUSSIA.

BY C. MÉHU.

The following interesting account of the conditions under which pharmacy is practised in Russia has been contributed to the *Journal de Pharmacie et de Chimie*, by M. C. Méhu, who attended the Conference at St. Petersburg last year as a delegate from the Paris Society of Pharmacy.

The larger proportion of Russian pharmacists are of German origin, all their names are either German or Polish. It has been only during the last few years that the Emperor Alexander has permitted a true Russian to become a pharmacist. The Emperor Peter the Great reserved to Germans all the pharmacies in his dominions.

The pharmacist who conducts an ordinary pharmacy takes the name of "free pharmacist" (*freir Apotheker*); others bear the name of "crown pharmacist" (*Krons Apotheker*). The so-called "crown pharmacies" are those of the civil and military hospitals and benevolent institutions. Of these there exist twenty-five in St. Petersburg, two or three among them supplying the public with medicaments.

There are also in Russia some pharmacies called "*Filialapotheke*," or branch establishments. In the district of St. Petersburg there are two to fifty pharmacies. As their name indicates, they are dependent upon another pharmacy, and are established in places where an independent pharmacy could not be founded. The branch establishment is within a distance not exceeding fifteen versts from the mother pharmacy, and it is worked at times when there is a temporary augmentation of the population of the district, as during a fair, or during the winter when the roads are rendered impracticable by the snow, or during the fine season for a group of country houses. The branch establishment belongs to the nearest pharmacist; sometimes to several pharmacists residing within a radius of less than fifteen versts. It contains all the medicines of an ordinary pharmacy, but it is not necessary that it should contain a laboratory, a store of drugs, and other additions required by the regulations for a complete pharmacy. It is conducted by a graduate in pharmacy under the superintendence and responsibility of the proprietor of the normal pharmacy upon which it depends. In the branch establishment all the prescriptions are registered as in other pharmacies.

The law compels the pharmacist to enter all the prescriptions he executes and to pass a special examination in the deciphering of handwriting and the legal prices of medicines.

The annual number of prescriptions in a town is one of the elements which determine the Government in opening or closing a pharmacy. For this purpose a calculation is made of the average number of prescriptions made up in all the pharmacies of the locality during the three years last past, the renewal of a prescription being reckoned as a new prescription. In Moscow and St. Petersburg there is a pharmacy to 12,000 inhabitants and an average of 30,000 prescriptions. In the principal seats of the Government there is one pharmacy to 10,000 inhabitants and 15,000 prescriptions. In the chief places of a district there is a pharmacy for 7000 inhabitants and 6000 prescriptions. Finally, in sea-ports there is one pharmacy to 7000 inhabitants and 12,000 prescriptions. The military are not reckoned in the numbering of the inhabitants.

In the large cities pharmacies sell for a sum equal to from three to three-and-a-half-times their annual receipts. In the small towns the price falls to one or one-and-a-half times their annual receipts.

When the opening of a new pharmacy is authorized, it is established in the quarter where the augmentation in the number of inhabitants has become most manifest. If no pharmacy exists in a circuit of 15 versts (= about 10 miles), although the number of neither the inhabitants nor prescriptions in the locality comes up to the regulation standard, the medical council is authorized to open a pharmacy.

The pharmacies in the large cities are inspected several times each year, and those of the small towns at least once a year, by Government medical officials. More than once during recent years grave complaints have been made respecting the manner in which these commissioners do their work, and of their inexperience in pharmaceutical matters. In the case of great negligence or bad pharmaceutical preparations, the government can withdraw from the holder of a pharmacy the privilege accorded to him, but not until after he has been fined several times. The withdrawal of the privilege is ordered by the medical department of the minister of the interior on the recommendation of the medical authority of the government in which the pharmacist resides. The granting of the privilege and the penalties for contravention of the regulations are all the subject of particular rules.

After satisfying these numerous shackles upon his liberty it would appear reasonable to expect that the pharmacist would be assured of a comfortable living. This is, unfortunately not the case, especially in the smaller towns; because every town and village can have a pharmacy which must supply medicines at cost price in the cause of humanity. This pharmacy is placed under the direction of a medical man, who draws from it all the profit possible, to the great detriment of the pharmacist of the town, who, in consequence of the unfair competition, is often compelled to close his pharmacy, whilst his hypocritical competitor, free from the expense of rent and first establishment, takes his ease without running any risk. The limitation of the number of pharmacies, moreover, has only been instituted for the profit of the State. The compulsory legal tariff places the pharmacist at the mercy of commissions in which medical men constitute the majority. On the other hand, the illegitimate competition of the medical men at the benevolent institutions contributes to place the Russian pharmacist in a position little to be envied.

Education.—There is no special school of pharmacy in Russia. There are professors of pharmacy in the universities of Moscow, Kiew, Kasan, Charkow, Dorpat, and Varsovie. At St. Petersburg the teaching of pharmacy is entrusted to the Medico-Chirurgical Academy, established at the ministry of war.

The pharmacist can acquire all his grades in the educational centres. Each of these establishments has a plan of study which is vigorously observed. With the courses of theoretical and practical pharmacy the student attends also the university courses, particularly those in chemistry, physics, mineralogy, botany, zoology, during three or four semestres.

The pharmaceutical student passes through three successive grades: "assistant" (*Gehülfe*), "dispenser" (*Provisor*), and "master" (*Magister*).

First Grade.—Before being admitted to pass the examination for assistant the apprentice (*Lehrling*) must present (1) A certificate that he has entered as apprentice either in a free or a crown pharmacy, and (2) a certificate attesting that he has passed at least three years in a free or a crown pharmacy. The certificate also states the zeal and behaviour of the candidate during that time, as well as his progress in the art of pharmacy, and it must be signed by the master and also the magistrate in whose jurisdiction the master resides. A pharmacist is interdicted from receiving as an apprentice a pupil who does not possess a certificate from a director of a gymnasium or similar institution to the effect that the young man is suited to enter a pharmacy as an apprentice and possesses a competent knowledge of the subjects taught in the three lower classes of a gymnasium. The period of three years may be reduced to two years in the case of young men who have completed their courses at a gymnasium before entering a pharmacy.

The examination for the degree of "assistant" includes—

(1) A knowledge of the laws which concern the pharmacist.

(2) Translation of a passage from the national or some other pharmacopœia written in Latin.

(3) The reading of a medical prescription. The candidate has also to indicate the order in which he would make it up, fix the price according to the legal tariff, and to give practical proof of his dexterity as a dispenser and his ability to overcome any difficulties the prescription may present.

(4) The recognition of the most usual pharmaceutical substances (simple drugs and commercial products) and the indication of their principal characteristics.

(5) The recognition and description of the more common medical and poisonous plants, especially those that grow in the wild state in Russia.

(6) The method of preparing, the properties, and the constituent elements of two frequently used compound medicines, and of two chemical preparations.

(7) Knowledge of the various names of medicines.

(8) Knowledge of the usual doses of powerful medicines.

(9) The preparation by the candidate in the laboratory of the university or academy, under the supervision of the professor of pharmacy, of two common products specified by the examiners, one of them to be a pharmaceutical compound, the other a chemical product. The candidate has also to describe the processes of preparation he adopts.

Second Grade.—The candidate for the grade of "dispenser" (*Provisor*) must possess a thorough practical and theoretical knowledge of the subjects pertaining to pharmacy. Upon presenting himself for examination he must produce a certificate that he has served three years in a crown or private pharmacy, and that he has attended, in a school of medicine or university, complete courses in the sciences which are the subject of examination (usually four semestres). The assistant enters the school of medicine or university without undergoing an examination, upon the simple presentation of his diploma as assistant. He also brings a certificate he received upon leaving the pharmacy in which he completed his first stage, and this certificate reports upon his conduct and industry. These certificates are regulated by the superior medical authority.

The examination is public and is held in the large room of the university; it is oral and practical. The subjects for examination are as follows:—

Mineralogy.—Terminology and history of the minerals used in pharmacy.

Botany.—Terminology; principal systems of classification; the recognition and description of at least two fresh or dried plants.

Zoology.—The principal systems of the classification of animals; description of one or two animals, parts of which are used in medicine.

Physics.—In its relation with chemistry and pharmacy.

Chemistry.—Principally from a pharmaceutical point of view, and in respect to chemico-legal researches.

Pharmacology.—Doses and pharmaceutical forms of medicines. Also a knowledge of the temporary assistance to be rendered to the sick and wounded in urgent cases.

The candidate has besides (1) to recognize and describe by their external characters two pharmaceutical drugs and two chemical products, and to make quantitative and qualitative analyses of the latter; (2) to conduct a chemico-legal research under the supervision of the examiner, and to give a written report; (3) to prepare two pharmaceutical chemicals in a school of medicine, under the supervision of the professor of pharmacy; and (4) to show generally that he possesses the knowledge necessary to fit him to undertake the responsibility of a pharmacy.

Third grade.—The title of "master" (*Magister*) is the highest that can be obtained by a pharmacist. Before being admitted to the examination for this degree the candidate must have served at least one year as a "dispenser." The examination is mainly in the same subjects as that for "dispensers," but the candidate must exhibit a more extensive knowledge of chemistry and pharmacy than is required from a "dispenser." He has (1) to make two analyses or chemico-legal researches, and to render a satisfactory report; (2) to treat in writing of two questions chosen by the examiners, one in pharmaceutical chemistry, the other in natural history or physics. The answers may be written in Latin, Russian, or any commonly used European language. The candidate then presents a thesis written in Latin, Russian, or any commonly used European language. The subject of this thesis may be chosen by the candidate, or selected by the examiners. The discussion upon the thesis and the annexed questions (six at least) may be taken in any of the before mentioned languages, at the choice of the candidate. To this test the same rules are applied as regulate the reception of doctors.

The holder of a diploma as "master" takes the pharmaceutical oath, and subscribes his signature at the foot of this oath printed across the diploma.

A METHOD OF INCREASING THE SOLUBILITY OF SALICYLIC ACID.*

The solubility of salicylic acid is enormously increased by the addition of borax to the water, so that as much as ten parts of the acid can be dissolved in 100 parts of water, if eight parts of borax be present. This discovery we owe to Dr. H. Bose, assistant in the Surgical Clinic at Berlin, who has contributed a paper of much interest to the *Berliner Klinische Wochenschrift* (No. 28, July 12), to which we are indebted for the following details. The solution should be made by first dissolving the borax with the aid of heat, and then gradually adding the salicylic acid to the boiling fluid. Since commercial samples of both these drugs are not chemically pure, a small amount separates, and requires to be filtered off on cooling. The filtrate is a clear yellowish or light-brown fluid, according to its concentration. The proof that the addition of borax does not convert more than a part of the salicylic acid into salicylate of soda—a salt devoid of antiseptic properties—is easily shown; for if we dissolve 6·9 parts of the acid in 100 parts of boiling water, and then add 2·89 parts of bicarbonate of soda, the carbonic acid in the latter is set free, while the soda combines with the salicylic acid, and on cooling there is such an abundant deposition of the excessive acid that the whole liquid becomes nearly solid, owing to the formation of crystals. Now if the whole be reheated until the acid is completely dissolved, and then 3·58 parts of boracic acid added, no deposit of any kind occurs on cooling. The most suitable strength in which the above solution can be used for direct application to wounds, is, according to Dr. Bose's experience, one which contains from 2½ to 5 per cent. of salicylic acid, and 2 to 4 per cent. of borax. Solutions containing more than 5 per cent. of acid are too irritating, and give rise to a very abundant capillary hæmorrhage if applied to the surface of a fresh wound. Dr. Bose speaks highly of the result obtained with the boro-salicylic dressing in a number of cases of removal of small tumours. The operations were all performed without the spray, and only the sponges and forceps used were cleansed antiseptically with the above solution. The wound was thoroughly washed with the same liquid, and then a thick layer of salicylic wadding, also soaked with it, was laid on its apposed edges, so as to reach several finger's-breadths beyond them, and fixed by means of a bandage; catgut was used to tie any vessels requiring ligature. In those cases where the edges of the wound could not be accurately brought together, Dr. Bose put in catgut sutures, and then filled the spaces between the edges with the salicylic solution by means of a small syringe, and applied the wadding over all. The greater number of the cases thus treated healed by first intention, without the formation of a drop of pus.

Dr. Bose concludes his paper by stating that he has as yet no experience of the value of the boro-salicylic acid solution in dressing *large* wounds, and that he has not found it invariably successful in the case of small ones.

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* From the *Medical Times and Gazette*.

The Pharmaceutical Journal.

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SIR ROBERT CHRISTISON UPON TEACHING IN THE LECTURE ROOM AND IN THE LABORATORY.

ON Tuesday last, the forty-third annual meeting of the British Medical Association commenced in Edinburgh, under the presidency of the veteran Sir ROBERT CHRISTISON. About thirteen hundred gentlemen appear to have already intimated their intention to take part in the Congress, a number that testifies to the high position the Association has now taken in the esteem of the profession. The proceedings were commenced by a morning service in the choir of St. Giles's Cathedral, when the sermon was preached by the Rev. Dr. W. LINDSAY ALEXANDER, to a crowded congregation. The first general meeting was held in the afternoon in the Free Church Assembly Hall, where, after a vote of thanks to the retiring President, Dr. E. COPEMAN, had been passed, and a welcome from the city had been given by the acting chief magistrate, the President-Elect, Sir ROBERT CHRISTISON, delivered a lengthy and able address. During the discussion of the report of the Council, which was adopted, the question of the admission of ladies arose, a member calling attention to the fact that amongst the names of persons who were announced as intending to read papers were those of two ladies. He therefore proposed that the SECRETARY should be instructed to issue a circular before the next annual meeting to each member of the Association, requesting the expression of an opinion whether female medical practitioners should be admitted to membership. A decision upon the question was adjourned until the following day when the proposition was almost unanimously adopted. In the evening of Tuesday, the President held a reception in the Assembly Rooms, which was attended by about sixteen hundred persons. On Wednesday, at the second general meeting, it was resolved that the meeting next year should be held at Brighton, and that the President should be Sir J. CORDY BURROWS. There was some opposition, however, in consequence of the medical gentlemen in Brighton not having been unanimous in their invitation. After this meeting the proceedings in the different sections commenced.

Pharmacy is so closely allied to medicine that the annual meetings of a representative medical association must always present points of interest to pharmacists. But this may be emphatically remarked of the present meeting, when a President who for upwards of thirty years has occupied with honour the professorial chair of materia medica in Edinburgh, and who has been an Honorary Member of the Pharmaceutical Society of Great Britain from the time of its foundation, has, in his address, uttered his matured opinions respecting the teaching of science in reference to medical art.

Sir ROBERT CHRISTISON commenced his address with an interesting sketch of the rise and progress of the Medical School in the Edinburgh University. It appears to have owed its origin in 1685, to the efforts of Sir ANDREW BALFOUR, Sir ROBERT SIBBALD, and Dr. PITCAIRN, and it is interesting to notice that botany seems to have been their first object. Fifteen years previously the former two gentlemen had formed the nucleus of the present Royal Botanic Garden in a plot of ground only forty feet square, but in which were reared no fewer than nine hundred plants. Their idea was to introduce into Scotland the cultivation of plants yielding medicinal products, which in those days of less easy intercourse between nations were not always to be had when wanted.

Among the causes of the prosperity of the school, Sir ROBERT claimed that it was the first in Great Britain to assign special subjects to special professors, and that no slovenly half measures had ever been admitted into the school work. The subjects were taught in all their details, not by the detached tutorial method of the English Universities, but to the students *en masse* by full courses of lectures of five months' duration. These courses were afterwards extended to six months; though in deference to the opinions of those who failed to see the utility of so much oral instruction, the winter course was again more recently reduced to five months, with what advantage Sir ROBERT confesses he has been unable to discover.

But although Sir ROBERT is thus jealous of securing a full proportion of systematic oral teaching, he fully admits that the able professors of the last century strangely failed to supplement it with practical teaching. Botany was not taught practically till 1820, when Dr. GRAHAM introduced field instruction. Neither was there then any school for practical chemistry in the British Isles, so that Sir ROBERT CHRISTISON found himself in that year compelled to resort to Paris to study chemical analysis. At the present time every branch of medical education is taught practically in the Edinburgh University—save one, and that, curiously enough, is materia medica, one branch of which, pharmacy, lends itself eminently to practical teaching. This is due to want of accommodation, but Sir ROBERT states that he has taken care that ample provision for the purpose shall be made in the new college buildings.

But, nevertheless, Sir ROBERT insists that practical instruction cannot take the place of systematic instruction; that the latter is an essential preliminary for the former; and that as a rule a student's time is much too short for him to make himself acquainted with all the required subjects by practical study. On the other hand he mentions that having himself attended 136 lectures by Dr. HOPE on systematic chemistry, fully illustrated by experiments, he found no difficulty, after learning the use and the handling of apparatus, in taking up subsequently in Paris such practical researches as the analysis of gases, the proximate analysis of vegetable poisons and medicines, and the elementary analysis of nitrogenous organic bodies. No such thorough preparation, he considers, could have been attained by the brief systematic course of sixty or eighty lectures proposed by the "practically minded" of the present day. Referring to the proposition to substitute practical instruction and home study for lectures, Sir Robert remarks that reading at the student's home is an essential ingredient in both systems of tuition, and that every student who wishes to profit by a course of lectures uses works of reference to enforce, recall, or expand what he hears in the lecture-room. But reading cannot replace what he hears in the lecture-room, and Professor Christison evidently has great faith in appealing both to the ear and to the eye of the pupil. A remarkable contrast to the present order of things in respect to the latter point was given from his own experience half a century ago, that during his four years' course of study the professor of the practice of physic did not once make use of a specimen, drawing, diagram, or black-board; neither did his colleagues in clinical medicine, physiology and pathology, or materia medica.

In fact, short courses of brief lectures would appear to be Sir Robert's *bête noire*, and he shows great anxiety that practical teaching should be kept within due bounds. Systematic teaching he considers to be not only an indispensable preliminary to the practical, but also more economical of time, since a lecturer can go over in his course, even including demonstrations and experiments, three or four times the amount of details which the student can hope to overtake in any plan of practical study. He is also evidently inclined to credit practical teaching with the responsibility of a great deal of superficiality, due to a tendency to attempt to cover too great an extent of ground. And he fortifies this opinion by a statement that on one occasion after a popular course of practical chemistry had been given in the Edinburgh school, he found that not one of his four clinical clerks, who had all gone through it, could make a filter, pour a liquid securely into one, or boil wine in a glass tube with confidence.

Finally, the conclusion Sir Robert Christison comes to on the whole question of medical training, is that the most efficient method consists in full systematic lectures and auxiliary practical instruction, carefully chosen and limited. Such a system, hitherto pursued in the University of Edinburgh, has, he contends, been eminently successful. This conclusion of the worthy and experienced professor will doubtless meet with considerable concurrence, although it is probable there will be many persons who will dispute that the premises laid down are sufficient to altogether justify it, or that it is necessarily correct to so sharply limit the application of the adjective "systematic" to teaching by lectures. At any rate, all will readily acknowledge that he has done good service to the cause of education by publishing the results of his ripe experience.

We regret to learn from the medical journals that Mr. John Churchill, the eminent medical bookseller, for many years the publisher of this Journal, died on Monday last at the age of seventy-four.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, August 4th, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT.
MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Atherton, Baynes, Betty, Cracknell, Greenish, Hampson, Hanbury, Owen, Rimmington, Robbins, Sandford, Shaw, and Williams.

The minutes of the previous meeting were read and confirmed.

The following being duly registered as Pharmaceutical Chemists were respectively granted a diploma, stamped with the Seal of the Society:—

Anderson, Alexander.
Atkinson, John George.
Baildon, Henry Bellyse.
Balchin, Edward Samuel.
Basker, John Anthony.
Blake, Charles Alexander.
Cardwell, Ernest.
Edward, William Wales.
Green, George.
Halse, Thomas.
Hefford, Charles.
Long, Theophilus Henry Beavan.
Metherell, Kinneard.
White, Charles.
Wyles, William.

Elections.

MEMBERS.

Pharmaceutical Chemists.

Atkinson, John George	Alford.
Baildon, Henry Bellyse	Edinburgh.
Balchin, Edward Samuel	London.
Basker, John Anthony	Grantham.
Cardwell, Ernest	Lytham.
Halse, Thomas	Exmouth.
Hefford, Charles	Upper Sydenham.
Long, Theophilus Hy. Beavan	Brighton.
Metherell, Kinneard	London.
White, Charles	London.

Chemists and Druggists.

Drury, George Samuel	Milton next Gravesend
Ginner, Isaac Benjamin	Cannes, France.
King, William Raymond	Liverpool.
Lemmon, Robert Alce	Hythe.
Thompson, Henry James	London.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations and being in business on their own account were elected "Associates in Business" of the Society:—

Minor.

Griffiths, Edwin Harpham	Hanley.

Modified.

Hester, Charles	Northampton.
Magin, Arthur Ellis	Matlock Bath.
Webster, Thomas	Beaumaris.

ASSOCIATES.

The following having passed their respective examinations were elected Associates of the Society:—

Minor.

Andrew, Frederick William	Falmouth.
Andrews, Henry Albert	Harrogate.
Barker, Alfred William	Saffron Walden.
Downing, Frederick	Falmouth.
Elliot, Joseph	York.
Embley, John	Brierfield.

Fox, Charles James	Witney.
Holt, Edmund	Scarborough.
Howe, Oliver George	Stony Stratford.
Hunt, Arthur	London.
Ison, Francis	Penrith.
Jones, George Marsh	Sheffield.
Jones, William Nathanael	Conway.
Knight, George James	Newark.
Minnitt, Walter	London.
Mitchell, Andrew	St. Andrews.
Park, Charles James	Devonport.
Radley, William Gibson	Newton Abbot.
Rickinson, Valentine, jun.	West Hartlepool.
Rogers, Oliver	Upper Norwood.
Sampson, George	Chesterfield.
West, John Leaver	Ashby-de-la-Zouch.

Modified.

Moverly, Robert	Maidstone.
Osbourne, Nicholas Twigg	Louth.
Snape, Edward	Prescot.
Thompson, Alfonso de Lamartine	Dublin.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary Examination, were elected "Apprentices or Students" of the Society :—

Bell, John Waller	Todmorden.
Bentlif, Philip Barnett	Bath.
Blacklock, Philip Walton	Brighton.
Coles, John George	Kettering.
Cracknell, Herbert	London.
Fairweather, Frederick Harry	Tavistock.
Foggitt, William Crossley	Thirsk.
Francis, Matthew Robert	London.
Hall, William George	London.
Hartridge, James Hills	Woodbridge.
Hogg, Andrew	Liverpool.
Holt, John	Aislaby.
Kettlewell, Harry	Beverley.
Lawton, Charles William	Redmarley.
Macaulay, William Henry	Rotherham.
Mitchell, Joseph Samuel	London.
Pinchen, William John	Norwich.
Potter, John Henry	Nottingham.
Ridgley, George Stevens	Gillingham.
Robinson, William	Turnham Green.
Shearcroft, Walter Fred	Long Sutton.
Smale, John Edward	Landport.
Stobbs, Robert	North Shields.
Temple, Charles Herbert	Winchester.
Usherwood, Thomas	Liverpool.
Wallis, John Webb	Thame.

Several individuals were restored to their former status in the Society on payment of the current year's subscription and a fine.

FINANCE.

The report of this Committee recommending the payment of sundry accounts was received and adopted.

BENEVOLENT FUND.

The report of this Committee was received and adopted including the following grant :—

£15 to a registered Chemist and Druggist, aged 74, who has been in business 40 years, but is now in difficulties owing to ill-health.

LIBRARY, MUSEUM, AND LABORATORY.

The minutes of two meetings of this Committee were read. The librarian had reported that the average attendance in the library had been during the day, 21·3 ; evening, 7·44 ; in the conversation room, 9·4. The circulation of books had been, in town, 159 ; country, 34 to 21 places. The curator had reported that the average attendance in the museum had been 21 during the day, and 3 in the evening, and that a large specimen of camphor had been presented to the museum by Messrs. Atkinson and Co. The library, museum, etc., had been ordered to be closed in the evening during the months of August and September. Professor Redwood had reported that the number of pupils in his class was about the same as when he made his last report. Professor Bentley had reported that his botany class, including perpetual students, now consisted of about 80, the numbers having been previously understated. A letter had been received from Mr. Davies, the senior demonstrator in the laboratory, asking leave to make use of the rooms, apparatus, etc., in the evenings, for the purpose of some original researches in which he wished to engage. The consideration of this matter had been referred to the House Committee. Professor Attfield had reported that there had been 107 entries in his class during the session, 53 students having been at work during the month of July. The Committee had considered the practicability of providing a model pharmaceutical laboratory, and the desirability of including a knowledge of its use in the instruction given to the pupils, and after consultation with Professor Attfield they were of opinion that it was not at present advisable to take any step in the matter.

The purchase of the following books for the Library was recommended :—Harley's 'Old Vegetable Neurotics;' Asa Gray's 'Manual of Botany, with Mosses etc., and Structural and Systematic Botany;' Balfour's 'Manual of Botany,' 5th Edition ; Scoresby-Jackson's 'Materia Medica,' 3rd Edition ; 'Taylor on Poisons,' 3rd Edition ; 'Tyndall on Heat as a Mode of Motion,' 5th Edition ; Weinhold's 'Experimental Physics,' by Loewy ; Watts' 'Dictionary of Chemistry,' 2nd Supplement, 2 copies ; 'Squire's Hospital Pharmacopœias,' 3rd Edition.

The report was received and adopted.

HOUSE.

This Committee had considered the desirability of increasing the amount of fire insurance, and recommended that this should be done. A communication had been made to the fire office accordingly. The Committee had also considered the application of Mr. Davies, the senior demonstrator to use the laboratory in the evenings, and likewise a request from Professor Attfield to use the octagon laboratory for the purpose of spectroscopical demonstrations. Further consideration of these matters had been deferred. The general repairs, cleaning, whitewashing, etc., necessary, were recommended to be carried out during the vacation.

The report was received and adopted.

PARLIAMENTARY.

The report of this Committee contained a record of the progress of the Irish Pharmacy Bill and the Sale of Food and Drugs Bill, and the action of the Committee in respect to them. Also the proceedings taken in various cases of reported breaches of the Pharmacy Act, in some of which the penalties and costs had been recovered, or paid without going into court, whilst in others there had been a failure to obtain sufficient evidence to take proceedings.

The report was received and adopted.

The SECRETARY reported that the Irish Pharmacy Bill had passed through both Houses of Parliament, and was now waiting the Royal assent ; that the Lords had disagreed with the Commons' amendment to the Sale of Food and Drugs Bill, and that the Drugging of Animals Bill had been withdrawn.

THE INAUGURAL ADDRESS.

The SECRETARY read a letter from Mr. Ekin, of Bath, consenting to deliver the inaugural address to the students in October next.

GENERAL PURPOSES.

The reports of the Professors as to the examinations for the sessional prizes had been presented to the Committee. Professor Redwood had reported that, as compared with previous years, there had been an increase in the number of students as well as in the regularity of the attendance. He had extended the duration of the lectures from one hour to an hour and a half, and had thus been able to give, in each session of five months, the equivalent of sixty lectures of one hour each; a change which had been greatly appreciated by the students. For the bronze medal there had been seven competitors, and fifteen for the silver medal; of the former, five had sent in papers which would have entitled them to a prize, whilst of the latter, ten had obtained a number of marks entitling them to some distinction. Professor Bentley had reported that nineteen candidates from his class had presented themselves as competitors for the silver medal,—a number quite unprecedented,—and the excellence of their answers was shown by the number of marks appended to their names. Altogether he was highly gratified with the result, and was pleased to be able to report most satisfactorily as to the class generally. With regard to the competition for the bronze medal at the conclusion of the second course, eleven had presented themselves, and the result had been very satisfactory. For the herbarium prize, five collections had been sent in; the first, consisting of 614 specimens, was of very high merit, and the others were also thoroughly commendable. Professor Attfield had also presented a long report on the progress and state of the practical chemistry class. The number of pupils during the session had been 107, being considerably above the average. With regard to the general attendance, diligence, and gentlemanly behaviour of the students he spoke in the highest terms. The report of the Board of Examiners on the competition for the Jacob Bell scholarships had also been submitted to the Committee, and the recommendation of the Board had been adopted by the Committee.

The report and recommendations of the Committee were received and adopted.

PRIZE AWARDS.

The following awards were made on the reports and recommendations of the Professors, and of the Board of Examiners:—

Jacob Bell Memorial Scholarships.

Henry George Greenish.
John Leaver West.

Chemistry and Pharmacy.

[Ten months' course.]

Silver Medal..................	Wm. Arthur Harrison Naylor.
Certificates of Honour ...	Henry Ellis. George Green. Thomas Eminson. John George Atkinson. William Coles.
Certificates of Merit......	John Anthony Basker. Theophilus Hen. Beavan Long. William Wyles. Thomas Slater, jun.

[Five months' course.]

Bronze Medal	William Coles.

Botany and Materia Medica.

[Ten months' course.]

Silver Medal..................	Henry Ellis.
Certificates of Honour ...	Theophilus Hen. Beavan Long. Thomas Eminson. John George Atkinson. George Green.
Certificates of Merit	John Anthony Basker. William Coles. Ernest Cardwell. Wm. Arthur Harrison Naylor. Charles White. Bernard Dyer. William Wales Edward. William Wyles.

[Five months' course.]

Bronze Medal	Thomas Eminson.

Practical Chemistry.

Silver Medal..................	George Green.
Bronze Medals	Wm. Arthur Harrison Naylor. Thomas Slater, jun.
Certificate of Honour	Henry Richard Arnold.
Certificates of Merit.. ...	John George Atkinson. William Wales Edward.

Botanical Prize.

Silver Medal..................	Arthur William Wheatly.
Bronze Medal	John George Prebble.
Certificate of Honour	Thomas David Wright.
Certificates of Merit	Arthur Poulton. James Chapman Shenstone.

THE PEREIRA MEDAL.

In answer to a question in regard to the award of the Pereira Medal,

The SECRETARY said there were no competitors for the medal this year, there being only one gentleman eligible to compete for it, as having passed the Major Examination in the first division, and he did not present himself; whilst for the Prize of Books no person was eligible to compete.

Mr. WILLIAMS suggested that the present standard required by the Board of Examiners for honours, viz., 75 per cent., was almost beyond what could practically be attained, and if it were slightly lowered, the effect would be very beneficial, especially with regard to the competition for the Pereira Medal.

The SECRETARY said the Board of Examiners had this question now under their consideration.

Mr. WILLIAMS said he believed the number of marks required for honours had been raised from a little over 60 per cent. to 75 per cent., which was a very material increase.

Mr. GREENISH suggested that it would be well if some distinction could be shown in the examinations of candidates for the chemistry and pharmacy prizes between those who attended the lectures only and those who attended also the class of practical chemistry in the laboratory; the latter having, of course, many advantages. He also wished to renew a suggestion he had before made, that the questions for the examinations should be set by some gentleman other than the lecturer himself, a printed syllabus of the lectures being supplied to him to guide him in framing the questions.

Mr. SANDFORD remarked that, in addition to the alteration made in the number of marks required to enable a candidate to pass the Major in honours, the nature of the examination had also been altered, some subjects being removed which had enabled the candidate possibly to obtain a larger number of marks than he could in those remaining, and thus the alteration pressed hardly on the competitors in two ways at once. He believed the whole subject was now under the consideration of the Board of Examiners, and of course the Council must not unnecessarily interfere with its arrangements.

Mr. BETTY thought it would be well if the question mooted by Mr. Greenish were referred to a committee.

Mr. WILLIAMS said the matter had already received the attention of a committee which had discussed it with the professors; but these gentlemen seemed so opposed to anything of the kind that no further action was taken in the matter.

Mr. HAMPSON thought it would be well if the question were more fully discussed before it was referred to a committee, and suggested that Mr. Greenish should give notice of motion with regard to it.

Mr. GREENISH said he would adopt that course; but he was not aware that the matter had ever been discussed with the professors by any committee.

EXHIBITION AT PHILADELPHIA IN 1876.

The following letter from the Philadelphia College of Pharmacy was read by the Secretary:—

"Philadelphia College of Pharmacy,
"145, North Tenth Street, Philadelphia, U.S.A.,
July 12th, 1875.

"Thos. H. Hills, Esq., President of Pharmaceutical Society of Great Britain.

"The International Exposition, which will be held in this city in 1876, will, without doubt, attract many pharmacists, chemists, and druggists from different parts of the world. Most of these visitors will probably endeavour to be present at the 23rd Annual Meeting of the American Pharmaceutical Association, which will convene in this city in August or September, 1876.

"The members of the Philadelphia College of Pharmacy earnestly desire to make the visit of their professional brethren on these occasions agreeable, and to facilitate the objects of their visit to this country as much as possible. With this intent, at the Quarterly Meeting of the College, held June 28th, it was resolved, that a cordial invitation be extended to the members of your honourable Society, and to all kindred societies in your country, to make the College Building their head-quarters during the International Exposition.

"It is intended to set apart a room to be used for reading and correspondence, and to have an actuary daily in attendance, for the purpose of giving all needful and desirable information to strangers. It will be our aim to give information to our visitors regarding hotels and boarding houses in this city, to procure for them tickets of admission to the various places of interest, to place them in telegraphic communication with all parts of the city and country, to receive and take charge of letters, to give information regarding travel to points of interest, etc.; finally, to make our visitors, while among us, feel at home.

"In extending to your Society this invitation, we would respectfully ask that the same be communicated to the kindred societies of your country.

"Hoping many will give us the pleasure of welcoming them to our city, we have the honour to remain,

"With fraternal greetings,

"CHARLES BULLOCK, 1st Vice President,
"ALFRED B. TAYLOR, Corresponding Secretary.

"P.N.—It is desirable that the members of Pharmaceutical and kindred societies of foreign countries be provided with a note, certifying their membership."

Mr. HAMPSON, speaking on the spur of the moment, thought it would be well if the Society sent a representative to Philadelphia, and he hoped this would be considered before any reply was sent.

Mr. WILLIAMS drew attention to the fact that the letter in question, though signed in autograph, was only a printed circular; he did not think they should take it more seriously than was intended.

Mr. ATHERTON thought it was simply an invitation to any pharmacists who went to the Philadelphia exhibition to go to the College of Pharmacy, where they would be welcomed.

Mr. GREENISH hoped no immediate steps would be taken in connection with this letter, as it would be printed in the Journal, and every opportunity given to consider it. All the invitations from St. Petersburg were printed, and his experience of his recent visit as a representative to that city convinced him of the great value of international acts of courtesy and friendship. A medical congress was about to be held in Brussels, when certain pharmaceutical subjects would be discussed, and for the first time on record one of these subjects had been deputed to a pharmacien to deal with. A Belgian gentleman had lately written to him (Mr. Greenish) asking if the Pharmaceutical Society did not intend to send a deputy to attend the congress. He did not ask the Society to send a representative to that congress, though, if he were not otherwise engaged, he should attend it himself; but with regard to Philadelphia, he really thought it would be beneficial to the Society to send a representative there.

Mr. SANDFORD thought they were taking rather too serious a view of this matter. It was not a special pharmaceutical meeting which was to be held in 1876, but the exhibition taking place in Philadelphia, it was determined to hold the annual meeting of the American Pharmaceutical Association there, just as they were going to hold the British Pharmaceutical Conference in Bristol.

Mr. BETTY said that international visits between pharmacists should be promoted; they well recollected the proceedings of the Pharmaceutical Conference at Brighton, and how materially the presence of Professors Markoe and Wayne added to the interest of that meeting; but as the letter now before them could not be considered as an official invitation to the Pharmaceutical Society, they might refer the matter for further consideration to a committee. At least no advantage could be lost in so doing.

Mr. HAMPSON said he was under the apprehension when he first spoke that the letter was an invitation to some important gathering, and it might be so still, and he certainly thought if the occasion was a fitting one, that a representative of the Society should be present. At the present time there was a great reciprocity of influence between America and this country, and he thought any pharmacist visiting America would bring back with him a great deal of useful information.

Mr. GREENISH said he did not advocate any gentleman being sent over specially to attend the meeting, but he thought if any one happened to be going to America in 1876, it would be very well if he were deputed to represent the Society, and the Society might contribute something towards his expenses, in consideration of his so doing. At the Vienna exhibition it was a remarkable thing that though there were a large number of pharmaceutical and chemical products shown, no British pharmacist had made a systematic report upon them.

The VICE-PRESIDENT said he hoped the President at the forthcoming Conference would read the letter in order to convey the information contained therein to all local pharmaceutical societies, as had been requested.

The SECRETARY was instructed to acknowledge the receipt of the letter.

WRITTEN EXAMINATIONS.

The following gentlemen were appointed to superintend the written examinations for the ensuing year:—

SUPERINTENDENTS OF EXAMINATIONS.

England and Wales.

Aberystwith	Davies, John H.
Barnstaple	Goss, Samuel.
Berwick-on-Tweed	Carr, William Graham.
Birmingham	Southall, William.
Boston	Marshall, Robert.
Brighton	Gwatkin, James T.
Bristol	Stoddart, W. W.
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Cross, William.
Cardigan	Jones, J. E.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, R. M.
Carnarvon	Jones, John.
Cheltenham	Smith, Nathaniel.
Chester	Grindley, William.
Colchester	Shenstone, J. B. B.
Darlington	Robinson, Alfred F.
Doncaster	Dunhill, W. W.
Dorchester	Evans, A. J.
Exeter	Delves, George.
Guernsey	Arnold, Adolphus.
Hereford	Jennings, Reginald.
Hull	Bell, C. B
Jersey	Ereaut, J., jun.

Leamington	Jones, S. U.
Leeds	Reynolds, Richard.
Leicester	Cooper, Thomas.
Lincoln	Maltby, Joseph.
Liverpool	Abraham, John.
London	Taylor, Geo. Spratt.
Lynn	Atmore, George.
Macclesfield	Bates, W. J.
Manchester	Wilkinson, William.
Newcastle-on-Tyne	
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	Atherton, J. H.
Oxford	Prior. G. T.
Peterborough	Heanley, Marshall.
Plymouth	Balkwill, A. P.
Portsmouth	Rastrick, J. L.
Preston	Hogarth, William.
Reading	Hayward, W. G.
Salisbury	Atkins, S. R.
Scarborough	Whitfield, John.
Sheffield	Wilson, Edward.
Shrewsbury	Cross, W. G.
Southampton	Dawson, O. R.
Stafford	Averill, John.
Swansea	Brend, Thomas.
Taunton	Prince, Henry.
Truro	Serpell, Samuel.
Worcester	Witherington, Thomas.
York	Davison, Ralph.

Scotland.

Aberdeen	Davidson, Charles.
Dumfries	Allan, William.
Dundee	Hardie, James.
Edinburgh	Mackay, John.
Glasgow	Kinninmont, Alexander.
Inverness	Galloway, G. R.
Perth	Dandie, David.

DEPUTY-SUPERINTENDENTS OF EXAMINATIONS.

England and Wales.

Aberystwith	Cole, John.
Barnstaple	Symons, William.
Berwick-on-Tweed	Carr, Robert.
Birmingham	Churchill, W. J.
Boston	Pilley, Henry Thomas.
Brighton	Savage, W. W.
Bristol	Schacht, G. F.
Cambridge	Church, H. J.
Canterbury	Amos, D.
Cardiff	Kernick, S. P.
Cardigan	Williams, John.
Carlisle	Hallaway, John.
Carmarthen	Davies, R. M., jun.
Carnarvon	Hughes Richard.
Cheltenham	Barron, William.
Chester	Hodges, William.
Colchester	Prosser, E. T.
Darlington	Hutchinson, Rev. E.
Doncaster	Shaw, Henry W.
Dorchester	Durden, Henry.
Exeter	Lake, J. H.
Guernsey	Collenette, A.
Hereford	Parkin, Tohmas.
Hull	Baynes, James.
Jersey	Ereaut, John.
Leamington	Davis, Henry
Leeds	Smeeton, William.
Leicester	Cooper, Henry.
Lincoln	Battle, John Scoley.
Liverpool	Shaw, John.
London	Bremridge, Richard. Knapman, John William. Holmes, Edward Morell.
Lynn	Willis, Cottingham.
Macclesfield	Wood, Richard.
Manchester	Wilkinson, George.
Newcastle-on-Tyne	
Northampton	Mayger, W. D.
Norwich	Corder, Octavius.
Nottingham	Fitzhugh, Richard.
Oxford	Thurland, Thomas Henry.
Peterborough	Buckle, Frank George.
Plymouth	Hearder, H. P.
Portsmouth	Rastrick, Robert J.
Preston	Willan, Wm.
Reading	Timothy, T. N.
Salisbury	Orchard, E. J.
Scarborough	Fryer, Charles.
Sheffield	Ward, William.
Shrewsbury	Cross, W. G., jun.
Southampton	Spearing, James.
Stafford	Averill, Henry A.
Swansea	Layng, Thos. B.
Taunton	Gregory, Geo. H.
Truro	Richards, J. E.
Worcester	Virgo, Charles.
York	Cooper, Thomas.

Scotland.

Aberdeen	Kay, J. P.
Dumfries	Carruthers, R. B.
Dundee	Laird, William.
Edinburgh	Ainslie, William.
Glasgow	Davison, Thomas.
Inverness	Galloway, George.
Perth	Dandie, Robert.

REPORT OF EXAMINATIONS.

July, 1875.

ENGLAND AND WALES.

		Candidates.					
		Examined.		Passed.		Failed.	
Major	(14th)	7		4		3	
,,	(15th)	8		3		5	
,,	(21st)	9		6		3	
			— 24		— 13		— 11
Minor	(14th)	15		7		8	
,,	(15th)	16		9		7	
,,	(16th)	20		8		12	
			— 51		— 24		— 27
Modified			14		10		4
Preliminary			202		109		93
Total			291		156		135

Three Certificates were Received in lieu of the Preliminary Examination.

1 College of Preceptors.
2 University of Cambridge.

SCOTLAND.

		Candidates.					
		Examined.		Passed.		Failed.	
Major			3		2		1
Minor	(27th)	7		6		1	
,,	(28th)	8	—15	5	—11	3	—4
Modified			1		1		0
Preliminary			26		16		10
Total			45		30		15

MR. GREENISH, upon the presentation of this report, asked if any use was made of the spectroscope in the examinations. He said he knew of one instance in which questions had been asked, though, fortunately, the candidate knew something of the spectroscope and was able to answer them. Nevertheless he contended that such subjects should not be introduced without a previous general understanding in reference to them, so that students could prepare themselves for the ordeal, because in any case it occupied the time, attention, and energy of the candidate, and might thus prevent him getting as many marks as he otherwise would, whilst in many cases the candidate would probably never have had the opportunity of seeing a spectroscope, or have considered it necessary to make himself acquainted with it. Not long ago the question of the introduction of the microscope in the examinations in Edinburgh was mentioned by Mr. Hampson, but he certainly thought any objection to the introduction of the microscope would apply with much more force to the spectroscope. He did not desire for a moment to undervalue a practical knowledge of either instrument, but he wished the fact that they are used to be recognized and more generally understood by students.

Mr. Hampson regretted to find that the examiners overstepped what he considered their proper functions, and he hoped that some means would be taken to convey to the Board of Examiners the opinion of the Council with respect to this practice.

Mr. Sandford, after referring to the regulations for the examinations, said he thought they would justify the examiners in putting questions on the microscope or the spectroscope.

Mr. Hampson said that if that idea were carried out it would empower them to introduce any new instrument which might be invented. He maintained that no important new instrument should be made use of which the candidates had not had notice of, otherwise they might be confused and agitated and the whole result of the examination rendered fallacious.

Mr. Williams said he had discussed this matter with one or two members of the Board of Examiners, and had been informed that such questions were never put to backward or nervous candidates, but only where a young man showed more than ordinary intelligence and ability, in order to afford him an opportunity of showing the extent of his information.

EXAMINATIONS IN EDINBURGH.

July 28th and 29th, 1875.

Present—Messrs. Ainslie, Buchanan, Gilmour, Kemp, Kinninmont, Noble, Tait, and Young.

Professor Maclagan was present during the first day of the Major Examination, on behalf of the Privy Council.

MAJOR EXAMINATION.

Three candidates were examined. *One* failed. The following *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Baildon, Henry Bellyse	Edinburgh.
Halse, Thomas	Tiverton.

These names are arranged in order of merit.

MINOR EXAMINATION.

Fifteen candidates were examined. *Four* failed. The following *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Tocher, William Francis	Jedburgh.
Jones, William Nathaniel	Conway.
Brown, Edward Oliver	Leeds.
Brunt, Francis	Ashby-de-la-Zouch.
Rickinson, Valentine, jun.	West Hartlepool.
Mitchell, Andrew	St. Andrews.
Windmill, William Henry	Barking.
Embley, John	Brierfield.
Walton, John	Birmingham.
Hughes, Albert James	Wolverhampton.
Law, James	Blackburn.

The above names are arranged in order of merit.

MODIFIED EXAMINATION.

One candidate was examined, and declared qualified to be registered as a Chemist and Druggist:—

Picton, John Taylor	Warrington.

Proceedings of Scientific Societies.

ROYAL INSTITUTION OF GREAT BRITAIN.

On Accidental Explosions.*

BY F. A. ABEL, F.R.S.

(*Continued from page* 98.)

The dangers resulting from the escape of petroleum spirit or its vapour from receptacles in which it is kept, in confined spaces, where little or no ventilation exists, has been but too frequently exemplified by explosions more or less violent, followed by fires, in localities where it is stored or handled, or in the holds of vessels in which it is transported. Accidents of such kinds have been due either to carelessness in transferring petroleum from one vessel to another in a shop or store in which a light has been burning at the time, or to a light being carried into, or a match struck in, a store where vapour has been escaping until it has formed an explosive mixture with the air. The explosion which occurred in a sewer at Greenwich last January, and was productive of much damage, was clearly traced to the entrance into the sewer of certain petroleum products (from a patent gas factory in the neighbourhood); the vapour from these had formed an explosive mixture with the air, which had become accidentally lighted, perhaps by the dropping of an inflamed pipe-light through one of the sewer gratings. The speaker has a vivid recollection of an accident of this kind which he witnessed at the Royal College of Chemistry in 1847. Mr. C. B. Mansfield, who was then engaged in his important researches on the composition of coal-tar naphtha, which led a few years afterwards to his sad untimely death, was engaged at one extremity of a low room (38 feet long, about 30 feet wide, and 10 feet high) in converting one of the most important of these products—benzol—(which boils at 176°F.) into nitrobenzol in a capacious retort, which suddenly cracked, and, yielding to the pressure of its contents, allowed the warm liquid hydrocarbon to flow over the operating table. There was a gas-flame burning at the other extremity of the laboratory, and no other source of fire. Within a very few minutes after the fracture of the vessel a sheet of flame flashed from the gas-flame along the upper part of the room and communicated to the table upon which the liquid had been spilled.

The firing of the ship 'Maria Lee,' just now referred to, was clearly proved to have been preceded by the explosion of a mixture of air and petroleum vapour, produced by leakage or evaporation from the barrels stored in the hold of the vessel. The weather was very hot at the time, and there having been a heavy thunderstorm the night before the fire, the hatches had been kept closed and covered over with tarpaulin, so that there was no possibility of ventilation. The vapour gradually diffused itself through the air in the ship during the night until the explosive mixture extended to the cabin at the after part. As the captain entered this cabin quite early in the morning (the *immediate* source of the fire was not clearly traced) a loud explosion occurred, and flame was immediately observed issuing from the fore part of the ship.

A similar explosion of petroleum vapour and air occurred not long since in a ship at Glasgow; and lastly it was established by a sound chain of circumstantial evidence, that the explosion of the powder-laden barge in the Regent's Park must have been caused by the ignition, in the cabin of the barge, of an explosive mixture of air and of the vapour of petroleum, derived from the leakage of certain packages of the spirit which were packed along with the powder. The description given by an eye-wit-

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[*] Lecture delivered at the Royal Institution of Great Britain, Friday, March 12, 1875.

ness, on board a barge in front of the ill-fated 'Tilbury,' of a bluish flash of flame, emanating from the cabin of the barge within a very brief period of the explosion, corresponds with the result produced when flame is applied to a mixture of hydrocarbon vapour with a large proportion of air. The manner in which the freight of the barge was enclosed by tarpaulins precluded ventilation, and was most favourable to the gradual diffusion of inflammable vapour, from even slight leakages in the barrels, through the confined air; until an explosive mixture extended to the opening in the bulk-head or partition, which in these barges separates the cabin from the hold.

It is impossible to protect heavy packages from rough usage in the processes of unloading ships or other vehicles of conveyance; it is therefore most important that means should be adopted of thoroughly closing the vents of receptacles of petroleum spirit by such means as are capable of sustaining ordinary rough usage without any injury to their efficiency, and that the improvement of the nature and construction of the receptacles themselves should be seriously considered with the view of reducing the liability to accidents resulting from the escape of the spirit or its vapours, and the consequent creation of danger connected with the transport and storage of these valuable illuminating materials.

The fact that combustible, and especially inflammable solid substances, if of sufficiently low specific gravity, and reduced to a sufficiently fine state of division to allow of their becoming and remaining for a time suspended in air, may furnish mixtures with the latter which partake of an explosive character, scarcely needs to be pointed out. The ignition of a particle of such a substance, surrounded by atmospheric oxygen, will, under these conditions, at once communicate to others immediately adjacent to it; and, if the particles of suspended solid matter be sufficiently numerous and finely divided, the ignition will spread throughout the mixture with a rapidity approaching that of a mixture of inflammable vapour and air, the development of gaseous products and heat being sufficiently rapid and considerable to produce explosive effects, which may even be of violent character; their violence being regulated by the nature and *inflammability* of the solid substance, the proportion and state of division in which it is distributed through the air, the quantity of the mixture, and the extent of its confinement.

Explosions of an accidental nature produced in this way are believed to have occurred in connection with operations in the chemical laboratory; but it was scarcely to be expected that the first clearly authenticated cases of any importance should have arisen out of the apparently harmless operation of grinding corn.

That a mixture of very fine flour and air will ignite with a flash when light is applied to it, and produce in a very mild form the species of explosion observed on applying a light to lycopodium suspended in air, is not very difficult of demonstration; but it is not easy to realize the possibility of the production of violent explosive effects by the ignition of such a mixture even upon a very large scale, though the rapidity of its ignition be accidentally favoured by the warmth of the atmosphere. Cotton mills have been known to be rapidly fired by the ignition of cotton particles suspended in the air; but, compared with flour, cotton is very combustible. Flour when absolutely dry would contain only about half its weight of carbon, and about 6 per cent. of hydrogen, the remainder consisting of nitrogen and mineral substances; constituents which, by absorbing heat instead of contributing to its development, must tend to reduce the rapid combustibility of the substance. Yet the possibility of very serious calamities arising out of the accidental ignition of a mixture of flour-dust and air has been but too conclusively demonstrated.

On the 9th July, 1872, the inhabitants of Glasgow were startled by an explosion which was heard to a considerable distance, and occurred in some very extensive steam flour-mills, of which the front and back walls were blown out, while the interior was reduced to ruins, and speedily enveloped in flame, destroying the remainder of the extensive buildings. Several persons were killed, and a number of others were severely burned, or injured by the fall of masonry. That the explosion was not occasioned by the steam-boilers employed as motive power in the mill was soon made clear; and by the evidence of persons employed in the mill at the time of the explosion, its origin was conclusively traced to the striking of fire by a pair of millstones, through the stopping of the "feed," or supply of grain to them, and the consequent friction of their bare surfaces against each other, the result being the ignition of the mixture of air and fine flour-dust surrounding the mill-stones.

This ignition alone would not suffice to develop any violent explosive effects; such ignitions, though occasionally observed in small mills, being caused either by the striking of fire by the stones, or by the incautious application of a light near the mill-stones, or the meal-spout attached thereto, have not in these instances been attended by any serious results. But in an extensive mill, where many pairs of stones may be at work at one time, each pair has a conduit attached to it, which leads to a common receptacle called an exhaust-box; into this the mixture of air and very fine flour-dust which surrounds the mill-stones is drawn by means of an exhaust-fan, sometimes aided by a system of air-blowers. The fine flour is allowed to deposit partially in this chamber or exhaust-box, and the air then passes into a second chamber, called a stive room, where a further quantity of dust is deposited. It follows that when the mill is at work, these chambers and the channels or spouts connecting them with the atmosphere immediately surrounding each mill-stone, are all filled with an inflammable mixture of the finest flour-dust and air, and that consequently the application of a light to any one of those channels, or the striking of fire by any one of the mill-stones, by igniting some portion of the inflammable mixture, will result in the exceedingly rapid spread of flame throughout the confined spaces which are charged with it, and will thus develop an explosion. The violence of such explosions depends much upon details of construction of the exhaust-boxes and stive rooms, and upon the dimensions of the channels of communications; it must obviously be regulated by the volume of inflammable mixture through which fire rapidly spreads, and upon the extent of its confinement. In the case of the catastrophe at Glasgow, the production of a blaze at a pair of mill-stones was observed to be followed by a crackling noise as the flame rapidly spread through the conduits leading to the exhaust-box upon an upper floor, and a loud report from that direction was almost immediately heard. Professors Rankine and Macadam, who carefully investigated the cause of this accident, report that other flour-mill explosions which they have inquired into had been observed to be attended by a similar succession of phenomena to those noticed upon this occasion. The bursting open of the exhaust-box by a similar though less violent explosion, attended by injury to workmen, the blowing out of windows and loosening of tiles, appears to have taken place on a previous occasion at these particular mills. In the last accident, however, the more violent explosion appears to have been followed by others, the flames having spread with great rapidity to distant parts of the mills through the many channels of communication in which the air was charged with inflammable dust, resulting from the cleansing and sifting operations carried on in different parts of the building, and rapidly diffused through the air by the shock and blast of the first explosion.

The subject of flour-mill explosions, though it has attracted little if any attention in this country previous to the Tradeston explosion, is discussed in Continental treatises on flour-mills, and the results of Messrs. Rankine and Macadam's inquiries have demonstrated that accidents of this kind are actually of ordinary occurrence in mills, especially since the introduction of the exhaust arrangements. Those gentlemen point out that it appears scarcely possible to guard against such accidents altogether, although the frequency of their occurrence may probably be much reduced by adopting efficient precautions to prevent, as far as possible, a stoppage of the "feed" to the mill-stones or the accidental introduction of nails between them together with the grain, and by prohibiting the employment of naked lights in the vicinity of the mills and the dust passages. In order to reduce as far as possible the damage and risk of sacrifice of life resulting from such explosions, it is important that all receptacles into which the dust-laden air is drawn from the mills, should be fixed outside the buildings, and constructed so as to offer as little resistance as possible to the sudden expansion resulting from the ignition of the inflammable mixture. The conduits leading from the mills to the exhaust-chambers should, moreover, be of small dimensions, and there should be no other communication between the interior of the building and the dust receptacles, which must not be opened while the mill is at work. By adopting precautions of this kind, the mill-owner may succeed, at any rate, in reducing the mischief resulting from an accidental ignition of flour-dust at the mill-stones to such limits that the mill itself and the lives of those engaged in it will not be endangered.

The production of explosions by mixtures of air with marsh-gas, coal-gas, petroleum vapours, or a finely divided inflammable solid, such as flour, has been shown to be due to the application of sufficient heat to some portion of the mixture to cause the atmospheric oxygen to combine with the combustible constituents of the gas, vapour or solid; the results being the development of chemical action, the formation of gaseous products, and their expansion by the heat developed. It need scarcely be said that the same explanation applies to the production of explosions by that class of so-called explosive agents which is prepared by intimately mixing combustible or inflammable solids with a solid oxidizing agent (*i.e.*, an oxygen-compound which readily yields up a part or the whole of that gas under the influence of heat, and with the co-operation of chemical force, to carbon, hydrogen, or other readily oxidizable elements). Distinct from these explosive mixtures as regards their nature, but quite analogous to them in their behaviour and the effects they produce when subjected to heat or other disturbing influences, are explosive *compounds*. The majority of these contain carbon, hydrogen, and oxygen as the most important components; they are more or less susceptible of sudden or extremely rapid transformation into gases or vapours, attended by development of great heat, in consequence either of their resolution into their elementary constituents or, generally, of the rearrangement of these into comparatively simple forms of combination. Some of these explosive compounds are of such unstable character that they are liable to undergo change from very slight inciting causes, such as the existence in them of minute quantities of foreign substances of active chemical character; or they may even be prone to absolutely spontaneous change. In such substances decomposition may be in the first instance established only to a very minute extent; but this decomposition, by the products to which it gives rise, and by the attendant development of heat, however small, may speedily promote further and more rapid change in the mass of the substance, so that eventually decomposition of violent nature may be established, and the principal portion of the compound may suddenly undergo the same transformation into gases or vapours, attended by the same development of heat, as though any one of the agencies (*i.e.* fire, friction, or percussion) ordinarily employed to determine the explosion of these bodies had been applied. Cases of so-called spontaneous explosion thus brought about are more familiar to scientific and manufacturing chemists than to the general public; but accidental explosions of very alarming and, in a few instances, of very calamitous character, are on record; which, though not actually of spontaneous nature, in the strict application of the term, have been brought about without any apparent application of external inciting agencies, and have hence, from a practical point of view, not been incorrectly classed as spontaneous explosions.

A few substances, well known to chemists, are so very unstable in character, or are so very difficult to prepare in a condition approaching purity, that they either begin to undergo change as soon as they have been produced, or very shortly afterwards, such change proceeding sometimes gradually and quietly until the substance has been transformed into non-explosive bodies, or occurring in other instances with a rapidity speedily resulting in the violent decomposition or explosion of the substance. Injuries more or less severe have been inflicted upon the discoverers or investigators of substances of this kind, or upon those who prepare them and exhibit their properties for instructional purposes; and such accidents occasionally occur, even though all possible or reasonable precautions appear to have been taken to guard against them. It has occasionally also happened that serious accidents have resulted from attempts to apply to practical purposes the explosive power of such substances (as, for example, the chloride of nitrogen and iodide of nitrogen) by persons imperfectly acquainted with their properties or those of explosive substances generally. The great danger in which want of knowledge may involve experimenters in this direction is too obvious to need being dwelt upon.*

The risk of accident resulting from the liability of explosive compounds to so-called spontaneous decomposition has been on several occasions exemplified in the past history of the two most important of these compounds, gun-cotton and nitro-glycerine. Until within the last few years it was believed that both these substances were in themselves so prone to change, that their preservation for any length of time without undergoing spontaneous decomposition, resulting most probably in explosion, was regarded as, at best, a great uncertainty. They acquired this character for instability partly from the imperfect purification of specimens prepared from time to time for scientific or instructional purposes, and partly from repeated attempts to utilize their explosive properties, and therefore to produce them in considerable quantities, while their nature and properties were still very imperfectly understood (this being specially the case with gun-cotton). The liquid nature and some other peculiar properties of nitro-glycerine delayed any important attempts at its application for many years; on the other hand, gun-cotton presented to the superficial experimenter so many alluring advantages as an explosive agent that its discovery was very soon followed by its manufacture and storage upon a large scale, which speedily resulted in such serious disasters that the material acquired, within a very brief period of its discovery, an unmerited, but for a long time completely damnatory, reputation for utter untrustworthiness. The stability of properly purified gun-cotton, as well as that of nitro-glycerine, has, however, now been for some time past fully established, and no difficulty exists in carrying on with safety their manufacture on such a scale as to satisfy the continually increasing demand for efficient preparations of these violent explosive agents. At the same time, the experience of the last few years has afforded repeated illustrations of the terrible risks and responsibilities incurred by manufacturers of these substances by the slightest departure from conditions essential to perfection and safety of manufacture, or by a relaxation of the strictest supervision in the production, purification, and storage of the materials. The calamitous explosion at Stowmarket in 1871, and many serious explosions at nitro-glycerine (or dynamite) factories during the last few years, in different parts of the Continent, have demonstrated the liability of these substances to so-called spontaneous explosion, if the acids employed in their production are allowed to remain in contact with them for protracted periods, even in very small quantities. Any negligence whatever, therefore, in the production and purification of these substances, or the introduction, by accident or otherwise, of acid impurity into the finished materials, must in all probability prove destructive of their stability, and may lead to most serious disasters.

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* The great danger incurred in experimenting with, or attempting the manufacture upon a large scale, of substances of unstable and explosive nature, the properties of which are imperfectly understood, has been exemplified by repeated accidents with a liquid called methylic nitrate, the vapour of which is highly explosive. In 1872, a young English chemist of great promise lost his life by a very violent explosion which occurred in a laboratory in Germany, where he had been engaged in preparing large quantities of this substance with a view to its employment as a substitute for nitro-glycerine preparations. No conjecture could be formed of the immediate cause of the explosion. Some time after a German manufacturing chemist of eminence lost the sight of one eye by the violent explosion of a very small quantity of the same substance while he was heating it in a glass tube; and in November last a very violent explosion occurred at the works of a manufactory of dyes at St. Denis, in a building where very considerable quantities of the methylic nitrate were being prepared and purified for colour-making purposes. Two men were killed, and a number seriously injured. In this case the accident was clearly traced to an act of recklessness of one of the workmen. The use of lights was prohibited in the building where the purification of the substance was carried on, in consequence of the inflammable vapour evolved and the danger of explosion from its ignition. But on this occasion a man not only brought a lamp into the room, but actually lowered it into a large boiler from which the liquid was being decanted with a syphon, his object being to see how much remained. The vapour in the boiler was at once fired, and a violent explosion occurred almost immediately, followed by a second, there being upwards 1000 lbs. of the material in an adjoining store.

In these respects the utilization of explosive compounds of this class involves special risks not attendant upon the manufacture of gunpowder and modifications of that substance; in others, however, it presents important elements of comparative safety. Thus, with proper precautions, the conversion of glycerine into nitro-glycerine may be carried on with safety; the purification of the substance is not attended by any danger, and the manipulations attendant upon its conversion into suitable preparations for use (*e.g.* dynamite) are also in themselves perfectly safe operations. Again, the manufacture and purification of gun-cotton, and its conversion into the compressed or granulated substance, are absolutely safe operations, the material being wet throughout the entire course, and therefore quite uninflammable, until, when completed, it is dried by long exposure to air, or by artificial heat. On the other hand, gunpowder, and all preparations of similar nature, are explosive from the very commencement of their manufacture; the roughly mixed ingredients already furnish a material which deflagrates violently when a spark reaches it, and the subsequent operations of intimate mixture or incorporation, compression, granulation, etc., which are necessarily carried out with the nearly dry material, are all of a highly dangerous character, demanding for their safe performance the strictest attention to precautions which have been dictated by practical experience and knowledge of the sources of danger to be guarded against.

Accidents at gunpowder factories are very frequent, and though they may not often involve considerable loss of life or destruction of property, the fact that their occurrence must in most instances be caused by partial, occasional, or complete and persistent neglect of precautions absolutely essential to the safety of the people employed in the works, or to a reduction of the risks of accident to the minimum, points to the necessity for improved legislation connected with manufactories of gunpowder and other explosive preparations, whereby the proper attention to regulations and precautions for safety may be rendered compulsory, and seconded by an efficient system of inspection. The absolute exclusion of lucifer matches from such works; the adoption of every possible precaution for excluding grit from all buildings in which the explosive substance is submitted to any kind of operation, by proper construction and closing of the buildings; the employment of special shoes and other external clothing for use in the buildings only; the total exclusion of iron, in any form, from the works; the proper separation from each other of the buildings in which the several operations are carried on, and their construction with a view to divert the force of a possible explosion into comparatively harmless directions; the reduction within particular limits of the quantity of explosive allowed to remain in any one building; the provision of efficient lightning conductors;—such are some of the principal precautionary measures which go far to reduce the possibility of accident in works of this kind (or the mischief accruing from such accidents when they do arise), and the adoption of which does not present any serious difficulty. And lastly, though properly first in importance, the manufacturers of gunpowder and other explosive agents should not only themselves possess some scientific as well as a practical knowledge of the nature and properties of the substances in the manufacture of which the lives of their workmen are at stake, but they also should ascertain and insist that at any rate, the persons who act as managers and foremen in their factories should not be deficient in the elementary knowledge indispensable to a proper performance of their duties.

Major Majendie, the Government Inspector of Gunpowder Works, etc., has reported officially that he was "much struck, in the course of his inspections, with the extraordinary ignorance of even the most elementary dangers, and the precautions necessary for avoiding them, which prevails among persons in charge of important factories and magazines," and that there can be no doubt that to the ignorance and incompetence of such persons a large number of the accidents which occur are indirectly due. Surely it is in the interest of employers to adopt measures for securing that the management of their works is in the hands of competent men, experienced in the details of the manufacture, and possessing adequate general education and technical knowledge to fit them for posts of such responsibility. The obvious mode of securing this is to render it compulsory for such men to obtain certificates of competency before they can hold responsible appointments in manufactories of gunpowder and other explosive agents.

The manufacture of fireworks, ammunition, percussion caps, and other articles involving the application of explosive agents is, it need scarcely be stated, attended by liability to accidents similar to, and sometimes even greater than that existing in manufactories of gunpowder and materials of similar nature, and necessitates the adoption of precautions of the same nature as apply to these works.

Such necessity has, however, been very much disregarded in the arrangement and management of factories of this kind; and many very sad casualties have resulted either from utterly inadequate arrangements for localizing explosions and reducing them to small proportions, by regulating the quantities of material dealt with in one building, and sufficiently separating and subdividing the manufacturing operations, or from neglect of simple regulations for excluding sources of fire from the buildings. Thus, in inquiries following on explosions at ammunition or firework factories, it has been found in some instances a common practice for the men to wear their ordinary clothing when in the factory, and to carry lucifer matches about them. Again, at an ammunition factory, at Birmingham, where an explosion, not long since, resulted in the deaths of fifty-three women, it was brought to light during the inquest that there were open stoves, not even provided with fenders, in the middle of the sheds in which the powder-work was carried on; at these stoves the women used to cook their dinners, and they were also in the habit of shaking the grains of powder off their aprons into the stoves.

Other and special sources of danger exist sometimes in connection with this branch of the industry of explosive substances. Great stress has been laid upon the dangers which may arise in the manufacture of gun-cotton, and and nitro-glycerine preparations, from the liability of those substances to spontaneous change in consequence of the readiness with which their stability may be affected by imperfections in their manufacture. But there are several important instances of accidental explosions on record, which have occured in the manufacture of pyrotechnic compositions and other articles of explosive nature in consequence of a liability to the establishment of chemical activity between the ingredients of such preparations by even very slight inciting causes. Thus, certain descriptions of coloured fires are readily susceptible of so-called spontaneous ignition or explosion, either simply from the unstable nature of one or other of their ingredients, or from so apparently trifling a cause as the absorption of a small amount of moisture, or the employment of a small quantity of an easily oxidizable oil or fat in connection with their application to pyrotechnic purposes. Two remarkable instances of unforeseen danger in dealing with materials of this kind, even when their stability, under normal conditions, is beyond question, have come under the notice of the speaker. In one case, an explosive mixture, prepared for use in percussion caps, was preserved in a moist condition with the view of storing it in a non-explosive form, but this very precaution gave rise to a serious explosion; chemical activity became established between the components of the mixture, through the agency of the water, attended by development of heat and the speedy production of violent chemical change, a result which would certainly not have occured had the mixture been kept dry. In the other instance, some signal-lights, composed of a mixture of ingredients which long experience had shown to be in every way as permanent as those of gunpowder, were found to be undergoing decomposition to an extent which, had it not been noticed in time, must have resulted in serious consequences. The cause of this change baffled inquiry for some time, but ultimately it was clearly established that a very minute quantity of free acid contained in the paper linings of the cases in which the composition was confined (and derived from the antichlore used in the manufacture of the paper) had set up an action between the saltpetre and the orpiment composing this material, which spread gradually but with increasing rapidity through the highly compressed mass, being of course accelerated by the heat developed. Such occurrences afford instructive illustrations of the dangers which surround the manufacture and application of explosive substances, and of the necessity for combining continued study with untiring vigilance in dealing with these branches of manufacture.

(*To be continued.*)

Parliamentary and Law Proceedings.

THE SALE OF FOOD AND DRUGS BILL.

In the House of Lords, on Tuesday, the 3rd inst., upon the order of the day for considering the Commons' consequential amendments in this Bill, the Duke of Richmond moved that their lordships should not agree to them. The motion was agreed to and a committee was appointed to confer with the Commons and draw up reasons.

On Wednesday, in the House of Commons, the Lords' reasons for disagreeing were considered, and a resolution was passed that the House would not insist upon the amendment to which the Lords disagreed.

PROSECUTION UNDER THE PHARMACY ACT, 1868.

At the Lambeth Police Court on Thursday, July 29, John Kempton, oil and colourman, of 258, Old Kent Road, was summoned before Mr. Ellison, at the instance of the Pharmaceutical Society, for having on the 7th July "sold by retail a poison (to wit, oxalic acid), the wrapper or cover in which such poison was contained not being distinctly labelled with the name of the article and the name and address of the seller, contrary to the 31 and 32 Vic. cap. 121, sect. 17."

The defendant pleaded "Guilty, but without a guilty knowledge."

Mr. Flux, who appeared for the prosecution, said that the defendant having pleaded guilty, he should offer no evidence as to the sale, but that he had evidence to offer as to the knowledge, and called

Mr. Ward, who deposed that at the time he made the purchase the defendant's shopman (who sold the article) told him that legally they were not allowed to sell oxalic acid, but that there were a great many portmanteau makers in that neighbourhood, and that to oblige neighbours they kept it.

The magistrate referred to the Act of Parliament which says that "the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller," and said that no doubt the accused was liable, and he fined him 40*s.* and 23*s.* costs, which the defendant paid.

ATTENDANCE OF ANALYSTS IN COURT.

At the Middlesex July Quarter Sessions for hearing appeals, the case of the Queen against John Robert Moon was heard on Saturday, July 24. This was an appeal against a conviction by Mr. F. H. N. Glossop and Mr. J. R. Hogarth, for selling adulterated bread. Mr. Poland and Mr. Moody were counsel for the appellant; Mr. Besley for the respondent. The case occupied the Court nearly the whole day, and was very strongly contested on both sides, one of the questions raised being whether it was incumbent on the prosecution to call the public analyst for the district (Professor Redwood), as a witness, or whether it was sufficient for them merely to put in the certificate he had returned to the Inspector of Weights and Measures. Although Professor Redwood was in Court, and although in consequence of the form of the certificate the Bench intimated their opinion that he ought to be called, Mr. Besley refused to do so on the ground that the principle involved was one of considerable importance, and might establish a precedent that would be attended with great inconvenience by compelling the attendance of the public analysts at all similar investigations. It appeared, however, in the course of the case that the attendance of the public analyst might not unfrequently be absolutely necessary to enable the Court to arrive at a right conclusion, for Professor Wanklyn, himself a public analyst for Buckinghamshire, who was called as a witness for the respondent, stated that some of the methods used in analysing bread with a view of discovering the existence of alum were erroneous, and not unfrequently led to the confusion of silica and other earthy or mineral substances naturally present in wheaten flour with alum introduced for purposes of adulteration. On this evidence being given, the Bench said that, considering the fact of Professor Redwood not having been called, and the somewhat peculiar form of his certificate, it would be better if the portion of the loaf still retained by the inspector were submitted to analysis by some independent gentleman to be agreed on by the parties or to be named by the Bench. As the parties could not, however, agree on any person, the Bench said they would name a gentleman, and that Mr. Wanklyn and Professor Redwood should be at liberty to attend and have notice of the analysis, and that for this purpose the case should stand over till the appeal day in October.—*Grocer.*

Prosecutions Under the Adulteration Act.

Adulteration of Milk—Amateur Prosecutors.

At the Manchester County Police Court, on Tuesday, August 3, John Gleave, farmer, Lostock, near Northwich, appeared to a summons charging him with selling, as pure, milk which was adulterated with nine per cent. of water.

Mr. Fleming prosecuted on behalf of the Manchester and Salford Milk Dealers' Protection Society, and Mr. Yates appeared for the defendant.

The complainant, James Charles Connell, a retail milk dealer, residing in Liverpool Street, Salford, said that about the middle of February he entered into a contract with the defendant to obtain a daily supply of milk to be delivered at Old Trafford Railway Station. On the 17th of June he went with his cart to Old Trafford, to get the milk as usual. Inspectors Fennell and Jarvey accompanied him by arrangement, and when he had obtained the milk intended for him he drove away with it, and opened the can containing it at his shop, in the presence of the officers, who held appointments under the Adulteration of Food Act. A sample of the milk was taken in a bottle, which, after being sealed, was delivered to Mr. W. Carter Bell, the public analyst for the borough of Salford, who, on examining it, found that it contained 9 per cent. of water.

Sir J. I. Mantell asked Mr. Fleming how he proposed to proceed with the case under the Adulteration of Food Act, when one of the first sections of that Act required that before proceedings could be taken in any county, a public analyst should be appointed by the court of quarter sessions. The appointment had not yet been made in the Manchester division of the county, and he therefore took it that the prosecution could not be sustained. Mr. Fleming said his impression, after glancing at the section referred to by the Bench, was that the evidence of any duly qualified person was sufficient, in the absence of an appointed public analyst, to prove adulteration; but if this evidence was disputed the Court would have no alternative but to decide in favour of the person accused.

Sir J. I. Mantell said the Act seemed to presume that an analyst should be appointed before proceedings could be taken.

Mr. Yates said it was evident that the Legislature had carefully limited the power to persons appointed under the Act. After again referring to the section, Mr. Fleming said he was bound to admit that the summons must be dismissed. He hoped that as soon as the case came to the ears of the county authorities they would resolve to put the Act in operation by appointing a public analyst.

Mr. Yates asked for the summons to be dismissed with costs.

Sir J. I. Mantell said that, as the prosecution ought to have fully ascertained what status they had under the Act of Parliament before taking proceedings, the summons would be dismissed with costs, which would be fixed at three guineas.—*Manchester Courier*.

Copper in Preserved Peas.

At a Special Petty Session, held at the Parochial Hall, Cranbrook, on Saturday, July 17, Mr. John Stapley, of Beddenden, grocer, etc., was summoned for selling preserved peas, which were adulterated, on April 2. The case came on for hearing at the Petty Sessions held in the month of June, when the inspector said that he had submitted the peas in question to Dr. Adams, who, on analysing them, certified that they were adulterated with a specified amount of copper. Mr. Stapley thereupon asked for an adjournment of the case, in order that another analysis might be made; the firm from whom he purchased the peas having assured him that they were quite free from any adulteration whatever. This application the Bench granted, and the peas in the meantime were analysed by Dr. Letheby, who now attended to give evidence. Mr. George Hinds appeared for Mr. Stapley.

Dr. Adams public analyst for the county of Kent, under the Adulteration of Food Act said that on April 8 he received from the inspector a quart tin of preserved peas for the purpose of analysing them. He submitted the peas to a proper chemical analysis, and he detected a considerable quantity of copper in them. In 100 drachms of the peas he found 4¼ milligrammes of copper, and this would give a proportion of about 5 grains of sulphate of copper to a quart tin. He extracted the copper in its metallic state, and now produced it for the inspection of the Bench. He also put before their worships other characteristic proofs that the peas contained copper. In reply to the chairman, Dr. Adams said that copper, present in such quantities as he found in these peas, would undoubtedly be very injurious to the health of any person who partook of them. He considered that the quart tin of peas would weigh about 32 ounces. In cross-examination Dr. Adams said that copper was used for colouring preserves, imparting to them a green tint, but in the process which he had used in the analysis of these peas he had been sedulously careful to use no instrument or vessel which might have contaminated them with copper. He used a fragment of zinc for the purpose of solution and precipitation. He considered that the process he had employed was the most satisfactory way of treating the analysation of the peas. He had found iron in several tins of peas which he had analysed, but this metal was not injurious to health. Copper was often administered in a medicinal way when any part of the human body was diseased, and therefore it could not be deemed necessarily injurious to health. The peas in question were preserved in Paris, imported by the wholesale dealer, and sold to the retail trader in sealed tins.

Mr. Hinds then said he had no doubt that copper had been found in these peas, but it was in so small a quantity that no injury to health could possibly accrue therefrom. The firm from which the peas had been purchased had given an assurance that no adulterating agent whatever had been used in the process of preservation; and he had no doubt at all but that the metal found in the peas was in consequence of copper vessels being employed in preserving them. He read a certificate from a French doctor of high standing who had visited the establishment where these peas were purchased, had witnessed their process of preservation, and he certified that "nothing whatever was used which was of a deleterious nature in that operation." Before the Bench could convict his client they must be satisfied that there was an intention to defraud, and that these particular peas were "injurious to health and dangerous to life." He then called

Dr. Letheby, who said: I am Professor of Chemistry at one of the London hospitals, and have been so for a period of about thirty years, during which time I have had much practice in analytical chemistry. On June 10, in the present year, Mr. Bourne, in the presence of Mr. Stapley, the defendant, delivered to me a portion of a tin of peas sealed up in a bottle, and requested me to submit them to chemical analysation, and communicate the results of my analysis as soon as convenient. I took 1185 grains of the peas alone (separated from the liquid), and on analysing them I found them to contain the twelve-hundredth part of a grain of sulphate of copper. Estimating from analogy, that would constitute a proportion of seven-tenths of a grain (or nearly three-quarters of a grain) of sulphate of copper to the pound weight of peas. [The witness produced the amount of copper he had discovered, and placing it on the table at which the magistrates sat, addressing them said, "There it is; you can see for yourselves, and there is no mistake about it."] Continuing his evidence, he said: I then analysed two ounces two drachms of the liquid, and here there was no trace whatever of any copper to be found. In reply to a question from the Bench as to how he accounted for Dr. Adams finding, as he had stated, so much copper in the peas, Dr. Letheby said that if Dr. Adams found the quantity of copper in that portion of the peas he had analysed, the deleterious metal must have been very unequally distributed; but even if this could be proved, it would at once constitute a proof that no adulteration had been used in the preserving process, otherwise the debasing ingredient would have been found throughout alike in the liquid, as well as in the peas, in proportionate quantities. No evidence that could be adduced would prove that the infinitesimally small quantity of sulphate of copper he (Dr. Letheby) had discovered in these peas could possibly be injurious to the health of any one who partook thereof. The fact is, said Dr. Letheby, these peas were preserved in France, and the French people almost invariably use copper vessels for preserving processes, in the course of which a small and very minute portion of the copper would come off. The liquid being free from copper, entirely convinced him that the peas themselves, while undergoing the preservation process, came into contact with the sides of the preserving pan, and so imbibed a small portion of the deleterious metal; but the quantity so imbibed was so insignificant that, as he had before stated, it could not be injurious to health. If injury to health could thus have accrued, this particular process of preserving would have been abandoned long since. By permission of the Bench, the two doctors were here allowed to have a scientific disquisition on the methods each one had employed in the process of analysing these particular peas, in the course of which Dr. Letheby elicited from Dr. Adams that he used a gas furnace close to the burner; whereupon Dr. Letheby immediately said, "I should be inclined to the opinion that such a process was by no means a safe and sure one. Some gas burners have copper tubes, and in the process—which, perhaps, may occupy some fifteen minutes—these tubes give off a portion of the metal of which they are composed, and this, too, in notable proportion. I should feel very delicate when giving evidence, either in a court of law or justice, in placing any reliance on a method so inaccurate and uncertain." Placing a ginger-beer bottle on the table, which contained the remaining portion of the peas, which had not been analysed, Dr. Letheby said, "If there is any doubt about the matter as to the quantity of copper contained in the peas I have analysed, your worships can satisfy yourselves by having those in that bottle submitted to the operation of a competent chemical analysis; the final and conclusive proof can be found there."

The Bench retired for about about minutes, and, on returning into Court, the chairman said: We have given the evidence in this case our best attention, and have carefully considered all the points therein adduced. The question really is, "Were these peas adulterated, or were they not?"—and we have come to the conclusion that they were. Without casting any imputation on the defendant's morality or throwing any stigma on his honesty—for he no doubt purchased these peas, and sold them, believing them to be free from adulteration,—we impose a fine on him of 20*s.* and costs.

Mr. Hinds intimated that the conviction would be appealed against, and Mr. Farrar said that notice of appeal must be given in two days. Mr. Hinds said he would communicate with the principal of the firm which sold the peas, and consider what course to take.—*Grocer.*

Review.

On Alcohol: A Course of Six Cantor Lectures delivered before the Society of Arts. By Benjamin W. Richardson, M.A., M.D., F.R.S., Fellow of the Royal College of Physicians, etc., etc. London: Macmillan and Co. 1875.

Although alcohol has been known and used from the very earliest times, the manner in which it produces its familiar effects on the human constitution is still but imperfectly understood. Modern chemistry has contributed largely to our knowledge of its ultimate composition, of the process of its formation, and of the retrogressive steps by which it undergoes resolution into its proximate elements when placed under favourable conditions. The general opinion of mankind, derived from the experience of ages is likewise unanimous as to the apparent effects resulting from the employment of wine as a beverage.

It is recognized as a stimulant or temporary pick-me-up when taken in moments of cardiac depression; "making the heart merry" when used in moderate doses at any time, but chiefly with food; and as a narcotic and direct sedative producing intoxication and insensibility when imbibed in excessive quantities.

But this information is not sufficient for the purposes of the physician. He requires to know the different changes which alcohol itself undergoes after ingestion—whether it is eliminated or assimilated; and the nature and extent of its action on the internal structures of the economy. Does alcohol directly or indirectly add to the constructive materials of the body? Does it promote or arrest the metamorphosis of tissue? Is it a fat-forming or nerve-energizing food? How does it affect the temperature, and what is its significance?

Physiologists have for a long time widely differed in opinion on these questions, and although the experimental investigations of Binz, Anstie, Dupré, and more recently of Parkes and Wollowicz, have conclusively determined a few of them, there are others which still remain disputed and uncertain, and which must be left to future investigators to clear up.

Dr. Richardson, who has himself been engaged in physiological experiments, was invited to deliver a course of Cantor Lectures on Alcohol, before the Society of Arts. These lectures he has now published in response to a request "too general to admit of hesitation or delay." He informs us in an introductory note of the manner in which he has treated his subject:—"I have spoken out freely the lessons I have learned from Nature. No pledge binds me, and no society banded to propagate particular views and tenets claims my allegiance. I stand forth simply as an interpreter of natural fact and law."

We were at first somewhat puzzled to understand why the truthful and unbiassed statement of "natural fact and law" should require such an assertion of courage; and what facts the lecturer could have discovered in his physiological inquiries which might possibly have deterred another and a less courageous interpreter from "speaking out freely." On looking through the pages of this book we find that the author has said but little to enlighten us on the physiological uses of alcohol, and a great deal more than was necessary about the baneful effects of intoxication and the imprudent and excessive indulgence in spirituous liquors. Although Dr. Richardson assures us that he has not actually taken "the pledge," the general tone of his lectures leads us to conclude that he has a great horror of "this chemical substance, alcohol," which "outside the organism is a useful substance," but "is neither a food nor a drink suitable for man's natural demands."

All that is fairly deducible from the *clinical lectures* on alcoholic diseases towards the end of the book, is that when taken in excess alcohol ruins the health. We presume the "numerous audiences" at the Adelphi scarcely considered this as a novel piece of information, although it came from the lips of a living physiologist. No one could have had a doubt about drunkenness being an unmitigated evil, and one cannot conceive it possible that any man of ordinary intelligence would need the help of an "interpreter of natural law and fact" to teach him that too much of even a good thing is good for nothing, and often the very opposite of good.

"Every *inordinate* cup is unblessed, and the ingredient is a devil," was a fact known long before physiology aspired to the name of science; and "good wine is a good familiar creature if it be *well used*," had received the sanction of common sense and experience at as quite an early a time. "Ex abusu non arguitur ad usum," says the old law maxim, which should be constantly kept in mind to check undue prejudices and hasty opinions.

Of course, no one would think of insisting that a usage, however ancient it may be, and however wide its prevalence, is any surety in itself of its *unmixed* advantage to those who practise it; and so the universal adoption of alcohol, in some shape or another, as an article of daily consumption, affords no proof of its *absolute necessity*. But surely no one can deny that this very universality of its prevalence argues the presumption of at least *some advantage*, without which the practice could hardly have recommended itself in the first instance, or have acquired such a general recognition after years of trial and experience.

Dr. Richardson would advise us to have nothing whatever to do with alcohol—not even as a stimulant. "If it be really a luxury," he says, "for the heart to be lifted up by alcohol . . . . then those who enjoy the luxury must enjoy it—with the consequences." Action is infallibly followed by reaction, through the whole realm of Nature, as labour and exertion are followed by fatigue and exhaustion. So is stimulation followed by sedation; but to insinuate that it is unwise to stimulate the heart when it suffers from depression, because such stimulation gives no "*persistent* increase of power by which men are enabled to perform more sustained work," is, to say the least, a very quaint way of estimating the value of therapeutics.

If the presence of alcohol in the stomach or in the circulation is calculated to do harm under any circumstances, what are we to say to the practice of eating ripe fruit? Nay, what are we to think of Dupré's discovery of alcohol itself in the healthy economy of the most ardent abstainers? Dr. Richardson says "the fault, if it be one, rests with Nature, who, according to our poor estimates, is no more faultless than the rest of her sex." Not at all a bad idea, but yet hardly a *scientific interpretation* of natural fact and law, which the learned lecturer in his introduction professed to "speak out freely." We have serious misgivings, however, that Nature will not be improved by Dr. Richardson's physiological lectures, and we would suggest as an alternative, that the lecturer should accept and try to understand her teachings, such as they are. It would appear as if the long-expected "coming race" had really come, and that, before being ourselves improved off the face of the earth, the programme is to open with an attempt to correct some of Nature's evil habits and perverse ways. The good old dame's inherent frailty in brewing "a wee drap" in every healthy abstemious man having been so curtly disposed of, we think it very generous of the lecturer to have refrained from censuring the unphysiological advice which St. Paul gave to Timothy:—"Drink no longer water, but use a little wine for thy stomach's sake."

Obituary.

Notice has been received of the death of the following:—

On the 11th of July, 1875, Mr. Edward Charles Holt, Chemist and Druggist, of Altrincham. Aged 28.

On the 17th of July, 1875, Mr. John Alfred Rastrick, Pharmaceutical Chemist, of Woolwich. Aged 61. Mr. Rastrick had been a Member of the Pharmaceutical Society since 1842.

On the 27th of July, 1875, Mr. Samuel Cryer, Chemist and Druggist, of Lighthouse, Lancashire. Aged 68.

On the 28th of July, 1875, Mr. Thomas Burden, Pharmaceutical Chemist, of Store Street, Bedford Square, London. Aged 58. Mr. Burden had been a Member of the Pharmaceutical Society since 1846.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Erratum.—Page 99, col. ii., line 4 from bottom, for "serous" read "serious."

G. E. Jones.—(*a*) *Carex glauca;* (*b*) *Brachypodium sylvaticum;* (*c*) *Lastræa dilatata;* (*d*) *Carlina vulgaris;* (*e*) *Luzula pilosa;* (1) *Arrhenatherum elatius;* (2) *Bromus asper;* (3) *Aira flexuosa;* (4) *Agrostis canina*, awnless; (5) *Juncus Gerardi;* (6) *Molinia cœrulea;* (7) *Holcus lanatus; Cynosurus cristatus;* (9) *Dactylis glomerata.*

J. B. Bradley.—Potentilla Tormentilla, β procumbens.

C. F. Johnson.—(1) *Anthyllis vulneraria;* (2) *Spiræa Filipendula;* (3) *Melampyrum pratense;* (4) *Calamintha Clinopodium;* (5) *Scabiosa columbaria;* (6) *Trifolium procumbens.*

G. Watt.—(1) *Crepis virens;* (2) *Centaurea nigra;* (3) *Teucrium Scorodonia;* (4) *Sisymbrium officinale.*

W. S. C.—Athyrium filix fœminea. An entire frond should always be sent of ferns.

H. Forster.—Miller's 'Elements of Chemistry,' 2 vols., 5th edit. (Longmans); Watts' 'Dictionary of Chemistry,' 5 vols. 1863, and two supplements, 1872 and 1875 (Longmans); Dorvault's 'L'Officine,' 8th edit., 1872 (Paris: Asselin). The prices may be obtained by applying to the publishers.

J. M. C.—The fact of passing the one examination would not be of much service to you in passing the other; but the preparation for it would.

H. D.—We cannot explain the phenomenon, unless, indeed, it had anything to do with the worship of Bacchus which you half hint preceded that of Morpheus.

Rusticus.—Bentham's 'Illustrated Handbook of the British Flora' (Reeve and Co.); Sowerby's 'English Botany' (Hardwick).

A. M.—The following formula for Pil. Christisoni, which is probably what you require, has already appeared in this Journal:—

Mass. Pil. Coloc. c. Aloes Barbab. .	gr. xvj.
Ext. Hyoscyami	gr. viii.

Ft. Mass. et divide in pil. xij.

"*Chemist.*"—You are recommended to transmit the details of the two cases you mention to the Secretary of the Pharmaceutical Society or to the Chairman of the Board of Examiners, by whom the subject would doubtless be carefully considered.

R. Watson.—Probably preparations of Goa powder are meant, but we know of no authorized formulæ. See the papers on the subject in vol. v., pp. 721, 723, 801, 817.

A. L. F. B.—(1) *Polygonum aviculare;* (2) *Stachys palustris;* (3) *Fumaria officinalis;* (4) *Sisymbrium officinale;* (5) *Torilis Anthriscus;* (6) *Agrostis vulgaris;* (7) *Arrhenatherum elatius;* (8) *Chrysanthemum segetum;* (9) *Eryngium maritimum;* (*a*) no leaf sent with the fragment of flower; (*b*) *Statice Limonium;* (*c*) *Nasturtium officinale;* (*d*) *Chenopodium album;* (*e*) *Filago minima;* (*f*) *Teucrium Scorodonia;* (*g*) *Polygonum aviculare;* (*o*) *Ligustrum vulgare;* (*p*) *Stachys palustris;* (*r*) *Erodium cicutarium;* (*s*) *Lepigonum rubrum.* We must ask our correspondent to content himself on a future occasion with sending fewer specimens for naming, and to send better materials. We cannot undertake to name scraps.

"*Pharmaceutical Titles.*"—*T. T.* writes to say that some correspondents seem to have misconstrued the purport of his letter on this subject. He merely wished kindly to point out another argument, viz., that of the benefit, etc., to be derived from the knowledge and practice now required to be possessed by "Majors," in addition to "honourable titles gained thereby," and spoke from personal experience that it might be seen to be no fictitious case.

H. Bunning.—The restrictions respecting the sale of poisons by registered persons only do not apply to wholesale dealers in the ordinary course of wholesale dealing.

Communications, Letters, etc., have been received from Professor Hofmann, Mr. Bennett, Mr. Wilkinson, Mr. Boothby, Mr. Gregory, Mr. Hope, "Welsh Chemist," H. D., A.P.S., Fred. W. E. S., J. S.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from page* 83.)

Delaying all account of so much of the theory of polarization by double refraction as is essential to the comprehension of the phenomena we shall meet with in our further experiments until the experiments have themselves been described, I will pass on to notice more or less fully the various applications of which plane polarized light is capable, describing by way of introduction some of the apparatus to be employed.

Polarized light may be employed either in conjunction with the microscope, or without it, but as the microscope merely acts in its ordinary capacity as a magnifier, we may reduce our observations under the latter head, and conveniently discuss the non-microscopical use of polarized light in the first place.

The apparatus employed in ordinary work need not be either complex or expensive. All that is really essential for, at any rate, elementary work may be constructed by the student himself with a few cigar boxes, glass plates, pieces of wire, and nails or screws, and a few inexpensive additions will make the apparatus thus contrived suitable for all but very advanced researches. I show in Figs. 5 and 6 two forms, which are easy of construction and very efficient. Fig. 5 may be procured from Messrs. Mottershead of Manchester at a very small cost. The drawing is made from an instrument exhibited by them in the Yorkshire Exhibition this summer, and is only intended to give outlines for its construction. A is a rectangular wooden frame, carrying a stage D, and analyser support E at right angles to the upright A′. The upright A′ should be ten to twelve inches high and four to five inches broad. D and E should be not less than three inches square, be firm, and the aperture in the stage D a full inch in diameter. B is a reflector of black glass, or window glass backed with black velvet, inclined at about 3° to the horizon. C is a similar reflector, set at such angle that the light reflected from B may impinge upon it at the polarizing angle of 35°.65′ to its surface (54°.35′ to a perpendicular to its surface). The objects to be examined are placed upon the stage D, and viewed through a small Nicol at F (a sufficiently good Nicol may be purchased for about ten shillings from most good opticians) or by means of a glass plate arrangement as in Fig. 6. The portion of the apparatus between E and D may be very advantageously enclosed by a wooden or metal envelope, blackened inside, to exclude diffused and other extraneous light.

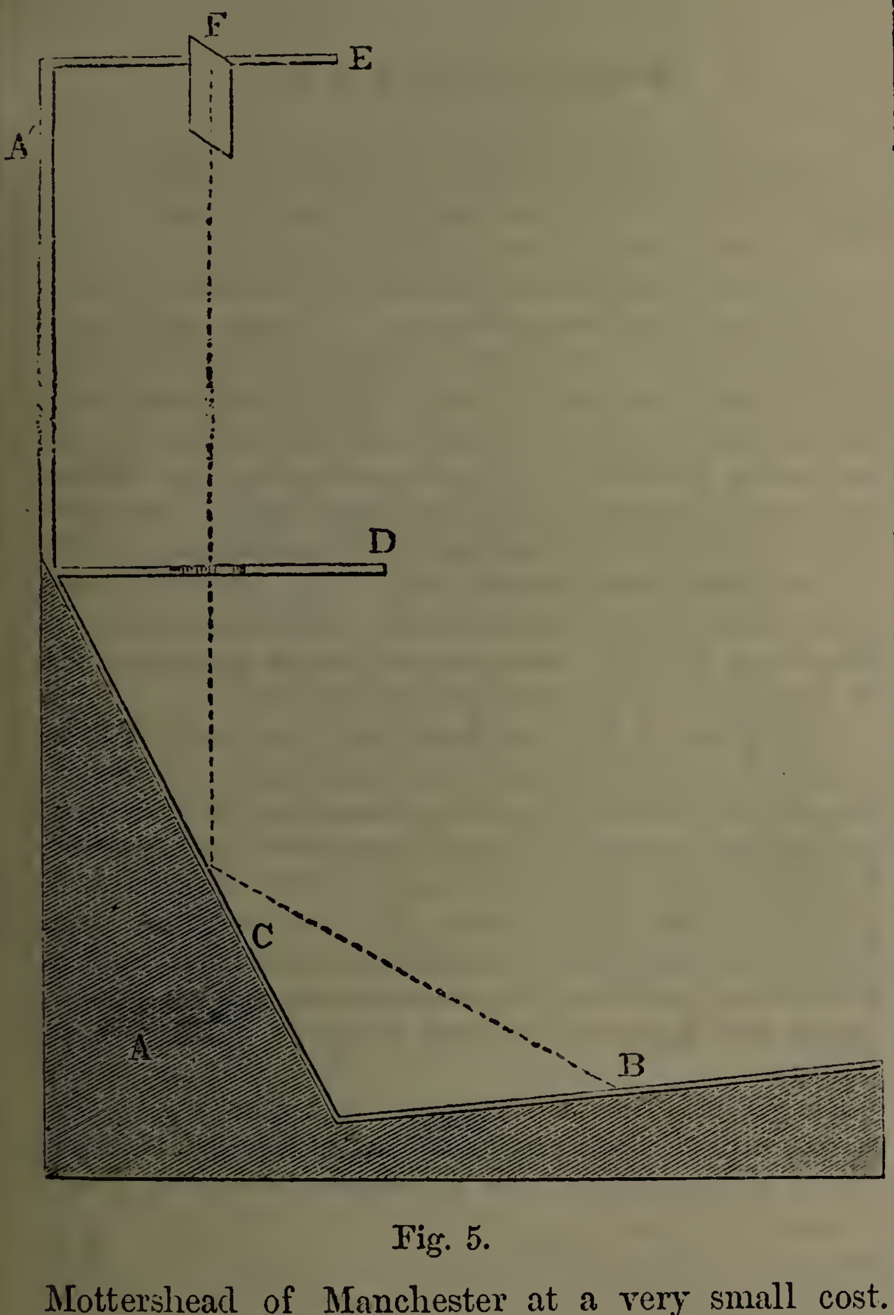

Fig. 5.

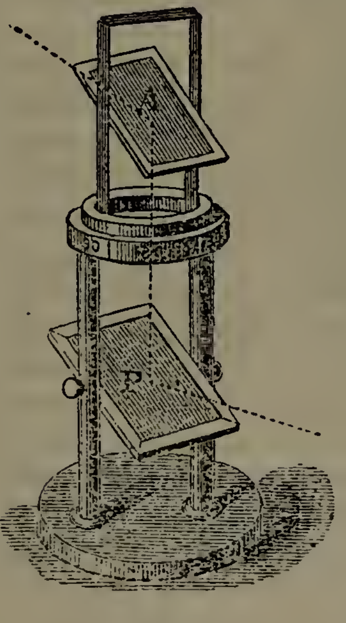

Fig. 6.

The apparatus shown in Fig. 6 is that figured in Deschanel's 'Physics' as Malus's polariscope, and consists of two piles of glass plates, each of which can be turned about a horizontal axis, and the upper one also about a vertical axis, the amount of rotation being measured on the graduated circle. "Each of the reflectors should be set at an angle of about 33° to the vertical, and a strong beam of light allowed to fall upon the lower pile in such a direction as to be reflected vertically upwards. It will then fall upon the centre of the upper plates, and the angle of incidence and reflection on both the piles will be about 57°." (Flint glass is referred to here. If common crown window glass be used the angle of the plates should be slightly altered from the vertical, so that the angles of incidence shall not vary much from 55°.)

It may perhaps be worth while to mention that the arrangement frequently used by myself is entirely extemporized out of the ordinary polariscope appliances of the microscopist, and a Field's half-guinea Society of Arts microscope used by me as a dissecting and mounting microscope. This microscope, as many readers know, is an upright stem about 5 or 6 inches high, which screws into the box into which it is packed when not in use. The stem is tubular and carries at its lower end, near its base, a concave mirror, and at its upper end, a stage; a round racked pillar works within the tubular stem and carries a transverse arm at its upper end. The polarizing Nicol prism belonging to a microscope is placed in the stage aperture (or by cork fittings immediately below the stage), and the analysing prism is attached to the transverse arm that ordinarily carries the simple lenses of the microscope. The object examined is placed on the stage immediately above the polarizer. A magnifying lense is sometimes used above the analyser, and in certain cases a condensing lense is used between the polarizer and the object. The concave mirror may be advantageously replaced by a plane mirror, but for such rough work as an extempore polariscope is likely to be employed upon, the arrangement described answers admirably, and a similar arrangement can, it is obvious, be contrived with any dissecting microscope, or not at all inefficiently with a common retort stand, Nicols and reflector. In fact, as has been said before, ordinary polariscope work does not absolutely require any but the simplest apparatus, and considering the wonderful beauties of the phenomena it is somewhat remarkable that so few persons have any knowledge of, or familiarity with it.

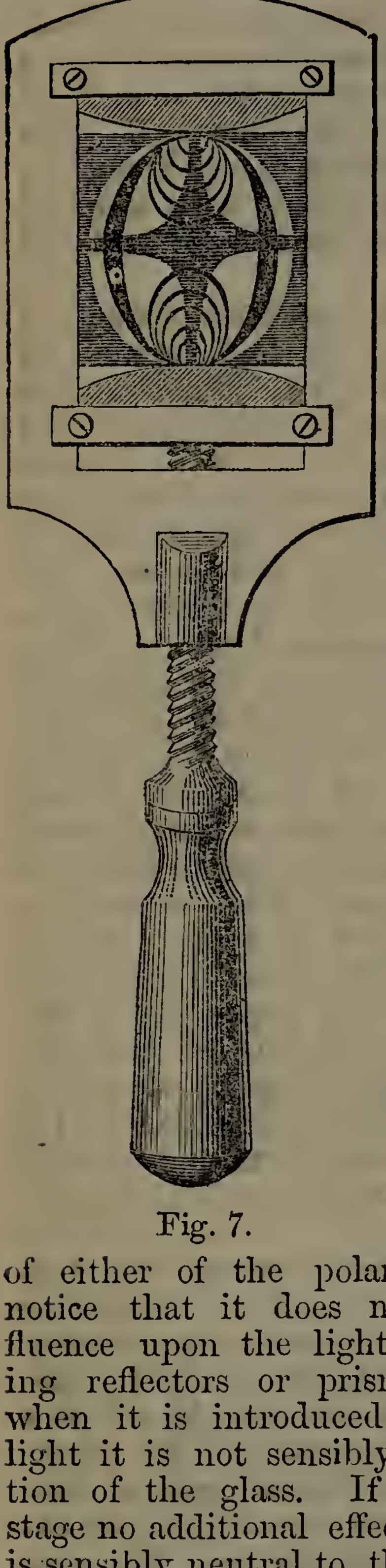
Fig. 7.

We are now in a position to inquire as to the directions in which we may employ the apparatus described. They are not very numerous, if we exclude the help of the microscope, and to pharmacists not, I fear, very interesting, but they may be briefly indicated.

The chief non-microscopical use of polarized light is in the investigation of lines of tension (of stress and strain) in transparent bodies, and of certain astronomical phenomena. This use is rendered possible so far as regards the investigation of lines of tension is concerned, by a certain notable difference between the behaviour of doubly and singly refractive substances when polarized light is passed through them. For our present purpose the difference may be shown by reference to two particular cases, the one of single the other of double refraction. If we place a piece of common window glass on the stage of either of the polariscopes described we shall notice that it does not exert the slightest influence upon the light received from the polarizing reflectors or prisms—if the field be dark when it is introduced it remains dark, if it be light it is not sensibly obscured by the introduction of the glass. If we rotate the glass on the stage no additional effects are observed. The glass is sensibly neutral to the polarized beam. But the case is quite otherwise if we substitute a thin plate of a doubly refracting crystal, such as selenite, for the glass. If the selenite be very thin we shall observe that its introduction, if it make any difference, floods the field with coloured light, and that this coloured light changes if the analyser be rotated. We notice also that rotation of the film materially modifies the phenomena. As we rotate it, we observe that its action waxes and wanes towards and from each of two points, and that there are two positions in which the action of the selenite is at a maximum and two other points at which it is at a minimum. If the selenite plate exceed the $\frac{1}{18}$ of an inch in thickness, the field will not be coloured but will be changed from darkness to brightness in each of two positions as it is rotated. This latter phenomenon, the brightening of a dark field in the polariscope by the introduction of a birefractive substance in the proper position is what we must now fix our attention upon,* for we have to learn to recognize this birefractive power when temporarily conferred upon substances from which it is ordinarily absent. We may perform an illustrative experiment very readily by placing a narrow strip of window glass between crossed Nicols (it may be well to mention that this term applies to any polarizing arrangement, and indicates that the field is dark), and bending it slightly between the finger and thumb, when its length makes an angle of 45° with the plane of polarization, *i.e.*, when it lies in this angle, with regard to the face of the glass reflector when one is used as polarizer. When the glass was free from pressure no effect was produced, but we no sooner attempt to bend it than the field becomes bright, provided the centre of the slip is not in the field. Looking at a considerable portion of the slip we see a black band with a bright portion on each side of it. The bright portions represents those portions of the glass which have become birefractive under pressure or strain, the dark portion is a neutral ground between opposing strains. This experiment is far more effective when thick plates, columns, or pillars are powerfully compressed by a properly devised screw press, as shown in Fig. 7.

(*To be continued.*)

SCAMMONIUM.†

BY A. HESS.

Scammonin, the active medicinal principle of scammonium, is a glucoside, possibly also called jalapin, convolvulin, and orizabin. In the pure state it is a dry, colourless, and tasteless substance, having a peculiar faint sweetish smell. It is completely soluble in alcohol and ether, forms a turbid solution with chloroform, and is only slightly soluble in oil of turpentine and glycerine. It corresponds to the empirical formula, $C_{68}H_{56}O_{32}$ or $C_{34}H_{56}O_{16}$. When treated with alkalies it is converted into scammonic acid; treated with boiling dilute sulphuric acid it is converted into scammoniol. The latter digested with alkalies is changed into scammoniolic acid, which, as well as scammoniol yields ipomæic acid by the action of hydrochloric acid.

Scammony is derived from the *Convolvulus Scammonia*, L., a plant growing principally in Syria, especially near Aleppo, but found also in the southern Balkan peninsula, the Crimea, the Caucasus, etc., which is brought into commerce entire or only in pieces of the roots about 30 centimetres long. Formerly, varieties of scammony from other species of the same family came into the market from France, Spain, and Egypt, but these are now entirely supplanted.

Besides cellulose, the roots contain a large quantity of oxalate of lime, scammonin, extractive matter, sugar, starch, tannic acid (coloured violet by iron), vegetable mucous, and small traces of wax. Three different specimens were examined by the author. No. 1 was a poor root, greyish-white at the section, with indistinctly seen woody fibres; No. 2 a very fine root, 10 centimetres thick and brown at the section; No. 3 was a medium root, 8 centimetres thick, brownish at the section, with indistinctly seen, irregularly distributed, woody bundles. He found :—

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* The theoretical explanation will be given later. Students will find the subject treated far better than I can hope to treat it in the books cited (*ante*), or in Airey's 'Mathematical Tracts,' Janin's 'Cours de Physique,' and Herschell's 'Familiar Lectures.' See also 'British Association Reports,' 1875.

† Abstract from a Prize Essay, published in the *Archiv der Pharmacie*, vol. iii., p. 223.

	Soluble in Water per cent.	Of this was in Alcohol	
		Soluble per cent.	Insoluble per cent.
I.	20·0	10·7	9·3
II.	27·4	12·3	15·1
III.	18·2	9·3	8·9

	Soluble in Alcohol per cent.	Of this in Water	
		Soluble per cent.	Insoluble per cent.
I.	17 7	13·2	4·5
II.	23·0	15·7	7·3
III.	21·4	12·1	9·3

The aqueous extract as a thick fluid was dark brown, becoming brownish black when dry, and having a sweetish taste that afterwards became astringent and faintly acid. In doses of 1·5 grams, taken three times at intervals of one hour, it had no purgative action and only gave rise to pains in the stomach and an accumulation of gas in the lower bowel. The extract obtained from the root by alcohol was evaporated and well washed with water. A residue was left consisting of a mixture of scammonin, tannic acid, and colouring matter, from which the pure scammonin could be obtained by treatment with animal charcoal. In this manner No. I. yielded 3·4 per cent. of nearly pure scammonin, No. II. yielded 5·11 per cent., and No. III. yielded 6·6 per cent.

Scammonium is obtained in Turkey by making an incision in the crown of the root, and collecting the exuding juice. This is the first very pure product, free from tannic acid, but unfortunately it is often adulterated with flour. By boiling the incised roots, two other quantities are obtained, which contain a mixture of mucous and tannic acid, but only very little scammonin, and therefore are often mixed with a decoction of species of euphorbia. Three kinds of Aleppo scammony obtained from different houses presented a great similarity in their external characters. Treated with hydrochloric acid, two of them swelled up, the third did not. After extraction by means of alcohol there remained from all three kinds a more or less dirty white residue, which was coloured by solution of iodine. Boiled with water the residues of the first two completely gelatinized, that of the third became flocculent, and upon filtration left an impure transparent paste upon the filter. These residues, upon incineration, yielded 4, 4·5, and 2 per cent. of ash, consisting principally of carbonate of lime, ferrous oxide, and difficultly combustible carbonaceous particles. To alcohol these three specimens of scammony gave up respectively 45, 34·3, and 53 per cent. All the remainder consisted consequently of impurities. These alcoholic extracts of scammony proved to be free from tannic acid, whilst in the alcoholic extract of the root much tannic acid was found.

To free the scammony from this tannic acid and the mucous substances is the object of the Pharmacopœia directions, and the author considers that a comparatively efficient purification may be effected by simple solution in spirit, pure scammony being soluble in two parts of spirit, whilst the other substances are mostly difficultly soluble.

The author then gives a description of five kinds of scammony supplied as official from different countries.

No. 1. Resin. Scammon. fusc. of the Pharmacopœa Germanica, from Dresden.—This specimen was in dark brown, dry sticks, presenting a shining resinous fracture, sp. gr. 1·142. Upon trituration it yielded a loose pea-green powder, which under the microscope appeared as shining coppery red or emerald green transparent glass-like particles. Dried over sulphuric acid it lost 2·2 per cent. The original scammony began to soften at 30° C. ; this dried substance melted at 200° C. to a fluid mass, which again became solid at 80° C. This scammony, powdered and moistened with a little water, adhered together and could be worked up into a uniform mass. Mixed with equal parts of gum arabic and water it formed an emulsion, which a further addition of water destroyed. It also remained tolerably well suspended in cow's milk, without altering the colour of the latter. It dissolved in nine parts of cold alcohol, imparting a brownish colour and a weak acid reaction ; this solution upon the addition of perchloride of iron acquired a brown violet colour, and after longer standing deposited a slight flocculent precipitate. In potash solution it dissolved in almost every proportion, with a darker colour ; with concentrated sulphuric acid it formed a solution at first brownish, then ruby red, and finally of a dark red-brown colour. An alcoholic solution precipitated with basic lead acetate gave 8·7 per cent. of tannic acid, calculated as quercetannin.

No. 2. Resin. Scammon. alb., from Dresden, prepared from the preceding by means of bone black. —This specimen was in white, opaque, very dry sticks, as hard as lac, and having the characteristic smell of scammony ; its sp. gr. was between 1·107 and 1·112. In thin layers this scammony was colourless and transparent, in thicker layers it was quite amber coloured. It grated between the teeth, but afterwards became soft, and dissolved in the mouth, communicating a slight tingling sensation to the palate. It was difficult to powder, but after drying, by which it lost 4·5 per cent., this became more easy. Under the microscope the undried preparation appeared as conchoidal and splintered fragments, whilst the anhydrous preparation under the highest powers of the microscope appeared only as an amorphous powder. The melting point of the undried preparation was 30° C., the same as that of No. 1 ; the dried preparation melted at 120° C.

It was easily suspended as a fine powder in cow's milk, the taste of which at first was scarcely altered, but afterwards it left a peculiar irritation in the throat. With gum arabic it formed a dirty white emulsion. It was freely soluble in alcohol, ether, and caustic potash; less soluble in glycerine and oil of turpentine. The concentrated alcoholic solution (1 to 4) was colourless, but was coloured yellow-brown by perchloride of iron ; no precipitate was formed even after standing. Concentrated sulphuric acid at first coloured the powder madeira brown ; then after complete solution the colour became ruby-red, and finally passed from a dark brown to a brownish black. The freshly fractured surface moistened with the alcoholic solution underwent no change of colour. Neutral as well as basic lead acetate produced, after standing some time, only a flocculent precipitate, which gave a yellow brown powder when dried, that corresponded to 0·8 per cent. of mucus. This was the only impurity in this scammony.

No. 3. Resin. Scammon., Pharm. Germ., from Hamburg.—This sample was in reddish brown translucent sticks, 1·2 to 1·8 centimetres thick, weighing 20 grams, and covered with a greenish grey dust. The resin had a peculiar smell, not unlike that of jalap resin. When chewed it at first crunched between the teeth, then became soft, and had a slight sweetish taste. When moistened with water it could be kneaded, its sp. gr. varying from 1·104 to 1·110. It gave a yellowish grey powder, which lost 4 per cent. by drying. Under the microscope it appeared as amber or emerald-green splinters, and when warmed behaved like the other kinds. Dissolved in five parts of alcohol the clear brownish green solution became coloured brown by dilute perchloride of iron, and brownish violet by the officinal solution. Water produced a greenish turbidity, and caustic potash a brown deposit. Basic acetate of lead produced a precipitate representing about 3 per cent. of mucous, with very little tannic acid. Strong nitric acid coloured the powder at first greenish, then dark brown, and ultimately dissolved it in part with separation of a reddish fatty substance and evolution of nitrous vapour. On neutralizing with ammonia the glucoside was again deposited. Strong sulphuric acid coloured the powder ruby or dark red.

No. 4. Resin. Scammon., Pharm. Holland., from Rotterdam.—This sample was in greenish twisted rods, 6 centimetres thick, the conchoidal fracture was blackish brown, resinous, presenting minute pores, and thin splinters of the resin were translucent at the edges. It had the peculiar smell and taste of the previous kind. The powder was yellowish brown, of sp. gr. 1·12, and lost 5·4 per cent. over sulphuric acid. Under the microscope it appeared to contain white as well as red and emerald-green fragments. It softened between 60° and 70° C.; and melted at 120° C., to a thick liquid, which became thin at 210° C. When heated at a higher temperature it gave off a pleasant smelling inflammable vapour, and began to carbonize at 250° C. The charred residue was brilliantly black, porous, difficultly combustible, and gave 0·2 per cent. of ash. The resin dissolved in twelve parts of alcohol; the brown solution was coloured brownish-violet by dilute perchloride of iron and blackish-violet by the officinal. Diluted with four times its volume of water the solution presented a green turbidity. Basic acetate of lead produced a precipitate representing 8·8 per cent. of mucous substances and tannic acid.

No. 5. Resin. Scammon., Pharm. Suecic., from Hanover.—This sample was in irregular brittle fragments, resembling pieces of bark, from two to seven millimetres thick, with a treacly smell; it crunched between the teeth, then became soft, and produced slight irritation of the throat. It gave a greenish-white powder that agglutinated with water and could then be kneaded between the fingers. With gum acacia it formed a greyish-white emulsion, and it could be suspended in milk or oily emulsion. When melted it behaved like No. 2. Its sp. gr. was about 1·16. Over sulphuric acid it lost 4·3 of moisture. The resin was very soluble in ether, and in five parts of alcohol. The almost colourless solution became brown with perchloride of iron solution and then gave a dark precipitate with caustic potash. Basic acetate of lead gave a whitish curdy precipitate representing about 4·2 per cent. of mucous substances.

The purest scammony was therefore that prepared with bone charcoal, it being quite free from tannic acid, and containing only 0·8 per cent. of mucous substances. The Swedish sample was also free from tannic acid, but the mucous substances in it amounted to 4·2 per cent. No. 3 contained only 3 per cent. of mucous substances, but traces of tannic acid. Nos. 1 and 4 contained rather much mucous substances together with sensible quantities of tannic acid. An important index of the purity of scammonin is its solubility in alcohol. It is evident that since the sample No. 2 dissolved in four, Nos. 3 and 5 in five, No. 1 in nine, and No. 4 in twelve parts of cold alcohol, by treating the several products with four times their weight of alcohol, it would be possible, especially by adopting purification with animal charcoal, to obtain good, and above all, uniform preparations.

Scammony acts upon the animal economy similarly to gamboge and jalap resins, between which it holds an intermediate place, since 0·06 gram of gamboge, 0·3 gram of scammony, and 0·5 gram of jalap resin have about the same action. A dose of 0·3 gram of the five kinds of resin above mentioned, scarcely differing in efficacy, produced in ten to fifteen minutes an evacuation of urine, and in three-quarters of an hour a loose evacuation of fæces, attended with slight pain in the stomach, followed after half an hour and an hour and a half by a second and third. Taken in three hourly doses of 0·05 gram the same effects were produced after the third dose. One gram produced violent pain and a rapid succession of evacuations, leaving considerable inactivity of the lower intestine, lasting during several days. At the same time inflammation of the mucous membrane was produced, attended by loss of appetite and headache.

Scammony resin is preferable to jalap resin on account of its pleasant smell and taste, and because it does not cause so much griping. It is also much less likely to cause vomiting.

IRON BY HYDROGEN.*

BY J. CREUSE.

The quality of the iron by hydrogen of the market leaves very much to be desired. The proportion of metallic iron which it contains is far from what it ought to be; it is even less than it was several years since. As the officinal process for making iron by hydrogen is long and difficult, few pharmacists ever attempt to prepare it the second time, and the totality of the product used in the United States may be said to be supplied by manufacturing chemists. Hence it becomes important to have reliable methods for judging of the quality of the chemical. Several processes have been proposed and employed for the purpose, but a discussion of their merits and their faults will be necessary, in order to find out to what extent they can be depended upon.

The qualitative examination of iron by hydrogen offers no real difficulty. The questions to be decided are the following:—Is the substance, iron, reduced by hydrogen, or is it iron mechanically divided? Does it contain impurities due either to defective fabrication, like sulphur and carbon, or to intentional adulteration, like plumbago, etc.

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* Read before the American Pharmaceutical Association.

The first question, which is, of course, the most important, admits of a positive solution. Magnus's test is quite reliable; iron reduced by *hydrogen* must catch fire from a lighted match. Occasionally, however, samples of undoubted origin fail to burn unless they are previously warmed; this peculiarity I incline to attribute to the insecurity of the packages in which the chemical is kept, for reduced irons are very sensitive to the action of the atmosphere.

Incidentally, I am led to explain the meaning of the expression "*reduced iron.*" Of course all iron is reduced in some way or other, but the term "reduced iron" in commerce is applied to the metal minutely divided by chemical means, as distinguished from the powder mechanically prepared from the ingot metal. The latter is generally called "*alcoholized iron.*" It follows that iron by hydrogen is a reduced iron, but all reduced irons are not irons by hydrogen, for other processes besides the officinal method are known and used by manufacturers; they will be noticed hereafter. Besides Magnus's test, other means are available for distinguishing reduced from powdered irons; they relate mainly to the physical appearance of the powder, such as its colour, density, mobility, etc. Under the microscope, for instance, reduced iron appears in lumps swelled up like sponges by the gases that have escaped from the mass, while alcoholized iron seems torn and ragged. The extreme lightness of real iron by hydrogen is so remarkable as to be also a good test of genuineness.

Next in order comes the search for the impurities. Of these sulphur is the most objectionable; the best iron by hydrogen becomes worse than useless if it contains sulphur in any appreciable quantities. Carbon is less injurious. Both are easily detected by the smell of the gas formed in dissolving the iron in an acid. A quantitative estimation appears to be unnecessary, for the sense of smell is sufficient in ordinary instances to determine whether the chemical is free enough from impurities which have probably no other injurious effect than the offensive odour of the gas which they generate in the stomach. Other impurities may be detected by the usual chemical processes. I have found none of these in any of the samples that came under my observation.

The quantitative examination of reduced irons is more difficult. Several processes have been proposed for estimating the quantity of metallic iron contained in the various products. One is to transform a known weight of the sample into ferric oxide, and to calculate from the increase of weight the probable amount of metal. Another is to treat the chemical by iodine or bromine and to weigh the residue, the loss of weight being supposed to be that of the metal present. Another again, is to measure the volume of hydrogen gas evolved when a certain quantity of the reduced iron is dissolved in an acid, and to compare it with the volume of gas which a like amount of pure iron would generate under the same circumstances.

The *first* or *sesquioxide process* was used in a research on the subject made and published in 1861. The writer of that paper, starting from the hypothesis that the commercial irons by hydrogen are a mixture of metallic iron with the magnetic oxide, Fe_3O_4, neglected this oxide in his calculations, and deducted from the weight of the sesquioxide produced the probable quantity of metallic iron contained in the sample.

To this way of proceeding two objections can be made. The first is the neglect of the magnetic oxide. The error, however, is of little importance, and may be corrected in the following manner:

As 1 gramme of metallic iron produces 1·4285 of sesquioxide, and 1 gramme of magnetic oxide 1·0344 of the same, if we call x the weight of metallic iron contained in the sample, y that of the magnetic oxide m the weight of the sample, and n that of the sesquioxide produced, we may write the two following equations:

$$(1)\ x+y=m \text{ and } (2)\ x\times 1{\cdot}428+y\times 1{\cdot}034=n.$$

Subtracting equation (1) from equation (2) and eliminating y we have:

$$(3)\ x=\frac{n-m\times 1{\cdot}034}{1{\cdot}428-1{\cdot}034}$$

and if we make $m=1$, the equation becomes the following simple one:

$$(4)\ x=\frac{n-1{\cdot}034}{0{\cdot}394}$$

which may be translated into the directions: Take 1 gramme of the sample; from the weight of the sesquioxide it produces subtract 1·034 and divide the difference by 0·394. The quotient indicates in grammes the quantity of metallic iron contained in the sample.

I mention this at length, because I have first tested all my samples according to that method.

This calculation disposes of the first objection, but the second one is fatal and insurmountable; it is, that the magnetic oxide mixed with the metallic iron has but seldom the composition Fe_3O_4. It is a mixture, in unknown proportions, of all the magnetic oxides which range between Fe_3O_4 and Fe_6O_7. As we have no practical means of ascertaining the composition of these magnetic combinations, the sesquioxide process becomes useless, because the weight of the sesquioxide formed bears no known relation to the quantity of metallic iron contained in the sample. This is unfortunate, for the method allows of great accuracy, and gives results always concordant.

The *second* or *iodine process*, which has the sanction of the British Pharmacopœia, is based on the theory that when a mixture of iron and its magnetic oxides is treated by iodine, all the metal is dissolved without alteration, while the oxides remain unchanged during the operation as well as during desiccation.

In practice I have found the process to be slow and uncertain. A number of samples of iron already assayed being tested in that way, the results were so discordant and erratic that the process was abandoned. The ill-success may, to a certain extent, have been the fault of the operator, yet I will suggest, with due respect to the British Pharmacopœia, the following sources of error: First, pure iron is not always entirely dissolved by iodine without alteration. My experience, supported by that of Mr. B. A. McEntyre, of this city, is that even when bright and (commercially) pure iron is treated by iodine, a secondary reaction takes place, by which some of the metal is oxidized, and hydrogen is evolved. The formation of a gas is proved by the effervescence which occurs at a temperature where no steam can form, while the smell developed indicates plainly the nature of the gas. Other operators have no doubt remarked this fact, as well as the formation of a very fine black powder, which is nothing else than a magnetic oxide of iron. However, this source of error is unimportant, when compared with the others. While it is not certain at all that iodine has no oxidizing effect on the lower magnetic oxides of iron, these oxides are known to be quite unstable in the moist state. They keep moderately well under water, but when nearly dry they oxidize rapidly in open air, a change which may cause serious mistakes in the estimation.

The testing by bromine, as directed by the German Pharmacopœia, may be more accurate for separating the metal from its oxides, but the same objection, the instability of the moist magnetic oxides, remains as a stumbling-block. At any rate the prospect of a successful issue was not bright enough to encourage me to handle bromine, and I did not attempt it.

The *third*, or *gas process*, is founded on the relatively large volume of hydrogen evolved when iron is dissolved in acids. All the oxides of iron are dissolved without the formation of gas. The method is not a new one, for I proposed it in an article published by *Le Journal des Connaissances Médicales et Pharmaceutiques* in 1856. The suggestion appears to have been unnoticed or forgotten, yet the process is simple, rapid, and susceptible of a fair degree of accuracy.

The operation is conducted as follows:—A deep water-tank is provided, into which a narrow cylindrical receiver, graduated in 100 or 200 cubic centimetres, is inverted in the usual manner for collecting gases. The discharge-tube is made long enough to reach almost to the top of the receiver, and is accurately fitted by a simple perforated cork to an ordinary flask. The tube ought to be of one piece, without any rubber joints. When everything is ready, about 10 grammes of muriatic acid and 5 grammes of water are poured into the flask, a certain weight of the iron to be tested, say 0·50 to 1 gramme, is folded in fine letter-paper and slipped into the flask, the glass tube is adjusted, one end being introduced into the receiver, and the operation begins. The wrapping of letter-paper delays the reaction long enough to allow ample time for all the manipulations. The apparatus may now be left alone, save an occasional gentle shaking. After five or six hours the paper is found to be reduced to a pulp, the iron has dissolved, all evolution of gas has ceased, and the whole has come down to the temperature of the room where the operation is performed. The graduated glass is now lowered into the tank till the water inside is level with that outside; the end of the discharge-tube is also brought down to the level of the water, and the number of cubic centimetres occupied by the gas is noted, and preserved for further calculation and correction.

The calculation may be made in the following manner: As 28 grammes of iron are equivalent to 1 of hydrogen, 1 gramme of pure iron ought to yield 0·03571 gramme of hydrogen. The weight of a litre of the gas being 0·8961 at 0° C., it follows that one gramme of pure iron ought to generate 398·54 cubic centimetres of hydrogen at 0° C. Allowing for the correction due to the temperature and to the tension of aqueous vapour, we may say that 1 gramme of iron produces in round numbers, at the ordinary temperature, 400 cubic centimetres of hydrogen. The figures are not exactly accurate, they even differ somewhat from those indicated by theory, but they agree with the results of practical experiments. If necessary, they might be corrected according to well-known data; but as they stand I believe they are of sufficient accuracy for pharmaceutical purposes, except in unusual cases, where large quantities of sulphur or carbon are present. Such occurrences, however, are guarded against by the preliminary qualitative examination.

I shall now proceed to describe the experiments made with the various sorts of reduced iron found in the market. All the samples were procured from reliable houses, and were represented by them to be of the best obtainable quality, which augurs badly for what second-rate houses would call the second quality.

No. 1. *Quevenne's Iron*, genuine, sold by E. Genevoix, Paris. Appearance: A slate-grey powder, very light and metallic in lustre. When touched with a lighted match it burns readily, leaving a bright-red ash. It dissolves rapidly and completely in dilute muriatic acid, but emits a very offensive smell of hydrosulphuric acid. A strip of lead-paper held in the escaping gas becomes black in less than one minute. This sample is, by far, the worst of all in that respect. The solution in the acid has a light-green colour.

One gramme of the sample was dissolved in muriatic acid, oxidized by nitric acid, and filtered; the filtrate precipitated by ammonia, washed, dried, and ignited, gave 1·240 grammes of sesquioxide of iron, which, according to the formula given elsewhere, seems to represent 52·27 per cent. of metallic iron.

Fifty centigrammes, on being subjected to the gas-test in the manner explained before, generated 104 c.c. of hydrogen, equivalent to 52 per cent. of metal.

One gramme was stirred in a beaker with a solution of iodine in iodide of potassium and kept at a gentle heat for about three hours. The whole, being collected on a filter and well-washed, was dried over a water-bath; the powder, which was at first of a deep-black colour, looked like a rusty cake with bright yellow spots. The weight of it was 1·05 gramme, but, as on throwing some of it on muriatic acid, a quantity of gas was evolved, it was thought best to repeat the experiment.

Fifty centigrammes of the same sample were treated in the same manner by a solution of iodine, and allowed to stand about twenty hours in a moderately warm place. The whole was transferred to a filter and thoroughly washed with hot water first, and lastly with alcohol. When dry the weight of the powder was 0·450 gramme. The colour was not sensibly altered, a result I attribute to the use of alcohol. The powder was left over night in the laboratory, and dried again in the morning, when its weight was found to be 0·455 gramme, an increase of 5 milligrammes. It was then subjected to the gas process, and it produced 33 c.c. of hydrogen, showing that nearly one-third of the metallic iron had escaped the action of the iodine.

No. 2. Of German origin. Appearance: A greyish-black powder with metallic lustre, rather heavy and granular. It does not catch fire from a lighted match, even after being heated; when heated in a porcelain crucible over a Bunsen burner, a faint glow appears in the centre, the powder loses its metallic lustre and cakes together, but remains of nearly the same colour. It dissolves entirely in muriatic acid, although rather slowly, but with very little smell; yet lead-paper is blackened after awhile. The solution is of a pale-green colour.

One gramme, treated by the sesquioxide process, formed 1·211 gramme of oxide, which apparently indicates 44·67 per cent. of metallic iron.

0·40 gramme generated 33 c.c. of hydrogen, showing 20·6 per cent. of metal.

No. 3. French; name of maker unknown. Appearance: A very black powder without any lustre; quite light; catches fire from a match and burns rapidly, leaving a bright red ash, sensitive to the magnet. It is entirely soluble in muriatic acid; the reaction, very brisk at first, proceeds but slowly afterwards. The gas evolved has a fetid smell, and blackens lead-paper. The solution in muriatic acid has a pale green colour.

One gramme formed 1·130 of sesquioxide of iron, supposed to represent 25·63 per cent. of metallic iron.

One gramme gave 40 c.c. of hydrogen, equivalent to 10 per cent. of real metal.

No. 4. French; name of maker not very well known here. Appearance: A greyish-black powder with metallic lustre; rather light. It catches fire from a match only after being heated, and leaves a dark red ash. It dissolves rapidly and completely in muriatic acid, emitting a bad smell, and blackening lead paper. The solution is light green.

One gramme gave 1·215 of sesquioxide, representing a supposed proportion of 45·94 per cent. of metal.

0·40 gramme generated 44 c.c. of hydrogen, equal to 27·5 per cent. of iron.

0·50 gramme, macerated forty-eight hours with a solution of iodine in iodide of potassium, thrown on a filter and washed, first with water and then with alcohol, left a residue weighing 0·37 gramme, equal to 26 per cent. of metal.

No. 5. English; name of maker well and favourably known. Appearance: A moderately light powder of an intense black colour. The sample will not catch fire from a lighted match under any circumstances; and can be heated to redness without any apparent change. When treated by muriatic acid the powder dissolves with very little effervescence, and forms a yellow liquid resembling the officinal tincture of muriate of iron. Of course no smell is perceptible during the operation.

One gramme produced 1·085 of sesquioxide of iron, which indicates (hypothetically) 12·94 per cent. of iron.

One gramme, treated by iodine, left a residue weighing 0·99 gramme.

Two grammes generated 6 c.c. of hydrogen, equal to about three-fourths of 1 per cent. of metal.

The No. 6 is put up by an American firm, but on inquiry it was ascertained that the article sold under their label was sometimes of their own make, and sometimes German or French. I incline to think that the samples examined are of German origin.

Appearance: A greyish-black powder, somewhat granular and heavy, with a metallic lustre. It is entirely dissolved by muriatic acid, with scarcely any sulphurous smell. It does not catch fire from a match, but behaves in regard to heat exactly like sample No. 2.

One gramme formed 1·197 of sesquioxide, equal to a supposed proportion of 41·37 per cent. of metal.

0·50 gramme generated 26 c.c. of hydrogen, equivalent to 13 per cent. of iron.

No. 7 was from the same firm as the preceding sample, but it was taken from the bottom of a vial, where a small quantity had probably been left untouched several months.

Appearance: The same as No. 6, but the powder is partly caked together.

One gramme produced 1·143 grammes of sesquioxide, which is supposed to indicate 27·66 per cent. of metallic iron.

There was not enough of the sample left to test by the gas process.

No. 8. Manufactured by a French house of good repute.

Appearance: A light powder of a slate-grey colour, resembling Quevenne's iron. It burns rapidly when fire is applied, and leaves a bright-red ash. It dissolves quickly and entirely in weak muriatic acid, with evolution of a fetid gas, which blackens lead-paper.

One gramme produced 1·21 of sesquioxide of iron, which indicates a theoretical quantity of 44·67 per cent. of metallic iron.

One gramme, macerated for twenty-four hours with iodine and iodide of potassium, left a residue which, washed with water and alcohol and dried, weighed 0·77 gramme; this would correspond to 23 per cent. of iron.

0·50 gramme treated by the gas process yielded 62 c.c. of hydrogen, equivalent to 31 per cent. of pure metal.

No. 9. Alcoholized iron. The appearance of this preparation is too well known to need any description. It was only subjected to the gas-test.

0·25 gramme generated 98 c.c. of hydrogen, showing that the sample only contained 2 per cent. of impurities. The powder dissolved entirely in muriatic acid, forming a nearly colourless solution with a pale greenish tinge. The complete dissolution required some time, but the gas was almost odourless.

No. 10. A piece of piano wire, well free from rust and weighing 0·187 gramme, being treated by the gas process, generated 74½ c.c. of hydrogen. This would show a percentage of 99·43 of iron, a result of unexpected accuracy, I would say almost accidental, for I believe the method is only reliable within an average of 1 per cent.

All the results are appended here in tabular form, in order to show better at a glance the differences between the various products. In the first column are the numbers of the samples, in the second the quantity of sesquioxide of iron formed by one gramme of the substance, and in the third the number of cubic centimetres of hydrogen evolved by one gramme of the same. The fourth indicates the apparent percentage of metal calculated from the sesquioxide obtained, and the fifth the same percentage deducted from the gas generated. The numbers given in the sixth column were reached by weighing the quantity of each sample necessary to fill the same glass tube, and comparing the weights to that of Quevenne's iron, that being taken as standard and called 10. The method is certainly far from accurate, yet the figures obtained are quite interesting and suggestive.

Iron by Hydrogen of Commerce. Comparative Table.

Number of sample.	Sesquioxide of Iron.	Hydrogen. Cub. centim.	Appparent per cent.	Real per cent.	Relative Density.
1. Quevenne's .	1·240	208	52·27	52	10
2. German . . .	1·211	82·5	4 ·67	20·6	27
3. French . . .	1·130	40	25·63	10	12
4. French . . .	1·215	110	45·94	27·5	15
5. English . . .	1·085	3	12·94	0·75	15
6. German (?) . .	1·197	52	41·37	13	27
7. German . . .	1·143	....	27·66	10 (?)	....
8. French . . .	1·210	124	44·67	31	14
9. Alcoholized Iron	....	392	....	98	32
10. Pure Wire . .	....	397·7	....	99·43	....

Remarks.—As the British and the German Pharmacopœias appear to exact only 50 per cent. of metal in reduced iron, No. 1 may be said to be satisfactory, and No. 8 comes next to it in that respect; but when one takes into consideration that a 2-grain dose of these introduces into the stomach some 20 or 25 cubic centimetres of fetid gas, it becomes hard to decide which are the best, or rather the worst, the German and English products with their poverty in metal or the French irons with their sulphurous contamination. If, besides, we bear in mind the unreliable and extremely varying strength of the product supplied by the best manufacturers, the question is forced upon us: What is the advantage of iron by hydrogen over iron filings, or any other ferruginous preparation?

Other Processes for Making Reduced Iron.—Besides the officinal method, other processes are known and probably followed by manufacturers of reduced iron. An old way is to run a stream of carbonic oxide gas, instead of hydrogen, through the sesquioxide disposed in the usual manner. The reduction is said to be rapid and satisfactory; the product might be called *iron reduced by carbonic oxide.* Another method, not very new either, consists in heating oxalate of iron in a stream of hydrogen gas. When oxalate of iron is subjected to a sufficient heat in open air, it is first decomposed into carbonic acid, water, and metallic iron, but the finely divided metal is immediately oxidized again and burns with great brilliancy. If, on the contrary, the operation is conducted in hydrogen, the secondary oxidation cannot take place, and large quantities of reduced iron are thus rapidly prepared. However, the gas itself takes no part in the reduction: it acts simply as a non-supporter of combustion. The product, therefore, may probably be called *iron reduced by oxalic acid.*

Lastly comes the *iron reduced by cyanogen,* which is made according to an entirely different principle. It has long been remarked that a black powder containing iron is formed when cyanoferride of potassium is ignited with carbonate of potassa for the purpose of making cyanide of potassium. The powder in question was first supposed to be metallic iron, hence the suggestion was made by a German chemist to purify it by washing and to use it as reduced iron. Since then it has been found that the black powder is not iron, but the carburet of that metal. As, besides, cyanide of potassium is a powerful reducing agent, it occurred to Mr. Charles Maitre, in 1855, to take advantage of these facts to manufacture rapidly large quantities of reduced iron of tolerable quality. The secret of his process has been well kept, for it is only lately that I saw in 'Cooley's Cyclopædia' a similar one, attributed to Mr. Arthur Morgan, which consists in mixing four parts of sesquioxide of iron with three parts of carbonate of potassa and eight parts of cyanoferride of potassium. The two last chemicals being dried and powdered, the whole is thrown by portions into a red-hot crucible, and the heat is continued until all effervescence has ceased; when cold the mass is powdered, washed, and dried rapidly. Unfortunately the powder cannot be dried in that manner without almost complete oxidation. An important point is left out, which I shall explain presently. Maitre's formula was as follows:—

Take of	Ferrocyanide of Potassium	330 parts.
	Carbonate of Potassa	90 „
	Sesquioxide of Iron	150 „

Dry and powder the two first substances, mix with the oxide, and heat in an iron pot until effervescence ceases. Then throw the incandescent semi-fluid mass, by small portions, into boiling distilled water, and wash rapidly with enough of the same liquid; transfer the moist powder to a wide mouth bottle and *shake it with strong alcohol*, when the product can be dried without fear of oxidation. The washings should contain nothing but cyanate of potassa, if the proportions are exact, which I would not warrant, and if the operation has been successful. The reduced iron thus obtained is usually of a fair colour, and rich in metal, but it is rather heavy. Its principal fault is that it always contains more or less carburet of iron, which is easily detected by the smell of the gas evolved when it is treated by an acid. The metallic strength of this variety of reduced iron cannot be estimated from the volume of gas it produces, unless the proportion of carbon be first determined by one of the processes (chloride of copper, etc.) used for estimating carbon in cast iron. I have not met with any sample of the kind in the market.

Conclusion.—The United States Pharmacopœia gives excellent tests for iron by hydrogen, although no quantitative test is indicated; but I believe that, in that respect, our national Pharmacopœia has been wiser than some foreign authorities, for a doubtful test is worse than no test at all. This omission I would propose to remedy by adding, "one gramme . . . . . should at least generate 200 cubic centimetres of hydrogen," if, after trial by competent persons, the gas process is found sufficiently accurate and easy to manage.

In regard to the qualitative tests I would insist on a compliance with the demands of the Pharmacopœia. Iron by hydrogen *must* ignite when it is touched with a lighted taper, and produce an almost odourless gas when it is dissolved in an acid. This last condition ought to be made imperative. Pharmacists may, by insisting on it, compel manufacturers to furnish a better product, for the demand will always bring the supply.

MINERAL WATERS IN ITALY.

In a recent report upon the province of Parma, Mr. Colnaghi, Her Majesty's Consul at Florence, gives the following account of the mineral waters of the province:—

"Among the principal mineral waters of the province must be mentioned those of Salso Maggiore, a village placed on the last spurs of the Sub-Apennine hills before they lose themselves in the vast Emilian plain, and about 9 kilos. by a good road from the station of Borgo San Donnino.

"The waters are various. Besides the natural acidulo-ferruginous springs, many wells have been sunk in the course of centuries, from which literally any quantity of saline water (acqua salsa) can be obtained.

"The waters at Salso Maggiore, Salso Minore, and Pozzuolo are iodo-saline; those of the Cento Pozzi contain bromine in addition. The most important supply exists in the village of Salso Maggiore, where a commodious bathing house is established. In addition to its medical qualities, the water supplies excellent salt, of which from 1500 to 1600 Italian tons are annually extracted from 10,000 cubic mètres of water, under the management of the Marquis della Rosa, the present concessionaire. The product is bought by Government at the contract price of 60 lire per ton, so that the gross annual value is from 90,000 to 96,000 lire. M. della Rosa is in possession of a process for extracting the iodine from the mother liquor.

"These waters are met with in the miocene chalk formation, and are extracted mechanically by means of an artesian well, sunk about 1867, 306 mètres in depth, and 0·22 in diameter. When the well was finished a quantity of carburetted hydrogen gas was set free. This is collected in a gasometer, and used to evaporate the salt in one of the cauldrons under which a hundred jets burn. The Marquis della Rosa, when Syndic of Salso Maggiore, proposed to light the village with this natural gas, but his proposition was rejected; and now, at the mouth of a gas well, petroleum from America is burnt. The waters of Salso Maggiore have long been known, and are said to have been utilized before the Christian era.

"Under the first kingdom of Italy these works were all in activity, but after the fall of the Emperor Napoleon the establishment of Cento Pozzi was suppressed, and now the operations are limited to the works of Salso Maggiore.

"The sulphur springs and bathing establishment of Tabiano, 9 kilos. from the railway station of Borgo San Donnino, are found near the village, close to the Rivacchia torrent. The principal spring, issuing near the church, yields 16 hectolitres per diem; the other two are insignificant.

"The formation in the neighbourhood of the baths consists of pliocene clays. The village of Tabiano is built on porous argillaceous tufa, rich in marine fossils, and containing in many places, and especially in the neighbourhood of the springs, crystals of native sulphur in cavities."

TEA CULTIVATION IN JAPAN.

The following information respecting the cultivation and preparation of tea in Japan is taken from a report by Mr. Robertson, Her Majesty's Consul at Komagawa:—

"Tea is said to have been first introduced in Japan from China in the year 782, but it did not come into universal use until 1190. The districts which have a reputation for the best tea are those of Uji, Daigo, and Togano, situated in Yamashiro. Surumi, in Omi, takes next rank, but the shrub is very generally grown throughout the Empire. The ground best adapted for its cultivation exhibits a reddish soil, mixed with small stones, open to the south and east, but shut in from the north and west. Plantations are situated in warm but yet temperate climates. The plant blossoms late in autumn, and the nut or seed follows the flower. These nuts, however, do not ripen until the winter of the ensuing year. When ripe the nut bursts and the seed falls to the ground. This is known as the 'ochiko,' and is reckoned the best for sowing. They are placed in bags and stored. The seeds are sown in the course of the last month of the year. Patches of ground measuring six feet square are marked out, these are divided off in three parts, in each of which holes of little over a foot in diameter are dug; manure is used, and after the lapse of two days a small quantity of seed is sown in each hole; about an inch of light soil is then sprinkled over the seed. The seedlings will show up early in summer. In the ensuing year the seedlings are carefully protected from the cold. In the second year liquid manure is applied, but solid manure is not used until the third year. If the plantation is a very good one the leaves are picked immediately after the third year. The time for picking depends upon the temperature of the season, but the most fitting time is when the shrub is in what is known as the three leaf stage, and when summer has well set in. This picking makes the best tea. When four or more leaves appear they are somewhat dry in consistency, and make inferior tea. Choosing a fine bright day the women and children in the tea growing districts get together, each with a basket in hand, and set to work picking. The best leaves forming first class tea are picked; after thirty days comes the second picking for medium teas.

"The leaves are taken to the houses, and boiling water got ready in a range of cauldrons filled with water to about five-tenths of their capacity. About half-a-pound of leaves are placed in each steamer over these cauldrons, a lid is placed on the steamer, and the leaves are thus steamed for a brief period, then taken off, spread on matting, and cooled with a fan. Next, they are removed to the firing pan, and tossed and rubbed rapidly to and fro with the hands until the steam has dried off. They are now shifted to a pan placed over a light fire, where, after having been left for one night, they are completely dried. The leaves are then passed through a sieve to get rid of the stalks, and a rough cleaning process is gone through to remove conspicuous impurities, after which they are again carefully sifted. The sieves are made of different sizes, each of a successive grade adapted to every stage of sorting from rough to fine. They are classified into first, second, and third class, and an expert is employed who parcels out the leaves into good, medium, and inferior. When this has been done the tea is again fired, cooled, and placed either in cedar wood boxes or packed up in matting, and is now ready for transmission to different parts of the country, or it is placed in jars with the lids carefully secured so as to exclude all air. For storage a well ventilated place is selected, damp being very injurious to tea. When sudden changes take place in the temperature, as is not unfrequently the case in spring, summer, autumn, and winter, the leaves are taken out and refired, so as to ensure their retaining their full colour and flavour.

"'Powder tea' is esteemed a great luxury among Japanese, and, although coming from the same seed as ordinary tea, is cultivated in a different manner, thus developing a leaf different in consistency and flavour. This tea, of two kinds, known as 'koicha' and 'usucha,' is made from very old shrubs selected from the best grounds or plantations. These shrubs are very freely manured some ten times in the year for 'koicha,' and some six times for 'usucha.' About the end of March, or beginning of April, these shrubs are surrounded on all sides, in addition to being covered, with a bamboo screen work, so as to protect from frost. This screen work is removed as soon as summer has well set in. When the leaves have been picked they are steamed for about half-a-minute, spread out on matting, and cooled. Then follows the same process as with ordinary tea, namely, firing first over a quick, then over a slow fire, the only difference being that the leaves are turned about with a stick and not with the hand. When about half dried the leaves are placed on trays, and dried gradually before a light fire, after which they are passed through bamboo sieves; finally they are spread out on sheets of paper, each leaf being picked out singly. Great care is shown in the mode of storage of this particular kind of tea. The leaves are placed in tin or white metal jars, which again are inclosed in wooden boxes, and packed with a certain quantity of common leaf. This preserves the scent and flavour for a long time. When about to use for drinking, a sufficient quantity is taken out of the metal jar, placed in a small hand tea-mill, and slowly ground into a very fine powder. This powder is removed with a feather and placed in an air-tight jar. Boiling water is got ready, and when just at boiling-point about one-quarter of an ounce of tea-powder is put into a tea-cup, and boiling water poured on to suit the taste. The whole is then rapidly stirred with a bamboo stick, especially made for the purpose, until a good froth is produced, when the tea should be drunk. Much ceremony is observed in the drinking of this particular tea."

THE PHYSICAL PROPERTIES OF MATTER IN THE LIQUID AND GASEOUS STATES UNDER VARIED CONDITIONS OF PRESSURE AND TEMPERATURE.*

BY DR. ANDREWS, F.R.S.

The investigation to which this note refers has occupied me, with little intermission, since my former communication in 1869 to the Society, "On the Continuity of the Liquid and Gaseous States of Matter." It was undertaken chiefly to ascertain the modifications which the three great laws discovered respectively by Boyle, Gay-Lussac, and Dalton undergo when matter in the gaseous state is placed under physical conditions differing greatly from any hitherto within the reach of observation. It embraces a large number of experiments of precision, performed at different temperatures and at pressures ranging from 12 to nearly 300 atmospheres. The apparatus employed is, in all its essential parts, similar to that described in the paper referred to; and so perfectly did it act, that the readings of the cathetometer, at the highest pressures and temperatures employed, were made with the same ease and accuracy as if the object of the experiment had been merely to determine the tension of aqueous vapour in a barometer tube. In using it, the chief improvement I have made is in the method of ascertaining the original volumes of the gases before compression, which can now be known with much less labour and greater accuracy than by the method I formerly described. The lower ends of the glass tubes containing the gases dip into small mercurial reservoirs formed of thin glass tubes, which rest on ledges within the apparatus. This arrangement has prevented many failures in screwing up the apparatus, and has given more precision to the measurements. A great improvement has also been made in the method of preparing the leather washers used in the packing for the fine screws, by means of which the pressure is obtained. It consists in saturating the leather with grease by heating it *in vacuo* under melted lard. In this way the air enclosed within the pores of the leather is removed without the use of water, and a packing is obtained so perfect that it appears, as far as my experience goes, never to fail, provided it is used in a vessel filled with water. It is remarkable, however, that the same packing, when an apparatus specially constructed for the purpose of forged iron was filled with mercury, always yielded, even at a pressure of 40 atmospheres, in the course of a few days.

It is with regret that I am still obliged to give the pressures in atmospheres, as indicated by an air or hydrogen-manometer, without attempting for the present to apply the corrections required to reduce them to true pressures. The only satisfactory method of obtaining these corrections would be to compare the indications of the manometer with those of a column of mercury of the requisite length; and this method, as is known, was employed by Arago and Dulong, and afterwards in his classical researches by Regnault, for pressures reaching nearly to 30 atmospheres. For this moderate pressure a column of mercury about 23 metres, or 75 feet, in length had to be employed. For pressures corresponding to 500 atmospheres, at which I have no difficulty in working with my apparatus, a mercurial column of the enormous height of 380 metres, or 1250 feet, would be required. Although the mechanical difficulties in the construction of a long tube for this purpose are, perhaps, not insuperable, it could only be mounted in front of some rare mountain escarpment, where it would be practically impossible to conduct a long series of delicate experiments. About three years ago I had the honour of submitting to the Council of the Society a proposal for constructing an apparatus which would have enabled any pressure to be measured by the successive additions of the pressure of a column of mercury of a fixed length; and working drawings of the apparatus were prepared by Mr. J. Cumine, whose services I am glad te have again this opportunity of acknowledging. An unexpected difficulty, however, arose in consequence of the packing of the screws (as I have already stated) not holding when the leather was in contact with mercury instead of water, and the apparatus was not constructed. For two years the problem appeared, if not theoretically, to be practically impossible of solution; but I am glad now to be able to announce to the Society that another method, simpler in principle and free from the objections to which I have referred, has lately suggested itself to me, by means of which it will, I fully expect, be possible to determine the rate of compressibility of hydrogen or other gas by direct reference to the weight of a liquid column, or rather of a number of liquid columns, up to pressures of 500 or even 1000 atmospheres. For the present it must be understood that, in stating the following results, the pressures in atmospheres are deduced from the apparent compressibility, in some cases of air, in others of hydrogen gas, contained in capillary glass tubes.

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* A paper read before the Royal Society.

In this notice I will only refer to the results of experiments upon carbonic acid gas when alone or when mixed with nitrogen. It is with carbonic acid, indeed, that I have hitherto chiefly worked, as it is singularly well adapted for experiment; and the properties it exhibits will doubtless, in their main features, be found to represent those of other gaseous bodies at corresponding temperatures below and above their critical points.

Liquefaction of Carbonic Acid Gas.—The following results have been obtained from a number of very careful experiments, and give, it is believed, the pressures, as measured by an air-manometer, at which carbonic acid liquefies for the temperatures stated:—

Temperatures in Centigrade Degrees.	Pressure in Atmospheres.
0·00	35·04
5·45	40·44
11·45	47·04
16·92	53·77
22·22	61·13
25·39	65·78
28·30	70·39

I have been gratified to find that the two results (for 13·09° and 21·46°) recorded in my former paper are in close agreement with these later experiments. On the other hand, the pressures I have found are lower than those given by Regnault as the result of his elaborate investigation ('Mémoires de l'Académie des Sciences,' vol. xxvi., p. 618). The method employed by that distinguished physicist was not, however, fitted to give accurately the pressures at which carbonic acid gas liquefies. It gave, indeed, the pressures exercised by the liquid when contained in large quantity in a Thilorier's reservoir; but these pressures are always considerably in excess of the true pressures, in consequence of the unavoidable presence of a small quantity of compressed air, although the greatest precautions may have been taken in filling the apparatus. Even $\frac{1}{500}$th part of air will exercise a serious disturbing influence when the reservoir contains a notable quantity of liquid.

Law of Boyle.—The large deviations in the case of carbonic acid at high pressures from this law appeared distinctly from several of the results given in my former paper. I have now finished a long series of experiments on its compressibility at the respective temperatures of 6·7°, 63·7°, and 100° C. The two latter temperatures were obtained by passing the vapours of pyroxylic spirit (methyl-alcohol) and of water into the rectangular case with plate-glass sides, in which the tube containing the carbonic acid is placed. The temperature of the vapour of the pyroxylic spirit was observed by an accurate thermometer, whose indications were corrected for the unequal expansion of the mercury: while that of the vapour of water was deduced from the pressure as given by the height of the barometer and a water-gauge attached to the apparatus. At the lower temperature (6·7°) the range of pressure which could be applied was limited by the occurrence of liquefaction; but at the higher temperatures, which were considerably above the critical point of carbonic acid, there was no limit of this kind, and the pressures were carried as far as 223 atmospheres. I have only given a few of the results; but they will be sufficient to show the general effects of the pressure. In the following tables p designates the pressure in atmospheres as given by the air-manometer, t' the temperature of the carbonic acid, ϵ the ratio of the volume of the carbonic acid under one atmosphere and at the temperature t' to its volume under the pressure p' and at the same temperature, and θ the volume to which one volume of carbonic acid gas measured at 0° and 760 millimetres is reduced at the pressure p and temperature t':—

Carbonic Acid at 6·7°.

p. Atmospheres.	t'. Degrees.	ϵ.	θ.
13·22	6·90	$\frac{1}{14·36}$	0·07143
20·10	6·79	$\frac{1}{23·01}$	0·04456
24·81	6·73	$\frac{1}{29·60}$	0·03462
31·06	6·62	$\frac{1}{39·57}$	0·02589
40·11	6·59	$\frac{1}{58·40}$	0·01754

Carbonic Acid at 63·7°.

p. Atmospheres.	t'. Degrees.	ϵ.	θ.
16·96	63·97	$\frac{1}{17·85}$	0·06931
54·33	63·57	$\frac{1}{66·06}$	0·01871
106·88	63·75	$\frac{1}{185·90}$	0·00665
145·54	63·70	$\frac{1}{327·30}$	0·00378
222·92	63·82	$\frac{1}{446·90}$	0·00277

Carbonic Acid at 100°.

p. Atmospheres.	t'. Degrees.	ϵ.	θ.
16·80	100·38	$\frac{1}{17·33}$	0·07914
53·81	100·33	$\frac{1}{60·22}$	0·02278
105·69	100·37	$\frac{1}{137·10}$	0·01001
145·44	99·46	$\frac{1}{218·90}$	0·00625
223·57	99·44	$\frac{1}{380·90}$	0·00359

These results fully confirm the conclusions which I formerly deduced from the behaviour of carbonic acid at 48°, viz., that while the curve representing its volume under different pressures approximates more nearly to that of a perfect gas as the temperature is higher, the contraction is nevertheless greater than it would be if the law of Boyle held good, at least for any temperature at which experiments have yet been made. From the foregoing experiments it appears that at 63·7° carbonic acid gas, under a pressure of 223 atmospheres, is reduced to $\frac{1}{447}$th of its volume under one atmosphere, or to less than one-half the volume it ought to occupy if it were a perfect gas and contracted in conformity with Boyle's law. Even at 100° the contraction under the same pressure amounts to $\frac{1}{381}$ part of the whole. From these observations we may infer, by analogy, that the critical points of the greater number of the gases not hitherto liquefied are probably far below the lowest temperatures hitherto attained, and that they are not likely to be seen, either as liquids or solids, till much lower temperatures even than those produced by liquid nitrous oxide are reached.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, AUGUST 14, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PROPERTY IN A PRESCRIPTION.

A SHORT time since, a question was asked in our correspondence columns as to the course that should be followed by a pharmacist who is applied to for a copy of a prescription that has been previously dispensed in his pharmacy. The question did not then evoke the expression of opinion that might have been expected, especially as it is one that has an important bearing upon the relations between prescribers and dispensers. The subject, however, is recalled to notice by an angry letter from an M.D., published in the *Lancet* last week, in which the writer describes what he calls a glaring instance of "how workers are robbed in the present day of their just rewards," the dishonest drones implied in the metaphor being such dispensers as supply their customers upon application with a copy of a prescription.

There does not appear to be the promise of any benefit that would result from importing into the discussion such imputations as "robbery" and "wholesale defrauding of prescribers." On the contrary we would venture to say that if there be any truly objectionable practice prevalent in respect to copies of prescriptions it is due as much to the absence of any accepted rule as to any other cause. Moreover, we are confident that an expression of opinion from the medical profession upon this point would not only be received with respect, but heartily welcomed.

But it must be borne in mind that to meet with general acceptation it is necessary that any proposed rule should be based upon a broad and practical view of the question. It can be easily understood that the Utopia of some prescribers would be a land in which sick folk would neither attempt to doctor themselves nor allow their friends to do so; where the only medicines taken would be according to the freshly written prescription of an authorized practitioner. But we have to take the world as we find it, and in a day when the book market is flooded with receipt-books—between which and numerous treatises published by medical gentlemen there are many points in common—it would be unreasonable to expect that the pharmacist would consent to be bound by a hard and fast rule that he should on no occasion furnish a copy of a prescription that has been once dispensed.

Even with respect to prescriptions undoubtedly given by prescribers to particular patients, the question is not so one-sided as the correspondent of the *Lancet* appears to assume. When Mr. HOWDEN, four or five years ago, gave his interesting account of a visit to the United States, he described a state of things that was positively enviable and might well have been pointed to as an example. He stated that the medical practitioner there invariably writes prescriptions, and that on the other hand the pharmacist never prescribes. Further, that the physician is very jealous of his perogative, and will occasionally endeavour to prevent a pharmacist from repeating a prescription unless a second fee has been received, whilst a copy given for the use of the patient's friends would be considered an outrage. But it is by no means clear that this represents the universal practice in the United States although there would appear to be some ground for the boast of the American pharmacist that in respect to prescriptions he is ahead of the British *confrère.* For a very carefully written paper on the subject, contributed by Mr. M. S. BIDWELL to the *American Journal of Pharmacy* for October last, contained the assumption that by universal custom, sanctioned by law, wherever the statutes touch the subject, a patient is entitled to a copy of the prescription. Mr. BIDWELL also argued cogently, we think, that so far as the pharmacist is concerned the prescription is of the nature of a confidential communication from the physician to him, of which for obvious reasons he has the right of custody, but which he has not the right to make public. But the patient, being an interested party, has, so Mr. BIDWELL considers, the right to a copy.

Nevertheless, upon this right to a copy, or to the original prescription, as is the practice commonly in this country, hangs the whole question. It would be expecting more than Spartan virtue in a tradesman to require him to refuse to oblige a customer who comes with money in one hand and a prescription in the other, unless he were assured that the prescription had never been previously used. As to the supplying of an extra copy of a prescription, we are inclined to think that the practice of making high charge for it, though denounced by *M.D.* in his letter, is really about the best way of meeting the difficulty. The nearer the fee for a copy approaches that for an interview with the physician the less likely it would appear to be that any person would run the risk, for economical reasons, of taking a medicine that would do positive harm.

However, the question is one we have no desire to prejudge, and whilst we invite a free expression of opinion in our own columns we are not without hope that some of our medical contemporaries may see fit to bring the matter temperately before their readers.

EDITORIAL CLAIRVOYANCE.

A CURIOUS and unusual advertisement that appeared in the *Echo* and other papers recently, has furnished the *Medical Times and Gazette* with a text for a homily on the sale of poison. The advertisement was as follows :—

URGENT CAUTION !—On Monday evening, a man, having the appearance of a sailor, purchased at a chemist's in the City, a box of Beecham's Pills, Senna leaves, Epsom salts, and glycerine. On leaving, he took away an unlabelled parcel by mistake, instead of the Epsom salts. He is hereby CAUTIONED NOT TO MAKE USE of the contents of the said parcel for any purpose whatever.

After expressing a hope that the caution may meet the eye of the purchaser before mischief happens, our contemporary asserts that it is clear the advertiser is open to a charge of carelessness on two grounds,—namely, in supplying a medicine without a label and in giving his customer poison instead of a harmless purgative—and then he speculates whether the poison supplied was oxalic acid or something still more deadly. We must confess we quite envy such clearness of vision, which discerns so much that is hidden to the ordinary eye. To us the advertisement did not reveal that the unlabelled parcel was supplied to the customer, in fact it says explicitly that he took it by mistake ; neither is it "clear" to us, whatever we conjecture, that it contained a poison. But the danger of mistake in "jumping at conclusions" is shown by the fact that a paragraph which at first sight might appear to be tinged by an antagonistic feeling proves to be a vehicle for a compliment to English pharmacists. For after referring to the substitution of sulphate of atropia for carbonate of lithia which was recently the subject of an investigation in France (see vol. v. p. 1035), our contemporary adds :—"We mention this case to show that mistakes in dispensing are made in France as well as in England ; but they are happily—in this country at least—of such rare occurrence, that they serve when they do happen to give us fresh confidence in our pharmacists, through whose hands so many thousands of prescriptions annually pass without mishap, although the issue of life and death often hangs upon their accuracy and care."

THE CONFERENCE MEETING.

By the courtesy of Professor ATTFIELD we have been informed that communications on the following subjects are expected to be read at the forthcoming meeting :—

1. Linimentum Terebinthinæ Aceticum. By W. SYMONS, F.C.S.
2. Aqua Chloroformi. By T. B. GROVES, F.C.S.
3. Researches on the Oxidation of Essential Oils. By CHAS. T. KINGZETT, F.C.S.
4. The Microscopy of Natal Arrowroot. By T. GREENISH, F.C.S.
5. On the Use of Optical Analysis in Pharmacy. By Mr. H. POCKLINGTON.
6. Rodger de la Bastie's Hardened Glass. By Mr. H. POCKLINGTON.
7. The Possible Applications of Salicylic Acid in Pharmacy. By F. B. BENGER, F.C.S.
8. Report on the Magnesian Carbonates of Trade. By Mr. J. C. THRESH.
9. Fluid Preparations of Cantharides. By Mr. JAMES DEANE.
10. Contributions to our Knowledge of *Chondodendron tomentosum*. By JOHN MOSS, F.C.S.
11. Report on Jaborandi. By Mr. A. W. GERRARD.
12. Report on the Phosphate of Calcium of Trade. By Mr. J. F. BROWN.
13. Note on the Preservation of Hydrocyanic Acid. By J. WILLIAMS, F.C.S.
14. Japanese Oil of Peppermint. By Dr. C. R. ALDER WRIGHT, F.C.S.
15. New Derivatives from the Opium Alkaloids. By Dr. C. R. ALDER WRIGHT, F.C.S.
16. The Horsley-Stoddart Method of Estimating Fat in Milk. By A. H. ALLEN, F.C.S.
17. Citrate of Lithium. By CHARLES UMNEY, F.C.S.
18. Commercial Compound Colocynth Pill. By Mr. W. LAIRD.

We are requested to urge all gentlemen intending to attend the Conference to send their names at once to the Honorary Local Secretary of the Conference, Mr. JOHN PITMAN, 50, Redcliff Hill, Bristol.

FOOD FROM THE OCEAN.

VICE-CONSUL CROWE, in his annual report on the manufactures, commerce, etc., of Sweden and Norway, gives some interesting details of the fisheries of those countries, and among other matters of novelty he describes "fish flour," which has been manufactured within the last few years, though not yet made in any great quantity.

The flour is prepared from dried fish of the first quality ; it is thoroughly dessicated, and then ground in a mill. There are two qualities, the coarse and fine ground. It is especially the former which has found favour with the public ; from it an excellent dish of preserved fish can in a short time be prepared, while the finer flour is used for fish puddings, a dish highly appreciated in the country.

He also states that the manufacture of fish guano has at length been successfully carried out, and that large quantities of the refuse of the fisheries and salting establishments are now being utilized in this way and exported for use as manure, so as indirectly to provide a further supply of available food. The largest factory of this kind is at the mouth of the Tana River : it employs forty workpeople, and produces from 6 to 8 tons daily.

Consul MURRAY reports of the lobster packing in Maine that it has become so enormous as to cause serious apprehensions. The supply will not last many years longer at the present rate of canning. In 1873 nearly a quarter of a million dozen tins of lobsters were put up. The export of preserved salmon from Maine, Oregon, and San Francisco is also carried on to an enormous extent.

ON Wednesday last, the Sale of Food and Drugs Bill and the Irish Pharmacy Bill received the Royal Assent and became law. The Acts have not yet been issued, but we shall take the earliest opportunity of placing them before our readers in their perfect form.

MR. W. A. SHENSTONE, Bell Scholar in session 1871-72, and for some time Junior Demonstrator in the Society's Laboratory, has been appointed Science Master at the Church of England College, Taunton.

Proceedings of Scientific Societies.

PARIS SOCIÉTÉ DE PHARMACIE.

A meeting of this Society was held on Wednesday, July 7, under the presidency of M. Planchon. Among the subjects brought forward was a note on the root of *Petiveria tetrandra*, as a sudorific and stimulant.

Artificial Colouring of Brandies.

M. Carles read a note upon the artificial colouring of brandies. It is known that brandy acquires certain qualities by age, and one of the most manifest of these, when the brandy is kept in wooden casks, is a deepening of the yellow colour, due to a slow solution of the extractive principle of the wood in the spirit. Hence it is a frequent fraud to give brandy the appearance of age by an artificial colouring, and the substance most often employed for the purpose is caramel. To experienced palates this addition is to a certain extent perceptible, but in albumen and sulphate of iron the author considers two tests are available by which the purity or otherwise of brandy in this respect can be easily ascertained.

If the white of egg be added to two different portions of brandy, one artificially coloured and the other not, to the extent of about one-sixth, and they be then shaken, the mixtures become very turbid. Upon standing, however, a limpid liquor comes to the top, which retains the yellow colour in brandy to which caramel has been added, but is completely colourless in the brandy coloured naturally from the wood. If the two liquids be separated from their respective precipitates by filtering, the difference is much more perceptible.

Again, if a crystal of sulphate of iron be dissolved in a little water, and a few drops of the solution be added to a suspected brandy, a greenish-black coloration will be manifested, and in proportion as the yellow colour of the spirit has been naturally acquired by ageing in the cask. On the contrary, the artificially coloured brandy does not manifest any change.

Lead in Tinned Vessels.

M. Thibault stated that having had occasion to use a still that had recently been newly tinned, and which had been cleaned by passing steam through it for several hours, for the distillation of a spirituous maceration of some antiscorbutic plants, he noticed some black flocks floating on the surface of the aromatic water, which proved to consist of sulphide of lead. This induced him to examine the tinning composition, and he found that it contained 44·75 per cent. of lead, although it had been guaranteed by the manufacturer as pure tin.

The Action of Saliva.

M. Petit communicated to the Society the result of his experiments upon saliva. He had found that 1 gram of ptyalin had the power of dissolving from 10,000 to 20,000 grams of starch, producing a quantity of sugar varying between 3500 and 7000 grams.

Mahogany Wood as an Astringent.

M. Latour described some researches he had made in conjunction with M. P. Cazeneuve, upon the chemical composition of mahogany wood, and an aqueous extract obtained from it. The action of ether, alcohol, and water upon mahogany sawdust had been observed, and a colourless crystalline principle obtained, together with two very acid coloured principles. One of the latter was very soluble in water, and possessed a strong astringency; the other was insoluble in water, but soluble in alcohol and in solutions of alkaline carbonates, to which it communicated a very rich carmine red colour. The crystalline principle, obtained in very fine needles, was catechin ($C_{28}H_{18}O_8$, H_2O). M. Latour said the extract of mahogany had been used as an astringent, but its composition had not yet been determined.

ROYAL INSTITUTION OF GREAT BRITAIN.

On Accidental Explosions.*

BY F. A. ABEL, F.R.S.

(*Concluded from page* 117.)

Many of the most distressing accidents connected with firework-manufacture have occurred in dwelling houses of the lower class, situated in crowded districts, in which not unfrequently several families reside, and where people, generally in very poor circumstances, have carried on the manufacture of squibs, crackers, or pin-wheels, which they have either retailed, or generally supplied to more extensive firework makers or sellers. This production of fireworks has almost always been carried on illegally, *i. e.* without the maker having obtained the licence necessary, under an existing Act of Parliament, to enable him to manufacture fireworks; hence work of this kind has mostly been conducted as secretly as possible, other dwellers in the same house being often unaware of the dangerous operations carried on in the house itself, or sometimes in small sheds or out houses. It can only be matter of surprise that firework accidents have not been more numerous, when it is remembered that the processes of mixing the firework compositions, ramming them into cases, etc., have frequently been carried on by these illegal makers in the common dwelling room, the several members of the family old and young taking part in the work, while cooking and even smoking may have been going on in the same room, and the work continued by candle light in busy seasons, the powder or finished fireworks being placed in a cupboard in the room, or perhaps even in places affording less protection. This illegal firework making has been greatly checked of late by vigilance on the part of the Government officials, and it is to be hoped that it will disappear almost entirely when new regulations are introduced which will facilitate the profitable employment of these small firework makers upon sufficiently extensive and properly organized premises of large manufactories, thus reducing the temptations which have hitherto existed for large vendors to purchase cheap fireworks of the poor people who carry on the manufacture illegally, and for the latter to convert their dwellings into sources of danger to themselves and their neighbours.

The fearful recklessness with which gunpowder and other explosive agents are handled and used by uneducated persons, such as these small firework makers, of whom there are large numbers in the mining and manufacturing districts, and by the most extensive consumers of powder, namely, the miners and quarrymen, can scarcely be realized by any one who has not had opportunity to acquire by personal observation a knowledge of the state of things. A miner may be seen with his naked lamp or tallow candle fixed in his hat or plastered against the rock close to the blast-hole he is about to load, pouring the powder into his rough measure, or his cartridge case, from the flask produced from a pocket which is often also the receptacle of lucifer matches, and at times of a half-finished pipe of tobacco (if he has not the pipe actually alight in his mouth). Having inserted the charge into the hole, he will proceed with the operation of *tamping*, which consists in ramming débris of the rock into the hole as tightly as possible by means of a heavy iron tool and a hammer. Grains of powder lying upon the sides of the hole, and sometimes forming a train to the charge at the bottom, are thus frequently submitted to most violent friction, and it is wonderful that accidents in this process of loading are not more frequent; but when, in spite of oft-repeated cautioning, the miner proceeds to submit to the same, and sometimes even to more violent treatment, a cartridge of gun-cotton, dynamite, or other explosive agent ignited more readily than gunpowder by friction (and which is tightly confined in the blast-hole by the act of ramming with a heavy tool), it is not a matter of surprise that fatal accidents should occur during the employment of these substances by the miner, although he is exposed to less danger with them when carrying them about his person or handling them for actual use, because they are not violently explosive in small quantities when unconfined.

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* Lecture delivered at the Royal Institution of Great Britain, Friday, March 12, 1875.

It is, however, more particularly from the fact that there are no regulations forbidding or restricting the making up, in dwelling houses, of blasting cartridges, mining fuzes and the so-called powder-straws used in blasting, that the chief liability to accidental explosions in mining districts arises. Miners are constantly in the habit of keeping considerable quantities of powder in their dwelling rooms, and making up their cartridges or fuzes (straws) at night. In a recent official report the head constable of Middlesborough stated, "In one case, at Eston, the roof of a house was blown off, and on inquiries being made respecting it the man . . . . stated that he was tallowing the end of the straw, when he put it too near the candle flame, which ignited the straw; he threw the straw away and it fell into the barrel of powder, which exploded." The head constable of Richmond in Yorkshire reported as follows: "I have seen miners with a quarter cask (25 lb.) making their charges by the fire frequently, and they generally keep it under the bed or in the pantry, where their children have access to it." At Wigan a collier was filling cartridges from a can of powder, when a spark from the candle fell into the can and produced a serious explosion. In another instance a boy was left alone in a house where an open barrel containing 7 lb. of powder, with a piece of wood simply placed over the head, was in the bedroom. A box of matches was known to be in the room, and it is supposed that the boy, who died from injuries received, exploded the powder by means of them.

Numerous illustrations such as these could be quoted of the fearfully careless manner in which powder is very generally dealt with in manufacturing districts. It naturally follows that other explosive agents, such as dynamite and gun-cotton, should be treated with similar and perhaps even greater recklessness. The apparently less dangerous nature of such materials when unconfined tends to render the miner even more regardless of precautions, and hence it is unquestionably wrong to foster the notion of the safety of these materials in the hands of the miner, especially as it frequently occurs that the men who use these materials are unable to read the printed instructions which are supplied by the manufacturers with the cartridges for the purpose of guarding against accident. Thus several frightful accidents have occurred through direct exposure to the fire of frozen cartridges of dynamite for the purpose of thawing them,* and the apparently harmless nature of dynamite and compressed gun-cotton has on more than one occasion caused the miner, when a charge has become jammed in a blast-hole, to endeavour to drive it home with his rammer, with all the force at his command, with what result need scarcely be stated.† The wholesome effect of stringent regulations which keep constantly before the minds of the ordinary operative the dangerous nature of gunpowder and all operations connected with it and with other explosives, is well exemplified by the care and caution which generally become developed as characteristics in the men employed in Government factories of this class; and although there is but little hope of the possibility of enforcing even the mildest precautionary measures with the miners themselves, it can hardly be doubted that their minds must become to some extent influenced by example, and that, by constantly witnessing the strict enforcement of precautions at the stores to which they resort to obtain their supplies, they must in time become impressed with the necessity for the exercise of some amount of care in handling explosive substances.

It does not admit of dispute, however, that the recklessness of the miners has actually been fostered hitherto by the utter disregard of all ordinary precautions which they must but too frequently witness at the stores where the powder is sold or issued to them. The practices of small dealers in gunpowder present illustrations of ignorance and recklessness if anything even more appalling than those which the habits of the miners furnish. The manner in which powder is often dealt with by those in charge of the stores or magazines in quarries or mines, and who have to issue supplies to the men, may be illustrated by one or two examples from a report to the Home Office by Major Majendie. At a quarry in Scotland he was conducted by the man in charge to a magazine containing about six cwt. of powder. For this purpose the man lit a naked candle; as they entered the door it was blown out by the draught, but the man produced some matches from his pocket and rekindled it. When asked how he issued the powder to the men, he held the candle with his left hand, and ladled the powder out with the other hand. The practice of smashing in the head of a powder barrel with an iron crowbar is stated to be a very common one, or else a large stone is used, or a hole is bored into the head with a steel bit; and as an extreme instance of recklessness the case of a man is quoted who was in the habit of boring into the barrels with a red-hot poker; on one occasion the lid of the barrel being thinner than usual, the heated iron was thrust into the contents of the barrel, and the man fell a victim to his very original mode of dealing with packages of gunpowder.

In some mining districts it has been customary to pay no regard whatever to the suitability, in point of safety, of the localities selected for the storage of powder. It has not unfrequently been kept in large quantities (*e.g.* 500 lb.) in ordinary buildings, quite close to dwelling houses. An instance is quoted in an official report by a chief constable, of about three cwt. of powder being kept in a colliery lodge constantly used by workmen, and in which a fire was regularly kept. Even where magazines have been provided, in connection with extensive mines and quarries, many instances are on record of gross ignorance or carelessness in regard to the precautions essential to the safe handling of gunpowder. The men who go to the magazines for supplies of powder, and even the man who is in charge, are allowed to enter the building in their iron-shod dirt-covered boots, often coming to the store smoking, the pipe being merely put into the waiscoat pocket when they get close to the building; the barrels containing loose powder are often left unheaded, and powder grains lie upon the floor; the door of the magazine in some instances opens inwards, scraping the floor as it is pushed open. A magazine in which this utter want of precautions was observed in the most extreme degree, contained several tons of gunpowder. In illustration of the way in which explosions occur at such stores, it may be mentioned that some children saw some loose powder outside a store (in Cornwall), and set fire to it; the contents of the building were thus exploded, there being a train of powder grains leading under the door to the stock of powder in the building.

The strenuous exertions of the Government inspectors during the last few years have already resulted in a considerable amelioration of this lamentable condition of things although the existing state of the law affords them little power to enforce simple regulations which are vital to the safety of the people employed, and often of the neighbourhood, but scant regard being too frequently paid to the position of even extensive stores or magazines with reference to contiguous habitations.

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* The necessity for thawing dynamite cartridges before use in cold weather, and the disregard of instructions furnished by the makers for doing this with safety, constitute one of the chief causes of accidents with this material. Fatal explosions have resulted from the placing of cartridges in front of a fierce fire or upon a stove. Quite recently a pit sinker, at Mountain Ash, placed some dynamite in the oven of the fireplace in his house and sat down to breakfast. Before the meal was ended the dynamite exploded, killing the man and injuring two others.

† A fatal accident occurred quite recently at Ebbw Vale in consequence of a man using great force in ramming a dynamite charge into a blast-hole with a wooden rammer. The printed instructions distinctly laid down that the cartridges were never to be rammed. It came out at the inquest that the partner of the man killed could not read.

The fearful explosion which occurred at a gunpowder merchant's magazines at Erith, containing 51 tons of powder, in October, 1864, and the explosion at Liverpool, in the same year, of the ship "Lottie Sleigh," laden with 11½ tons of powder (through the accidental spilling and ignition of some paraffin oil), directed public attention at that time to the existing laws relating to explosives just as forcibly as did the recent explosion in London, and their very defective condition was then, as now, apparent. No steps have been taken since that time, in the way of legislation, to afford the public greater protection from dangers arising out of the storage and transport of gunpowder, or to bring the doings of powder makers and consumers more under legal control, although the Government did, in 1865, contemplate for a time the enactment of new laws relating to explosives.

Very considerable alarm was felt then, as lately again, at the possibility of most calamitous disasters arising out of the collection of very large stores of gunpowder, by powder merchants as well as by the Government, in particular localities, some of them in close proximity to populous districts. In some instances representations to the Home Office, which were followed by efficient inspection, made at the instance of Government by Colonel Boxer, led to the closing of extensive merchants' magazines existing in objectionable positions, or to a considerable reduction in the amount of powder stored in them; but it does not appear that any substantial improvement occurred in the extent to which precautions, vital to the safety of the magazines, were observed or attempted to be carried out by persons in charge of them.

The subdivision of the reserves of gunpowder, which it is the duty of the Government to maintain to as great an extent as is compatible with efficient arrangements of inspection, and with the exigencies of the service in time of war, is unquestionably most advisable. It is admitted to be desirable that the magnitude of depôts of powder at some of the principal establishments should be reduced in extent, and in some instances extensive depôts which existed in close proximity to towns have been removed or reduced to insignificant proportions. It must be borne in mind, however, that the possibility of the explosion of magazines, where powder is simply stored as a reserve, emanates almost exclusively from causes external to the depôts themselves; and that as long as these are situated at such distances from habitations as will secure them against fire reaching any part, the precautions adopted by Government to guard against accidents from electric discharges, and against the possibility of any danger arising within the establishments themselves, render such depôts quite safe, provided operations connected with gunpowder (such as the making up or breaking up of cartridges) are not carried on at or in close proximity to such magazines. It is only in conducting manipulations with gunpowder that danger may arise (from any causes excepting fire or electric discharges); and therefore any operations with powder, such as the making up of cartridges, or any transactions involving the frequent issue and receipt of powder, or the opening or repacking of powder packages, should be imperatively conducted in establishments distinct from those simply devoted to the preservation of reserve supplies.

The recent powder explosion revived the discussion which arose some years ago as to the probable advantages to be derived, in point of safety, from a dilution of gunpowder, for purposes of storage and transport, with some incombustible, non-conducting material, which, by isolating the grains from each other, would prevent the transmission of fire from one to those surrounding it. Although quantities of gunpowder may thus be rendered practically non-explosive, there can be no doubt that the possibilities of accident must be considerably increased by the additional manipulations to which the powder must be subjected in the application of such a safeguard. If, as in the case of compressed gun-cotton, gunpowder could be preserved in a sufficiently wet condition to be perfectly uninflammable, the drying, as a final manufacturing operation, being simply deferred until the material was required for use, the protection afforded by a diluent could be secured without the introduction of any extra operations involving, by their adoption, the usual risks invariably attendant upon manipulations with an explosive. The impracticability of such a course need, however, be hardly pointed out; in this particular respect, therefore, gun-cotton possesses a decided superiority over gunpowder, especially as for almost every purpose to which it can be advantageously applied it may be employed in the wet perfectly uninflammable condition as effectively as if perfectly dry, by the adoption of very simple modes of exploding it.* Supplies of gun-cotton in the condition in which it can actually be used without further preparation may therefore be stored without the precautionary measures indispensable in the case of gunpowder.

Experiments on a considerable scale made by the late Government Committee on gun-cotton, etc., demonstrated conclusively that when stored in *small* quantities (two or three hundred pounds) dynamite and dry gun-cotton are unquestionably much less dangerous in their character than gunpowder. Such quantities, even if confined in strong boxes and contained in buildings filled with inflammable matter, may burn away entirely when these are set on fire, without developing explosion; but the burning of 5 to 6 cwt. of these materials under similar conditions may terminate in an explosion, unless they be less strongly confined; and there is no doubt that very considerably larger quantities, if set fire to, will not even need other confinement, to develop an explosion, than that to which the interior of the mass of explosive is subjected by the external portions, and by the pressure of gas developed by the fierce burning of the substance. The degree of comparative safety with which explosive materials of this description may be stored is therefore regulated by the quantity and the extent of confinement, and hence great caution must be exercised in relaxing in their favour the precautions and restrictions applied to gunpowder. Indeed, the prudence of relaxing them at all is questionable, as the result may be the fostering a sense of security in those who have to use these substances, which, by encouraging negligence and forgetfulness as to the properties of the materials dealt with, may be productive of disastrous results.

A regulation of the quantity of an explosive stored in one place, and of the mode of storage, by the nature of the particular material, and the circumstances which may tend to develop its violent explosion, would involve a combination of complex rules with an impractically comprehensive system of supervision; and it is therefore obviously not only wise but also necessary to deal with the storage, upon an extensive scale, of all explosive substances, upon the broad general basis of their being susceptible of violent explosion from accidental causes; any relaxation in favour of the comparatively safe materials being suffered only to apply to small quantities.

The safe *transport* of gunpowder and other explosive agents demands the application not only of many of the precautionary measures which should be observed in their manufacture and storage, but also of certain others of special character, to meet the liability to casualties arising out of the ordinary accidents of locomotion, and out of the more or less unavoidable exposure of the explosive agents during transport to treatment and conditions involving risk of accident. Thus the submission of packages of gunpowder and many other explosive substances to the continued concussion unavoidable in transit by road or rail necessitates the employment of strong and thoroughly sound or tight receptacles, so as to prevent the escape of fine particles or dust from the packages into the conveyances, and the possibilities of accident resulting therefrom. Again, the transmission of both large and small quantities of explosives by land or water must be governed by well-defined rules regarding the extent and manner which the transport of such materials should be kept distinct from that of other goods, the nature and construction of the conveyances specially devoted to, or occasionally selected for, their transport, and the conditions generally under which such transport shall be accomplished.

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* In experiments recently conducted by the late Guncotton Committee at Eastbourne, two separate tons of compressed gun-cotton, in the wet condition in which it is now stored by Government, were exposed to fierce fires in strong magazines, the gun-cotton being confined in stout boxes and in wooden tanks. No explosion occurred; the gun-cotton was slowly converted into gases and vapour.

The utter inadequacy of the existing regulations as to the conveyance of powder, etc., by land or water, and the flagrant manner in which even these defective regulations are but too frequently disregarded, are matters to which public attention has been much directed since the explosion in October last, and which are but in harmony with the negligence and ignorance displayed to so alarming an extent in connection with the handling and storage of gunpowder. Thus, the packages (barrels, etc.) in which powder is transmitted to distant places are often so imperfectly constructed that the grains escape into the cart, or the hold of a vessel in which the powder is stowed, where they may become mixed up with grit and be eventually trampled upon. As regards the vehicles in which the powder is transported, some regulations exist with respect to the employment of covered or uncovered carts with reference to quantities of powder exceeding considerable limits; but there is no law requiring carts or barges to be specially constructed or employed so as to exclude sources of danger (such as grit, employment of iron fastenings, etc.). In the mining districts, and even in towns, powder is constantly conveyed in dangerous quantities in ordinary carts, which may have been used for carrying stones, coal, or road rubbish. It may be, and frequently is, conveyed in carts with other goods, such even as lucifer matches and petroleum; there is no regulation to prevent the person in charge from smoking while in his cart, or stopping at a public-house, leaving the powder standing at the door, and Major Majendie reports that such occurrences are frequent.

Public conveyances often carry packages of powder without any precautions other than perhaps a caution to a passenger who may unwittingly be exposing himself and companions to immediate danger. Thus there is a case officially recorded of a man who, on getting on to an omnibus at Wigan, was requested to put out his pipe, as the passenger next to him had 100 lbs. of powder in a barrel beside him. The conveyance of large quantities of gunpowder in a number of waggons passing close together through towns has been no uncommon occurrence; thus Major Majendie discovered that it was a practice in Edinburgh to convey as much as twenty tons and upwards of powder at one time through the streets, the public having thereby incurred the greatest possible risks, through smoking going on while the carts have been standing in crowded places. A similarly extensive conveyance of powder through the most populous districts of London for transfer to ships at wharves has often taken place; and as one of many instances mentioned by the police authorities may be quoted that of a train of fifteen vehicles loaded with about twenty tons of gunpowder passing from Camden Town to Blackwall Stairs (a densely populated place) to be shipped off, the whole of the loaded vans being detained in the street for some time for the arrival of the barge to which the consignment was to be transferred. Railway companies, as a rule, adopt comparatively efficient precautions with respect to the transport of powder and explosives. The former is conveyed, when in sufficient quantities, in vans specially constructed, and more or less well adapted to the purpose, or, when the quantities are comparatively small, in barrels separately packed in specially constructed metal cylinders. With regard to the conveyance of other explosives, and of small packages of fireworks, the regulations and charges adopted are in most instances so restrictive that they lead to much surreptitious carriage of such goods, whereby passenger and goods trains are often exposed to great risk.

The carriage of powder and other explosives by water should be the safest mode of conveyance, if proper regulations could be enforced; but here, again, the Regent's Park catastrophe has afforded a terrible example of the danger to which the public has been continually exposed by the profound oblivion which appears to have reigned in the minds of those engaged in the transport of powder by water-traffic as to the explosive nature of this material. The arrangements made by Government for the transfer of gunpowder by barges from the factory to the depôts illustrate the nature of the precautions which are regarded as indispensably necessary by those who have well considered the subject. No iron whatever is allowed to enter into the construction of the barges; the men engaged in stowing the powder wear special shoes and clothing; every particle of grit or dust is most scrupulously removed before the powder packages are introduced, and these are very carefully and securely covered in. The bargemen are strictly prohibited from smoking and carrying lucifer matches either about them or in any part of the vessel; no fire is permitted on board during the loading, carriage, and unloading of the powder, and the strictest regulations exist with regard to the manner in which the journeys are to be performed. The barges are, moreover, provided with valve-arrangements by means of which they may be sunk in a very short space of time, should danger of fire arise from neighbouring barges or other sources.

In other vessels used occasionally for the transport of powder by Government the foregoing precautions are carried out as far as possible; the vessels are not specially constructed, but, in order to exclude all iron fastenings and accidental grit from contact with the powder barrels, hides and thick woollen covers are spread over the bottom and sides of the vessel. Although the barges of canal owners and others are subjected to this practice when carrying powder for Government, it has not been so with regard to the freights of powder carried for merchants; and regulations respecting abstinence from smoking, or exclusion of fires or matches, have been avowedly of the most lax description, or have even become a dead letter although the existing law is thus set at defiance. The practice of carrying lucifer matches about the person, and of smoking, have unquestionably been among the most prolific sources of accidents connected with gunpowder, and it need scarcely be stated that they are almost the most important dangers to be guarded against in the transport of powder in barges. During the inquest which followed the great explosion at Erith in 1864, it transpired that lucifer matches were allowed as a rule on board the barges and vessels carrying merchants' gunpowder, and while one powder barge was unloading, another empty one by its side was seen to have a fire on board. The falling of a match from a man's pocket while he was engaged, in a stooping attitude, in moving the powder packages from the barge to the magazine was considered by Colonel Boxer, after careful investigation, to have been the most probable cause of that explosion.

Another source of danger, which, viewed in conjunction with the non-exclusion of sources of fire, is of a most alarming nature (and which has evidently been of common occurrence), is the carriage of gunpowder in barges as part of a miscellaneous cargo. There are obviously many goods which may be transported together with powder without danger to the latter, although the special care which gunpowder should always receive renders its isolation from other goods desirable under all circumstances. Recent experience has, however, demonstrated that it has not been the custom to exercise any discrimination in the stowage of packages of gunpowder with other goods, when the former was insufficient in quantity to constitute a barge load. It is scarcely to be realized that the indifference with which gunpowder has been treated by those who undertake its transport by water could have attained such an extreme that powder packages could be stored in the hold of a barge side by side with casks of petroleum spirit, by persons whose experience must have made them cognizant of the liability to leakage of petroleum from such casks. Such leakage (occasioned perhaps by rough handling in placing it on board) must inevitably furnish in course of time an explosive atmosphere by the diffusion of inflammable vapour through the air confined in the barge-hold (which is closely covered in); the extension of this explosive mixture to the small opening which these barges contain in the bulkhead separating the hold from the small cabin, or its penetration through crevices in the bulkhead, is but an affair of time; and then, whichever of the several sources of fire provided on board the barge, *i. e.*, the stove, lamp, or lucifer matches, happens to come within reach of the quickmatch which the explosive atmosphere constitutes, completes the arrangement for inflaming any small quantity of petroleum which may have leaked out on, or in close proximity to, a powder barrel. But for the fact that a concurrence of several conditions is essential to the communication of fire to gunpowder, through the agency of a leakage from a petroleum cask in a confined space, it can scarcely be doubted that the rude awakening which the public recently received, to the danger they were frequently exposed to in the vicinity of canals where powder traffic goes on, must have occurred long since. The simple flash produced by the ignition of a mixture of hydrocarbon vapour and air would probably not suffice to ignite powder grains exposed to it; but any small quantity of the liquid itself which, leaking from a cask, has furnished the vapour, may be in close proximity to a few grains of loose powder, or upon a powder barrel which is not securely closed, or some other simple conditions resulting in the conveyance of the fire to the powder may be fulfilled; and then explosion must ensue.

The imperative necessity for better legislation in reference to the transport of powder has been so convincingly demonstrated by the Regent's Park disaster, that the long-contemplated revision of the law relating to explosive agents would, there is little doubt, have been hastened thereby had the serious attention of the Government not already been devoted to this subject. During the first two years which succeeded the appointment of Government Inspectors of Gunpowder Factories and Magazines, the unceasing labours of Major Majendie resulted in so convincing a demonstration of the utter inadequacy of the existing laws relating to the manufacture, storage, transport, and use of gunpowder and other explosive agents, to afford protection to the public and to those dealing with these substances, that the intention (already entertained by the Government in 1865) of framing a bill to amend the Gunpowder Act, was actively pursued by the late Ministry in 1873. Although the submission to Parliament of new measures was delayed by the change of Government, this delay has been productive of benefit, inasmuch as the present Government has secured most important aid in the preparation of the comprehensive bill which has recently been submitted to Parliament, from the labours of a Select Committee, appointed last session, to inquire into the working of the existing laws, and the directions which fresh legislation should take.

The rapid development which has taken place in the manufacture and use of other valuable explosive agents has considerably increased the necessity for comprehensive measures regulating these important branches of industry. When the introduction of nitro-glycerine into this country, a few years ago, was speedily followed by numerous deplorable disasters, the protection of the public demanded the imposition for a time of severe restrictions in dealing with an explosive agent of most violent character, the nature of which was still very imperfectly understood. A measure was therefore made law in 1869, whereby the employment of nitro-glycerine itself and of its preparations was placed entirely under the control of the Government. Although this arrangement involved great labour on the part of the Government officials, and placed what now certainly appear to be unduly severe restrictions upon the manufacture and employment of dynamite, its necessity and beneficial operation as a temporary measure have been fully admitted by those chiefly interested in the progress of nitro-glycerine preparation; and there is no question that it importantly promoted the *wholesome* development of the application of dynamite in Great Britain, where it has during the last three years secured a firm footing as a material indispensable to mining industry. The existing laws relating to nitro-glycerine preparations can now be modified with great advantage, and no important difficulty should be experienced in including in a general Act the measures necessary for developing and regulating, with proper security to the public, the production of this and other valuable substitutes for gunpowder, in such a manner as not to hamper the powder industry with undue restrictions. Other long-established branches of manufacture connected with explosive materials, which are quite as dangerous as many of new creation, but have enjoyed comparative immunity from restrictions, will also be brought under the operation of that systematic supervision which the security of the public demands.

It is obvious that to attempt to deal in detail in one, or more than one Act of Parliament, with the various modifications of regulations specially applying to gunpowder, which the peculiarities of other explosive agents, or of branches of manufacture involving risk of explosions, necessitate, would be to overburden the law with an unwieldy mass of measures which, however circumstantial in their nature, would certainly fail to embrace all conditions and contingencies likely to arise. Hence the wisdom (which has been so clearly demonstrated by the Nitroglycerine Act) of entrusting the Government with discretionary powers, under the operation of a comparatively simple but sufficiently comprehensive Act of Parliament, can scarcely admit of question.

The beneficial results attainable by a systematic and thoroughly authoritative supervision, by Government inspectors, of factories and stores of explosive agents, if conducted with intelligence and discretion, have been most convincingly demonstrated by the great good which it is admitted on all sides that the inspectors have already succeeded in accomplishing, even with the very insufficient powers which the present state of the law affords them. The favourite argument of some, that Government inspection must operate mischievously by diminishing private responsibility, has certainly received no support from the results of inspection, so far as the experiment has been tried. It will scarcely be asserted that a manufacturer or store-holder who may have willingly adopted, as suggestions which the inspector has no power to enforce, measures conducive to the safety of life and property, would be careless in the application of those measures because their adoption was no longer optional, or because the responsibility for their due observance was to some extent shared by the inspector. This very system of inspection cannot fail to benefit those interested in different branches of the industry of explosives by reducing the necessity for hard and fast rules with respect to the arrangement and conduct of works, which might in many instances entail hardship or inconvenience without any real necessity, and by strengthening the hands of factory owners; and thus rendering comparatively easy the proper observance and enforcement of regulations for the safety of the men and the works. It is, however, especially in connection with the storage, transport, and employment of gunpowder and other explosives in mining districts that efficient inspection, supported by the reasonable power which a well-considered Act of Parliament cannot fail to afford, may be confidently expected to produce important beneficial results, not the least of which will probably be the wholesome influence exercised indirectly, by the force of example, upon the miner or pitman, whose ignorance has fostered the indifference with which long habit has led him to regard the possibility of danger.

But although improved legislation, and the beneficial regulations thus supplied, may be confidently hoped to effect an important reduction in the number and magnitude of the disasters now recorded as accidental explosions, it would obviously be worse than shortsighted to encourage a reliance upon legislation alone as a safeguard against the evils which lead to casualties of this kind. Punishments inflicted for transgression of the law may engender caution, but the disasters which arise from ignorance are not likely to be importantly reduced in number by legislative enactments alone.

It is to the general promotion of education among the people, and to the spread of scientific and technical knowledge, if even of the most elementary kind, among employers and employed, that we must look for a substantial diminution of these casualties which the uneducated mind is but too prone to attribute to accident, and the prevention of which rests, at any rate to a large extent, with those who are at present tacitly content to regard them as inevitable.

Parliamentary and Law Proceedings.

The Leeds Borough Analyst's Quarterly Report.

Alleged Jam Adulteration.

At the last meeting of the Leeds Sanitary Committee Mr. Thomas Fairley, the borough analyst, presented a report on analyses of samples received from the inspector during the second quarter, 1875, in which he referred to the unsuccessful prosecution for the sale of adulterated jam, which was reported at p. 77. He said:—"The substances received have been — Milk, one sample; bread, three; arrowroot, two; jam, two; pepper, one; ground ginger, eleven; cream of tartar, eight; mace, one; total, 29. The samples of milk and bread were not adulterated; one of the arrowroots consisted entirely of maize or corn flour, the other of potato starch. As the samples of jam when first supplied to me were labelled simply 'jam,' I found I could make no report on them. I therefore returned them to the inspector to be correctly labelled, saying that as they were jam, I could make no report, unless it was specified what they professed to be. The inspector then wrote new labels, and these labels I now produce. They are—'74, April 9, 1875, Gooseberry and Raspberry Jam,' and '75, April 9, 1875, Gooseberry and Raspberry Jam.' I then reported according to these labels, and bearing them in mind it was my duty to report the jams as adulterated, and I produce copies of my reports. These analyses involved much labour, and were made with the greatest care. They are substantially correct. I assert in each case that they contain a very large proportion of vegetable substance not found in gooseberries or raspberries, and I do not assert positively what this vegetable substance is, but only its probable nature. Dr. Hassall's report confirms mine that there is a third substance present, and this is all that I have positively asserted. I may point out that Dr. Hassall, in his book on 'Adulterations Detected,' describes 'three marmalades adulterated with large quantities of a vegetable substance, most probably turnips or apple,' and that he is there unable to distinguish which of them is present.* As I did not know that the matter was to come into court on July 21, I make this statement here. With regard to the other samples, the pepper was not adulterated; three of the samples of cream of tartar contained minute quantities of common salt, the others were pure; four of the samples of ginger were adulterated with various kinds of starchy matter, while the others were of moderately good quality. The sample of mace contained a small amount of impurity."

In reference to the above report, the following account has been forwarded "in self defence" to the *Yorkshire Post*, by Mr. John Newhouse, the Superintendent of the Sanitary Department of the Leeds Corporation:—

On the 4th March last I saw Mr. Fairlie, the borough analyst, and in consequence of what he said to me respecting some jam, I on the 9th of April procured two jars of gooseberry and raspberry jam. On the same day I and the inspector who purchased the jam proceeded to the analyst's office, taking the jam with us. We there delivered to the analyst a pound of jam from each jar. The jars were numbered 74 and 75, and labelled "Jam." At the same time I called his attention to the label on the jars, which were similar to the following:—"In accordance with the Act of Parliament, passed 10th August, 1872, to amend the law for the prevention of adulteration of food, etc., ch. 74, 35 and 36 Vict., section 3, this jam is guaranteed to consist only of the fruit named on this package, with a small percentage of apple jam, in combination with pure cane and grape sugar." Afterwards I received the analyst's report (which I attach). Upon that I saw the town clerk, showed him the report, and was instructed to take out a summons. Before doing so I saw Mr. Fairley again, and said to him, "The town clerk has ordered proceedings to be taken. Are you satisfied that the starchy and vegetable matter with which the jam is adulterated is not apple jam?" Mr. Fairley at once replied, "Oh, I am satisfied it is not apple jam; it is either turnips or potatoes." I said, "Very good, then I will take out a summons;" and did so. And at the hearing the case was adjourned to obtain a further analysis, which was done. On receipt of Dr. Hassall's report, I showed it to Mr. Fairley. He said he was not satisfied with it, and went with me to the town clerk, and asked for the case to be again adjourned, that a further analysis might be taken, as he was satisfied that he was right. On the 16th inst., Mr. Fairley came to my office, asking me, had I sent the jam off to be analysed again, and said, "I am afraid I have made a mistake, and I think it would be better to take Dr. Hassall's report, and withdraw the case." I then said to him, "You place the town clerk and myself in a very awkward position. Why did you not tell me this when I came to you before laying the information?" He then replied, "Sooner than have any unpleasantness I will pay the cost."

William Morris, assistant inspector of nuisances, says;—On the 9th day of April last I received instructions from Mr. Newhouse to buy some raspberry and gooseberry jam. Acting on those instructions, I bought two jars of jam. I then took the jam to the analyst's office, along with Mr. Newhouse. At the time the jam was given to Mr. Fairley, Mr. Newhouse called his attention to a label that was on the jars, and said, "This is labelled gooseberry and raspberry jam, with a slight admixture of apple jam."

"*Mr. Fairley's Report* (No. 74).—Largely adulterated. More than half of it consists of vegetable matter not contained in gooseberries or raspberries, and derived from some other source, probably turnips, potatoes, or similar vegetable substance. It has been made from the cheapest sugar, as it contains abundance of sugar mites."

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* See 'Adulterations Detected in Food and Medicine,' pp. 415, 417.

"*Mr. Fairley's Report* (No. 75).—This jam contains a very large admixture of vegetable substances not found in gooseberries or raspberries. It can scarcely be said to contain raspberries, as a most careful search does not show the presence of any. It contains much starchy matter, which may be derived from potatoes."

"*Dr. Hassall's Report.*—The Analytical Sanitary Institution, 14, John Street, Adelphi, London, 27th June, 1875.—Report on two samples of jam received from Mr. John Newhouse, Leeds. Sample marked 'Leeds, No. 74, Gooseberry and Raspberry Jam,' and sealed with the seal of the borough of Leeds. I have subjected this jam to a very careful examination and I find that it consists entirely of a mixture of raspberry, gooseberry, and apple jams. I may state that portions of the epidermis or cuticle of the apple and apple-pips were detected, proving conclusively the presence of apples. With regard to acari, it is now well known that these are of common occurrence in the ordinary brown sugars of commerce. Sample marked 'Leeds, No. 75, Gooseberry and Raspberry Jam.' The results of the examination of this jam correspond in every respect with those of the previous sample.

"ARTHUR HILL HASSALL, M.D."

SALT IN BEER.

At the Burton Police Court, James Moore, landlord of the "Junction Inn," Barton Green, has been charged by Mr. Horder, inspector under the Adulteration Act, with selling, as unadulterated, two quarts of ale, which were adulterated.

Mr. Fulford, barrister, who appeared on behalf of the prosecution, stated that the ale in question was adulterated with chloride of sodium or common salt to the extent of 175 grains per gallon. By a minute passed by the Inland Revenue authorities, a margin of fifty grains per gallon was allowed, as that amount might be present in the water from which the ale was brewed. This case, he deemed, was as bad a one as had lately been before any Court in the county. The ale was purchased on May 24th, by Samuel Toy, an assistant to Mr. Horder, and the defendant was informed for what purpose it had been purchased. On Toy leaving the house, Mr. Horder took possession of the ale, and it having been labelled for subsequent identification, a portion was handed over to Mr. Scott, county analyst. To-day Mr. Horder produced Mr. Scott's analysis, which stated that the ale was largely adulterated with chloride of sodium to the extent of 175 grains per gallon, and was flavoured with other ingredients than those which could be derived from malt and hops.

Mr. W. J. Drewry, who appeared for the defendant, referred to the hardships imposed by the present Adulteration Act, and hoped that many of the clauses would be altered. There was a probability of an alteration taking place in the course of a few months, and he thought that the present case ought to have stood over until after the alterations came into force. He then called Jane Fletcher, the defendant's stepdaughter, who deposed that she saw the ale purchased by Toy drawn from a certain cask in the cellar; and that immediately afterwards the defendant drew another two gallons from the same cask, and it was subsequently sent to London. (This witness was a very young but intelligent one, and Mr. Fulford failed to adduce from her one single fact which would tell against the defendant.)

Robert Sutton, a coal higgler, proved sealing a bottle of ale in defendant's house, and conveying it to the railway station for transmission to London; and Mr. Dugald Campbell, the professional analyst of the Country Brewers' Society, and consulting analytical chemist to the Board of Inland Revenue, stated that he received the bottle of ale on July 9th. He analysed the contents and found them to be perfectly genuine ale, there being only 38 grains per gallon of chloride of sodium, which would be derived in that weight of ale from the malt and hops. In answer to Mr. Fulford, he further stated that he did not think a man of experience, such as Mr. Scott, would make so great a mistake in the detection of so simple an ingredient as chloride of sodium if the ale in both cases had been drawn out of the same cask.

Mr. Fulford suggested that the remaining portion of the sample purchased for the inspector should be analysed by an independent analyst if the defendant was not satisfied with Mr. Scott's certificate.

Mr. Drewry said that their contention was that the ale supplied to Mr. Scott was not the same as that supplied to the inspector, and it would be therefore useless having the remainder of the sample analysed.

Mr. Tomlinson said that the Bench would be compelled to convict, and fined the defendant 40*s.* and £1 13*s.* costs.

Reviews.

LESSONS ON PRESCRIPTIONS AND THE ART OF PRESCRIBING. By W. HANDSEL GRIFFITHS, Ph.D., L.R.C.P.E., etc. London: Macmillan and Co. 1875.

The object of this work is to teach the art of writing prescriptions. It consists of eight short chapters or lessons cleverly arranged, and full of useful information, extending over 64 pages, with 85 pages of examples and exercises. The different magistral formulæ are intelligently set forth and explained, and a list of the terms most frequently employed in prescription writing is added with their contracted forms and meanings. Dr. Griffiths has done good service to medical and pharmaceutical students by publishing his lecture notes. We think this little book better suited for educational as well as examination purposes than any other of the same size with which we are acquainted.

NOTES ON THE TREATMENT OF SKIN DISEASES. By ROBERT LIVEING, A.M. and M.D. Cantab., F.R.C.P. London. Physician to Middlesex Hospital in charge of the Cutaneous Department. Third Edition. Revised and Enlarged. London: Longmans, Green, and Co. 1875.

The third edition of this handy little book contains much new matter, both as regards therapeutics and morbid anatomy.

There is introduced for the first time a short notice of Xanthoma, Lichen planus, Pityriasis Rubra, and Epithelioma, and reference is made to the use of Goa powder in Tinea Tonsurans, to chloral camphor in Pruritus, to nitrate of lead in Onychia, and a short chapter has been added on the morbid anatomy of the skin. The formulæ at the end of the book are well selected and will prove a ready help to the busy practitioner.

The following journals have been received:—The 'British Medical Journal,' Aug. 7; the 'Medical Times and Gazette,' Aug. 7; the 'Lancet,' Aug. 7; the 'London Medical Record,' Aug. 7; 'Medical Press and Circular,' Aug. 7; 'Nature,' Aug. 7; 'Chemical News,' Aug. 7; 'Gardeners' Chronicle,' Aug. 7; the 'Grocer,' Aug. 7; 'Journal of the Society of Arts,' Aug. 7; 'Grocery News,' Aug. 7; 'Produce Markets Review,' Aug. 7; 'Practical Magazine,' for August; 'Educational Times,' for August; 'British Journal of Dental Science,' for August; 'Journal of Applied Science,' for August; 'American Journal of Pharmacy,' for August; 'Pharmacist,' for August; 'Canadian Pharmaceutical Journal,' for August; 'Tennessee Pharmacal Journal,' for August; 'Moniteur Scientifique,' for August: 'Pharmaceutische Zeitung,' for Aug. 4 and 7; 'Sanitary Record,' Aug. 7.

Notes and Queries.

[445]. BEES.—Can any reader inform me how to drive away or kill bees, attracted by sugar to a lozenge factory—there are thousands of them ?—"M.P.S."

UNGUENTUM ARAROBÆ:—

℞ Goa Powder . . . . grs. xv
Glycerine . . . . ʒj
Ungt. Cetacei . . . . ad. ℥j

Rub the Goa with the glycerine, until a smooth paste is obtained, then add the ungt. cetacei and mix thoroughly.

The above has been found successful in cases of ringworm (the parts affected to be washed with a solution of *Sodæ Bicarb.* before applying the ointment).—Robt. Watson.

VILLATE'S MIXTURE IN CARIES.—In a paper in the *New Orleans Medical and Surgical Journal*, Dr. Hopkins mentions that this mixture was originally employed for caries in the horse ; and was afterwards used by Notta and Nelaton.

The original formula of this solution, as first composed by Villate, is as follows :—

℞. Liquoris Plumbi Subacetatis . . . ℥ij
Zinci Sulphatis Crystal. and Cupri Sulph. Crystal.. . . . . } āā℥ ss
Aceti Vini Albi . . . . 3℥ij ss mix.

Dissolve the salts in the vinegar, and add the subacetate of lead. Shake before using.

It is very important that this preparation is made as stated. Druggists very often substitute for the white-wine vinegar a solution of pyroligneous acid, in which case the liquid acts as a powerful caustic, and the patient cannot bear its application.

The two solutions can be easily distinguished. When the pyroligneous acid is used, the solution, once settled, has a bluish hue ; but when prepared with the white-wine vinegar it has a greenish hue.—*Practitioner.*

OXYGEN AS AN ANTIDOTE IN POISONING WITH PHOSPHORUS.—MM. Thiernesse and Casse have made some experiments on this point arising from a discussion in the Belgian Academy, in which it was maintained that whilst the raw oil was effective the rectified oil was inoperative. The authors first endeavoured to determine the advantages of transfusion of defibrinated and arterialized blood, both before and after venesection had been practised on the poisoned animal ; the results proved unsatisfactory. The effects of the direct injection of oxygen gas, slowly performed, were on the contrary very good, providing it was done before any deep-seated alteration in the structure or composition of the body had been effected by the poison. If the gas was allowed to enter the veins gradually, no ill results follow. They found that 150 to 200 ccm. of oxygen were required for a dog weighing 12 to 18 lbs. avoirdupois, and from 300 to 500 for dogs weighing considerably more. They give a description of a simple apparatus they have employed for the production and injection of oxygen. (*Bull. de l'Acad. Roy. de Med. de Belg.*, t. ix. No. 1.)

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Registration of Sales of Poison.

Sir,—Whilst the subject of the illegal and indiscriminate sale of poisons is being discussed in your columns perhaps you will allow me a few lines to show how the registration of poisons is carried on, or rather ignored, here.

A few weeks ago a little girl came into my shop for a "pen'orth of marcury" (meaning arsenic), which she said was for her mother, but she did not know what it was for. I, of course, told her to go home and tell her mother to either come for it herself or send some one grown up, and send word what it was for. I, however, heard nothing more of it till night, when the little girl came in again for something else, and I asked her what her mother said about the "marcury." She replied that her mother sent her to ——— (our local secretary) and she had got it there.

I found that it had been supplied to her as if it were magnesia, or any other simple family drug of every-day sale.

Vermin killers, too, are sold here without the slightest regard to registration by (I believe) every chemist in the borough.

For some time I registered all I sold, but customers objected to signing their names so frequently that I found I must either give it up or drive them elsewhere, and so of the two evils I chose the former.

Now, sir, if such a state of things is allowed to exist, I should like to know what use the "Poison Regulations" are.

Trusting this state of affairs will soon be remedied,

A. P. S.

August 4, 1875.

"*A Welsh Chemist.*"—(1 and 2) You will find numerous formulæ in Beasley's 'Receipt Book' or any other similar work ; (3) You are recommended to address this question to the editor of the 'New Veterinary Journal,' published by Baillière, Tindall and Cox, King William Street, W.C.

"*Sidonia.*"—(1) 'La Medecin des Familles,' published in 1843. We do not know the price.

A.D.—The term "dammar" is applied to the resinous exudations from trees belonging to more than one genus. The so-called "white dammar" is a resin yielded by *Vateria Malabarica*, Blume. Its colour ranges from light green to light yellow, the green tint predominating. It has a shining vitreous fracture, is very hard, and greatly resembles amber. Another dammar which dissolved in turpentine makes a good paper varnish that dries without cracking is yielded by *Shorea robusta.* It occurs in brittle, stalactitic pieces, of a pale creamy yellow, nearly opaque.

W. J. Smith.—The formula for Driffield Oils, as given by Beasley, is—Barbadoes tar, 1oz. ; linseed oil, 1lb. ; oil of turpentine, 3oz. ; oil of vitriol, 1oz. Several receipts for black ink have been given already in this series of the Journal.

T. Hope.—*Melampyrum pratense.*

F.L.P.—Copying paper may be made by coating glazed paper with a mixture of grease and black lead or lamp black.

J. Metcalf.—'A Year's Botany,' by E. M. Kitchener, published by Rivingtons.

"*Inquirer.*"—We are not acquainted with the motto.

"*Russia.*"—The Tinct. Chinæ Simplex of the Russian Pharmacopœia is a tincture prepared from one part of Loxa bark with six parts of alcohol of sp. gr. ·894.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ.* A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

Communications, Letters, etc., have been received from Mr. Allen, Mr. Pocklington, Mr. Thresh, Mr. G. Watt, Mr. Durrant, Mr. Bartley, Kino, Student.

SALYCILIC ACID FOR THE PRESERVATION OF INFUSIONS, ETC.

BY J. C. THRESH, PH.C.

The wonderful reports of the conservative properties of salycilic acid led me some time ago to commence a series of experiments to determine the proportions of acid necessary to add to infusions, etc., in order to keep them a reasonable length of time without change. The results I have obtained are not quite as satisfactory as I had anticipated, but probably they will not on that account be less interesting to pharmacists in general.

Before experimenting with the infusions I sought a suitable solvent for the acid, and several weeks ago found that solution of borax was its best solvent; but this does not take up a sufficient quantity to allow of its being added to medicinal preparations for the purpose of preservation. Boiling water dissolves the acid in proportions sufficiently large for the purpose, and does not deposit it again on cooling, therefore I made the infusions, etc., upon which I experimented with water in which I had previously dissolved the requisite proportion of the salycilic acid. The following are the results of the investigation:—

Infusion of cascarilla, without acid kept two days, with acid (five grains to pint) kept five days. Another infusion made of double strength with water containing ten grains of acid to the pint has now kept over a fortnight and is perfectly fresh.

Infusion of quassia.—A quart of concentrated infusion (one to seven) was prepared, having forty grains of the acid dissolved in it: this has kept now over a month and is as nice as when first made. One part of it was diluted with seven of water and kept for comparison with a simple infusion, the latter was unfit for use on the fourth day, whereas the former kept for six days.

Infusion of orange made with water containing five grains of the acid to the pint kept perfectly bright and fresh for eleven days, but then gradually became turbid.

Infusion of calumba went bad in three days, and a sample with three grains of acid to the pint only kept four days. A stronger infusion with ten grains to the pint was put into an uncovered beaker and was clear and good at the end of the week, but spots of mould then began to form upon its surface though it still remained bright.

Infusion of senna with eight grains of acid to the pint kept seven days, being four days longer than one without acid.

Infusion of malt (two ounces to pint).—A simple infusion was quite sour in three days, but with eight grains of the acid to the pint, a portion of the same infusion retained its odour upwards of fourteen days, and even now at expiration of twenty-one days the odour might be distinguished.

Tragacanth mucilage.—The addition of acid in the proportion of eight grains to the twenty ounces causes this to keep for a length of time, a sample prepared nearly a month ago being quite fresh, whilst a mucilage without this addition had acquired a repulsive odour in about eleven days.

Mucilage of acacia also appears to keep well with this addition.

Lemon juice will retain its odour for weeks, and will not turn mouldy, even if kept in an uncovered vessel, if five grains of salycilic acid are added to each pint. Having read that this acid would keep leeches healthy* and prevent the water in which they were kept becoming foul, I added ten ounces of acid solution (eight grains to pint) to half a gallon of water into which fifty leeches were put. Previous to this addition we had found two or three dead leeches every week when the water was changed, but since we have not lost a single leech and the water keeps fresh for weeks. I forgot to note that by adding ten grains of acid to each pint of syrups of red and white poppies, violets, etc., fermentation is effectually prevented. The addition of a little yeast to several of the samples produced no effect.

Buxton.

FURTHER NOTES ON MOROCCO DRUGS.

BY ARTHUR LEARED, M.D., F.R.C.P.,

Late Lecturer on Materia Medica, Grosvenor Place School of Medicine,

AND E. M. HOLMES,

Curator of the Museum of the Pharmaceutical Society.

A further supply of specimens from Morocco enables us to throw additional light upon the little-known drugs of that country.

HERBS.

Bohior.—This specimen consists only of the radical leaves of a species of *Eryngium*, apparently *E. tricuspidatum*, Desf.

Elhet Lehode.—This drug consists of the entire plant. The root is small and fibrous, and the leaves narrow and grass-like, with broad membranous united bases. The plant is *Asphodelus tenuifolius*, Cav.

ROOTS.

Adad.—The radical leaves of this plant have now been received, and show beyond a doubt that *Adad* is, as previously conjectured, the root of some species of thistle.

Ark abu.—This is a large root, about 1½ inch in thickness, slightly cracked longitudinally, and covered with a brownish stratified epidermis, the under layers of which are whitish, so that the root on being rubbed has a variegated brown and white appearance. The cortical portion of the root is nearly half an inch in thickness, and the meditullium about an inch; both are seen, in a transverse section, to be whitish, spongy, and speckled through with numerous brown dots. These are vessels from which exudes a clear gummy substance in drops, which remain rather soft. The taste of the root resembles the carrot in flavour, but has a slight bitterness and considerable pungency. The leaves sent as those of Bockbooka, appear to belong to *Daucus crinitus*, Desf.

Ark Egoody, or Igudu.—This drug consists of a fleshy root, about 1½ inch in thickness; the outer surface is of a dirty brown colour, cracked longitudinally, the portions between the cracks forming finely striated ridges. The root has a few scattered rootlets, the cortical portion of which has mostly fallen off, leaving a slender wiry meditullium. A transverse section shows a very large fleshy succulent meditullium, occupying the whole of the root except the thin cortical portion, which is not more than a line in thickness. The taste is something like that of a potato, with a slightly burning after-taste. The leaves and fruits accompanying the drug are those of an *Aristolochia*, and as the root has not lost its vitality, it will probably be possible to grow it, and thus

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* See *Pharm. Journ.* [3], vol. v., p. 1035.

identify the species. The root is usually sold in slices, dried and strung together.

Bocbookah.—The plants sent under this name have a root attached, which corresponds exactly with the drug described in the *Pharmaceutical Journal* [3], v. p. 522, as Ark Abu, a name which, as it appears from the specimens now sent, should be applied to the large root described under that name in this paper. The leaves of the Bocbookah plant are linear, and somewhat rigid with membranous bases. The taste is not astringent like that of Elod Elhmar, to which it has a slight resemblance externally, but differs in being white, not reddish, internally. Bocbookah may be easily distinguished by the very thin purplish layer just inside the epidermis of the root.

Cast ana.—This drug consists of a mixture of the root of Elod Elhmar (*Armeria mauritanica*, Wallr.) with another root, which varies from five to nine inches in length, and from a quarter to half an inch thick, is of a pale brown colour externally, and is furrowed longitudinally. A transverse section shows a porous meditullium of a pale primrose colour occupying fully three quarters of the diameter, and a white cortical portion which has a slightly horny appearance towards the meditullium. The taste is faintly acrid. It appears to differ chiefly from Bocbookah in having a yellow meditullium.

Elod Elhmar.—This root is about nine inches long, tapering and unbranched, of a reddish-brown colour, longitudinally furrowed with small scattered wart-like projections which are probably the scars of rootlets. The root varies in diameter from one-third to one-eighth of an inch. The cortical portion is thick, occupying about half the diameter. A transverse section shows the cortical portion of a reddish-brown colour and resinous appearance, and the meditullium of the same colour with a narrow ring of white rays next to the cortical portion. The taste is astringent. The plant sent with the root is a species of *Armeria*, probably *A. mauritanica*, Wallr.

Feshook or Fasogh.—The root sent is of the size and shape of a carrot, of a blackish-brown colour externally, not furrowed but studded over with numerous warty projections. When broken it exudes drops of milky juice which form yellowish white opaque tears. The taste of this gum resin is slightly bitter, with considerable acidity, which in a short time passes away. A single fennel-like leaf accompanies; the specimen is evidently the leaf of an umbelliferous plant.

This root is one of considerable interest, since it was sent as that of the Fasogh or plant which produces African ammoniacum. The leaf and root correspond well with the figure given in Pomet's 'Hist. of Drugs,' p. 189, pl. 60, fig. C., and the leaf also resembles that of *Ferula orientalis*, L., to which Fasogh or Feshook is referred in Lindley's 'Flora Medica.' On comparing the taste of the gum-resin of the root with that of a specimen of African ammoniacum, presented to the museum of the Society by the late Mr. D. Hanbury, it is found to differ slightly. The African ammoniacum has no taste at first, and no bitterness; but after a time a burning acrid taste is developed, which lasts for a considerable time.

The taste of the African ammoniacum having been compared with that of the fresh root of *Ferula tingitana*, L., to which African ammoniacum is referred by Pereira, it was found that the absence of taste at first and the permanent acridity as well as the peculiar apple-like odour of the root of *F. tingitana* appeared to correspond exactly with that of the African ammoniacum. It appears probable, therefore, that if the root now received from Mogador yields African ammoniacum that drug is produced by more than one species. The root is now planted both at Kew and at the Royal Botanical Gardens of London, and it is hoped that next year we may be enabled to identify the plant with certainty.

L'fuely.—Of this drug fine specimens of the root and plant in flower have been received. The plant has been identified by Dr. Ball, who has been lately engaged in examining the flora of Morocco as *Astragalus eriophaca*, Ball (*Phaca bœtica*, L.)

Tuco.—This is a large woody root from 1 to 1½ inch in thickness. Externally the root has a pale brown papery epidermis. A transverse section shows a thin white cortical portion, which has a very astringent taste, and a meditullium, occupying the greater portion of the root, which is of a dirty white colour and is marked with indistinct medullary rays. The plant has not been received. A list of Morocco drugs accompanying the specimens includes several not yet received, among which we notice the names Dreeyas and Silfion. The occurrence of these is especially interesting, since it shows that the Silfion is still an article of trade, or at all events a medicine still used, and also that the Driâs or Dreeyas which has lately been tried in France, and which was until a year or two ago supposed to be identical with the Silphium or Silfion plant, is regarded by the Moors as distinct. We trust through the continued kindness and liberality of our esteemed friend at Mogador, Signor Reuben El Maleh, to be able to examine and report upon specimens of these extremely interesting drugs.

DITA BARK.*

BY J. JOBST AND O. HESSE.

Under the name "Dita" the natives of the Phillippines indicate the bark of the *Echites scholaris*, L. (*Alstonia scholaris*, R. Brown), a stately forest tree which grows there to the height of fifty feet and upwards. They employ the bark as a remedy against numerous diseases, especially against fevers generally. The fame of dita bark as a remedy is of old standing, since in 1678 it was mentioned by Rheede and afterwards in 1741 by Rumphius. However the subject has only attained importance in recent times, when Gruppe, an apothecary in Manilla, prepared from the dita bark a substance possessing antifebrile properties in a high degree;† at least the latter is asserted by Pina, the chief physician in Manilla.

This substance was called by Gruppe "ditain." 100 parts of bark yielded him 2 parts of ditain, besides 10 parts of inactive extractive matter, and 0·85 parts of sulphate of lime. According to this dita bark would be very rich in active principle; moreover, since the *Echites scholaris* is widely distributed in warm climates and requires no particular care in its cultivation, it would appear possible that should ditain prove to sustain the reputation of dita bark as a febrifuge, dita bark might become an important competitor with cinchona bark.

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* Abstract of a paper in the 'Annalen der Chemie,' vol. clxxviii, p. 49.

† See *Pharm. Journ.* [3] vol. iv. p. 70.

According to Hildwein, ditain was prepared by Gruppe in a manner similar to that in which quinine is prepared. It was a dark green, extremely hygroscopic body, readily soluble in water, but insoluble in absolute alcohol or ether. Hildwein considered ditain not to be a pure alkaloid, since he had been able to separate from it two different apparently crystallizable substances. Afterwards ditain was examined chemically by Gorup-Besanez, who prepared from it a crystallizable substance which appeared to possess all the characteristics of an alkaloid. The quantity of this substance obtained from 30 grams of ditain was however so small as not to admit of further investigation. Thinking the subject worthy of further research, the authors undertook it with specimens of dita bark kindly supplied for the purpose by Mr. Gruppe. Their investigation of the bark was very thorough, and the following is only an abstract of a somewhat lengthy paper.

The dita bark consisted generally of irregular curved fragments, from 40 to 60 millimetres long, about 15 millimetres broad, and 1 millimetre thick. Larger pieces were very rare; one piece however was met with 85 millimetres long, 41 millimetres broad, and 5 millimetres thick. On the exterior of the bark was a thin leather-coloured corky layer, in which frequently transverse and longitudinal fissures occurred giving it a scaly appearance. Generally the margins of the fissures were raised, the transverse fissures which appeared to be formed before the longitudinal being quite or partly filled with a colourless cellular tissue. The bark was moderately hard; the fracture was horny in the older bark, and short in the younger. The inner side of the bark was slightly reticulated and sometimes striated longitudinally. The dita bark varied in colour from a leather-brown to a dark grey, and was not unfrequently marked with black spots and points. Lichens were seldom met with on it; the authors only noticed upon a decayed specimen a *Parmelia* with a greyish white thallus. The bark was easily powdered and yielded a yellowish grey powder without smell, and when masticated developed after a time a slightly bitter but not unpleasant taste. Under the microscope a crystalline substance was seen in the cells of the bark, which the authors thought to be oxalate of lime.

Hildwein reported that the aqueous decoction of dita bark was dark yellow, that it remained clear on cooling, had a pleasant bitter taste, and was not altered by salt of iron. With acetate of lead it gave a yellow brown precipitate, which carried down with it all bitter substances. Other reagents were without action on the decoction. This statement of Hildwein the authors only confirm in part. They found that lead acetate gave a precipitate in an aqueous extract, but that the separation of this in no wise removed the bitterness; that basic lead acetate gave still a copious amorphous precipitate; and that when this and the excess of added lead salt was removed, upon the addition of phosphotungstic acid, a precipitate was formed which contained the true bitter principle of the bark. The authors found, however, boiling alcohol to be far more suitable for the extraction of dita bark. The alcohol was coloured dark yellow, and yielded, upon evaporation after the addition of some water, a yellow liquid, upon the surface of which floated a greenish white fatty substance. After removal of this by filtration, and clearing the turbid filtrate by means of some petroleum ether, an intensely bitter tasting solution was obtained, in which no noteworthy change of colour was produced by a salt of iron. It gave a smaller quantity of yellow brown precipitate with sugar of lead, and a larger quantity of amorphous precipitate with basic lead acetate, and with phosphotungstic acid a pale yellow precipitate after the excess of lead had been removed by sulphate of soda and the liquor had been acidulated.

The precipitate produced by sugar of lead was suspended in water and decomposed by sulphuretted hydrogen, and the solution, after removal of excess of sulphuretted hydrogen, evaporated, when an oily brown residue remained. This was treated with a small quantity of cold water, whereby an oily acid was separated, which was removed by passing through a moistened filter. Shaking with ether removed more of this acid, together with another acid, which latter crystallized upon the evaporation of the ether. Very little of the crystallized acid was obtained, and this not quite pure; the authors therefore postpone further notice of this substance. But the oily acid was somewhat soluble in water, forming a solution having a strong acid reaction, which solution was not coloured by perchloride of iron, and gave a dense yellow amorphous precipitate. This acid was readily dissolved by solution of ammonia, soda, or potash. If the solution was somewhat concentrated, acetic acid produced an oily separation of the acid; if the solution was dilute the acid remained dissolved.

The precipitate produced by basic lead acetate dissolved with a dark yellow colour in solution of soda or potash; and these solutions, upon supersaturation with an acid, gave a dirty yellow brown flocculent gelatinous precipitate. This substance was fairly soluble in water, and the solution by evaporation gave a resinous deposit. The acrid aqueous solution gave with sugar of lead no precipitate, but with basic lead acetate gave a dense yellow brown amorphous precipitate.

But the substance most interesting to the authors, although too small in quantity, was that obtained by precipitation with phosphotungstic acid. In one experiment this precipitate was well washed with water mixed with excess of baryta water, shaken with ether, and then treated with a small quantity of dilute acetic acid, whereby an alkaloid was obtained, named "ditamine" by the authors. A portion of the baryta solution was from time to time saturated with sulphuric acid and phosphotungstic acid added, and in this way it was found that the greater part of this organic substance remained behind in the alkaline liquor after treatment with ether, and this could not be separated by chloroform, petroleum spirit, ether, or in any other way.

After the exhaustion of the solution by ether, the baryta was removed by means of carbonic anhydride; the alkaline filtrate, when neutralized with oxalic acid and evaporated, yielded a residue the greater part of which crystallized, upon moistening it with water, in small white crystals that formed with water a neutral bitter solution not rendered turbid by solution of ammonia or soda. But potash solution produces a slight turbidity, and after a short time the deposit of a small quantity of semi-solid substance. The solution saturated with dilute hydrochloric acid gave no precipitate with platinic chloride, but with gold chloride and mercuric iodide solution gave a yellow amorphous precipitate. Finally, the original solution gave with concentrated sulphuric acid a gorgeous purple red colour, which was rendered somewhat fainter by heating. The substance was not removed from the concentrated alkaline solution by ether. From these results the authors suppose they had here to do with a special alkaloid, readily soluble in water and alkalies, but insoluble in ether.

In a second experiment the precipitate obtained with phosphotungstic acid was mixed with milk of lime, and the undissolved portion as well as the filtrate examined. From the filtrate some ditamine was obtained by means of ether. The alkaline mother liquor after neutralization with oxalic acid formed a bitter tasting solution, which upon evaporation left an extremely small quantity of yellow amorphous residue that dissolved in concentrated sulphuric acid with a brownish red colour. The undissolved portion of the lime mixture, after being dried in the air, was treated with hot alcohol, the yellow tincture evaporated, the small yellow residue dissolved in acetic acid, the solution saturated with soda and the ditamine shaken out with ether.

Further, the solution obtained by extraction of this bark with alcohol was treated directly with an excess of soda and shaken with ether. Here the authors met with the same evidence as before, that the whole of the substance precipitated by phosphotungstic acid was not removed by ether.

After these experiments, the authors returned to the bark itself. From the powdered bark ether removed only some neutral bodies, which upon evaporation were left as a greenish white crystalline mass. A similar result was obtained with chloroform and with petroleum spirit. In the latter case the extract obtained from 2·206 grams of bark, when dried at 100° C., amounted to 0·066 gram, or 2·95 per cent. Potash solution coloured the bark yellow and gave a yellow solution which yielded only a light flocculent precipitate upon the addition of hydrochloric acid. Ether removed the greater part of these flocks from the solution, and upon evaporation left them as an amorphous residue. The behaviour of dilute hydrochloric acid with dita bark was noteworthy, in that it partially in the cold, but especially when heated, took up from the bark a considerable quantity of oxalate of lime, and upon saturation with ammonia gave a dense white precipitate that was free from any trace of alkaloid.

Dried at 100° C., the dita bark lost 12·7 per cent. of moisture. Upon incineration it yielded 10·4 per cent. of white ash, which consisted principally of lime. The large percentage of ash is evidently due to oxalate of lime.

Ditamine.—The most convenient method for the preparation of the alkaloid "ditamine" was found by the authors to be to exhaust the powdered bark with petroleum spirit at ordinary temperature, and then to remove the alkaloid by means of boiling alcohol. The yellow alcoholic solution is mixed with a little water, and the alcohol distilled off. The remaining aqueous solution contains the alkaloid combined with an acid. After removal of a small quantity of green resinous matter by filtration, the slightly acid solution is neutralized with soda, and the ditamine separated by shaking with ether, from which it is removed by dilute acetic acid. This it colours yellow, though it can be considerably decolorized with animal black without much loss of alkaloid. Upon the addition of ammonia in excess, the ditamine is then obtained as a white flocculent amorphous precipitate, in the proportion of about 0·02 per cent. of the bark used.

Upon trituration ditamine forms a slightly bitter white powder, which dissolves freely in ether, chloroform, benzine, and alcohol, from which it is again deposited upon evaporation. Petroleum spirit dissolves it with considerable difficulty, and appears to deposit it again in a crystalline condition.

By strong sulphuric acid, ditamine is coloured red, passing into violet red by heating. Strong nitric acid forms a yellow solution, which upon warming passes through dark green to violet, giving off red vapours at the same time. Ditamine melts at 75° C. to a yellow liquid which at 130° C. becomes deep red brown. In alcoholic solution it blues red litmus paper and neutralizes acids, forming with them bitter solutions. Only the hydrochlorate, however, was examined by the authors. In consequence of the small quantity of ditamine obtained from the 22 kilos of bark used, and the greater part of this and the other mentioned alkaloidal substance having been rendered unserviceable by an accident, the authors were unable to determine the composition.

The substances enumerated by the authors as having been found by them in dita bark are oxalic acid, combined with lime, in considerable quantity; a brown fatty acid, and a crystallizable acid, precipitated by sugar of lead; a yellow brown flocculent substance, precipitated by basic acetate of lead; ditamine, about 0·02 per cent.; another substance in somewhat larger quantity, the nature of which as an alkaloid was not ascertained with certainty; and about 2·95 per cent. of fatty resinous substances.

These fatty resinous substances were examined and are described by the authors as echicaoutschin ($C_{25}H_{40}O_2$), echicerin ($C_{30}H_{48}O_2$), echitin ($C_{32}H_{52}O_2$), echitein ($C_{42}H_{70}O_2$), echiretin ($C_{35}H_{56}O_2$), and another resin not fully investigated. Some of these bodies appear to be condensation products of the atom group C_5H_8, combined with two atoms of oxygen.

Echicaoutschin	$(C_5H_8)_5O_2$
Echicerin	$(C_5H_8)_6O_2$
Echiretin	$(C_5H_8)_7O_2$

Further, echitin is a homologue of echicerin, and echitein of echiretin:—

Echicerin . . .	$C_{50}H_{48}O_2$	Difference C_2H_4
Echitin	$C_{32}H_{52}O_2$	
Echiretin . . .	$C_{35}H_{56}O_2$	" C_7H_{14}
Echitein. . . .	$C_{42}H_{70}O_2$	

The authors also point out that some of these resinous substances are isomeric if not identical with resinous bodies met with in various plants by other investigators.

In conclusion, the authors concede that the ditamine would be present unaltered in "ditain" (Gruppe's preparation), if dilute sulphuric acid were used in the preparation of the latter, and this is confirmed by their conviction that the alkaloid obtained from "ditain" by Gorup-Besanez, using Stas's method, was identical with ditamine. The very small quantity of alkaloid obtained by him from "ditain" corresponds also with the results of the authors' experiments upon the dita bark. The authors believe that as a material for the preparation of its characteristic alkaloidal salts dita bark has no future before it, and further that if its antifebrile action be generally established, this action could hardly be attributed to the small quantity of alkaloid it contains.

THE PHYSICAL PROPERTIES OF MATTER IN THE LIQUID AND GASEOUS STATES UNDER VARIED CONDITIONS OF PRESSURE AND TEMPERATURE.*

BY DR. ANDREWS, F.R.S.

(*Concluded from page* 130.)

Law of Gay-Lussac.—That the law of Gay-Lussac in the case of the so-called permanent gases, or in general terms of cases greatly above their critical points, holds good at least at ordinary pressures, within the limits of experimental error, is highly probable from the experiments of Regnault; but the results I have obtained with carbonic acid will show that this law, like that of Boyle, is true only in certain limiting conditions of gaseous matter, and that it wholly fails in others. It will be shown that not only does the coefficient of expansion change rapidly with the pressure, but that, *the pressure or volume remaining constant, the coefficient changes with the temperature.* The latter result was first obtained from a set of preliminary experiments, in which the expansion of carbonic acid, under a pressure of 17 atmospheres was observed at 4°, 20°, and 54°; and it has since been fully confirmed by a large number of experiments made at different pressures and well-defined temperatures. These experiments were conducted by the two methods commonly known as the method of constant pressure and the method of constant volume. The two methods, except in the limiting conditions, do not give the same values for the coefficient of expansion; but they agree in this respect, that at high pressures the value of that coefficient changes with the temperature. While I have confined this statement to the actual results of experiment, I have no doubt that future observations will discover, in the case, at least, of such gases as carbonic acid, a similar, but smaller, change in the value of the coefficient for heat at low pressures. The numerous experiments I have made on this subject will shortly be communicated in detail to the Society; and for the present I will only give the following results:—

Expansion of Heat of Carbonic Acid Gas under High Pressures.

Pressure. Atmospheres.	Vol. CO_2 at 0° and 760 m.m.=1.	Vol. CO_2 at 6·05° and 22·26 At.=1.	Temperature. Degrees.	
22·26	0·03934	1·0000	6·05	(A)
22·26	0·05183	1·3175	63·79	
22·26	0·05909	1·5020	100·10	

Pressure. Atmospheres.	Vol. CO_2 at 0° and 760 m.m.=1.	Vol. CO_2 at 6·62° and 31·06 At.=1.	Temperature. Degrees.	
31·06	0·02598	1·0000	6·62	(B)
31·06	0·03600	1·3905	63·83	
31·06	0·04160	1·6068	100·64	

Pressure. Atmospheres.	Vol. CO_2 at 0° and 760 m.m.=1.	Vol. CO_2 at 6·01° and 40·06 At.=1.	Temperature. Degrees.	
40·06	0·01744	1·0000	6·01	(C)
40·06	0·02697	1·5464	63·64	
40·06	0·03161	1·8123	100·60	

Taking as unit 1 vol. of carbonic acid at 6·05° and 22·26 atmospheres, we obtain, from series A, the following values for the coefficient of heat for different ranges of temperature:—

$a=0{\cdot}005499$ from 6·05° to 63·79°.
$a=0{\cdot}005081$ from 63·79° to 100·10°.

From series B, with the corresponding unit volume at 6·62° and 31·06 atmospheres, we find:—

$a=0{\cdot}006826$ from 6·62° to 63·83°.
$a=0{\cdot}005876$ from 63·83° to 100·64°.

And in like manner, from series C, with the unit volume at 6·01° and 40·06 atmospheres:—

$a=0{\cdot}009481$ from 6·01° to 63·64°.
$a=0{\cdot}007194$ from 63·64° to 100·60°.

The coefficient of carbonic acid under 1 atmosphere referred to a unit volume at 6° is—

$a=0{\cdot}003629.$

From these experiments, it appears that the coefficient of expansion increases rapidly with the pressure. Between the temperatures of 6° and 64° it is once and a half as great under 22 atmospheres, and more than two and a half times as great under 40 atmospheres, as at the pressure of 1 atmosphere. Still more important is the change in the value of the coefficient at different parts of the thermometric scale, the pressure remaining the same. An inspection of the figures will also show that this change of value at different temperatures increases with the pressure.

Another interesting question, and one of great importance in reference to the laws of molecular action, is the relation between the elastic forces of a gas at different temperatures while the volume remains constant. The experiments which I have made in this part of the inquiry are only preliminary, and were performed, not with pure carbonic acid, but with a mixture of about 11 volumes of carbonic acid and 1 volume of air. It will be convenient, for the sake of comparison, to calculate, as is usually done, the values of a from these experiments; but it must be remembered that a here represents no longer a coefficient of volume, but a coefficient of elastic force.

Elastic Force of a mixture of 11 *vols.* CO_2 *and* 1 *vol. Air Heated under a Constant Volume to Different Temperatures.*

Vol. CO_2.	Temperature. Degrees.	Elastic Force. Atmospheres.	
366·1	13·70	22·90	(A)
366·2	40·63	25·74	
366·2	99·73	31·65	
256·8	13·70	31·18	(B)
256·8	40·66	25.44	
256·8	99·75	44·29	

From series A we deduce, for a unit at 13·70° and 22·90 atmospheres:—

$a=0{\cdot}004604$ from 13·70° to 40·63°.
$a=0{\cdot}004367$ from 40·63° to 99·73°.

And from series B:—

$a=0{\cdot}005067$ from 13·70° to 40·66°.
$a=0{\cdot}004804$ from 40·66° to 99·75°.

The coefficient at 13·70° and 1 atmosphere is—

$a=0{\cdot}003513.$

It is clear that the changes in the value of a, calculated from the elastic forces under a constant volume, are in the same direction as those already deduced from the expansion of the gas under a constant pressure. The value of a increases with the pressure, and it is greater at lower than at higher temperatures. But a remarkable relation exists between the coefficients in the present case which does not exist between the coefficients obtained from the expansion of the gas. The values of a, deduced for the same range of temperature from the elastic forces at different pressures, are directly proportional to one another. We have, in short—

$$\frac{0{\cdot}004367}{0{\cdot}004604}=0{\cdot}9485, \qquad \frac{0{\cdot}04804}{0{\cdot}05067}=0{\cdot}9481.$$

How far this relation will be found to exist under other conditions of temperature and pressure will appear when experiments now in process are brought to a conclusion.

Law of Dalton.—This law, as originally enunciated by its author, is, that the particles of one gas possess no repulsive or attractive power with regard to the particles of another. "Oxygen gas," he states, "azotic gas, hydrogenous gas, carbonic acid gas, aqueous vapour, and probably several other elastic fluids, may exist in company under any pressure and at any temperature without any regard to their specific gravities, and without any pressure upon one another." The experiments which I have made on mixtures of carbonic acid and nitrogen have occupied a larger portion of time than all I have yet referred to. They have been carried to the great pressure of 283·9 atmospheres, as measured in glass tubes by a hydrogen manometer, at which pressure a mixture of 3 volumes of carbonic acid and 4 volumes of nitrogen was reduced, at 7·6°, to $\frac{1}{378}$th of its volume without liquefaction of the carbonic acid. As this note has already extended to an unusual length, I will not now attempt to give an analysis of these experiments, but shall briefly state their general results. The most important of these results is *the lowering of the critical point by admixture with a non-condensable gas.* Thus, in the mixture mentioned above of carbonic acid and nitrogen, no liquid was formed at any pressure till the temperature was reduced below − 20° C. Even the addition of only $\frac{1}{10}$th of its volume of air or nitrogen to carbonic acid gas will lower the critical point several degrees. Finally, these experiments leave no doubt that the law of Dalton entirely fails under high pressures, where one of the gases is at a temperature not greatly above its critical point. The anomalies observed in the tension of the vapour of water when alone and when mixed with air find their real explanation in the fact that the law of Dalton is only approximately true in the case of mixtures of air and aqueous vapour at the ordinary pressure and temperature of the atmosphere, and do not depend, as has been alleged, on any disturbing influence produced by a hygroscopic action of the sides of the containing vessel. The law of Dalton, in short, like the laws of Boyle and Gay-Lussac, only holds good in the case of gaseous bodies which are at feeble pressures and at temperatures greatly above their critical points. Under other conditions these laws are interfered with ; and in certain conditions (such as some of those described in this note) the interfering causes become so powerful as practically to efface them.

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* A paper read before the Royal Society.

OFFICINAL RHUBARBS.

Under this heading the *Journal of Botany* for August publishes the following information :—

"At the garden of the Royal Botanic Society, Regent's Park, a plant of the *Rheum officinale* is now in nearly ripe fruit. This plant, a native of Tibet, is the species shown by Baillon to be the source of some at least of the 'Turkey' rhubarb of commerce (see *J. Bot.*, 1872, p. 379), and has been figured in the *Botanical Magazine* for last December (t. 6135). It is an exceedingly handsome plant when in flower, and certainly not less so in fruit. The broad wings of the triangular nuts are of a brilliantly bright red, and cordate at the base and apex, the whole fruit being nearly half an inch long, and pendulous in clusters. They are very indifferently rendered both in form and colour in the *Bot. Mag.* plate. Quite recently Professor Maximowicz* has proved that the rhubarb which enters Siberia by Kiachta, or 'Moscow' rhubarb, is yielded by *Rheum palmatum*, Linn., which was found in 1872-3 by Przewalski, on hills at Tangut, in the province of Kansu, in North-West China. This is a re-discovery, for the species was originally brought to Russia in 1750, and thence distributed to the gardens of Europe† as the undoubted source of officinal rhubarb. There is no necessary antagonism between the statements of Baillon and Maximowicz, and it may well be that the drug is afforded by both species of *Rheum.*"

SIR ROBERT CHRISTISON ON VIVISECTION.

At the fourth general session of the British Medical Association, during its recent meeting at Edinburgh, a reference to Vivisection was made in a paper read by Dr. Rutherford. In introducing the discussion the President, Sir Robert Christison, said :—

"I understand there was a great shyness to broach this question of vivisection at the present meeeting. I think that was a great mistake. It ought to have been made, in my opinion, a prominent question. It has been made a very prominent one with the public, who are completely in error in every respect regarding it, and therefore we should have taken advantage of this great meeting to show where the truth lies, because the truth can be shown by a few of those who have been engaged in vivisection all their life, in a few words. And, late as it is, I will show you how I think I can put down the matter at once. I put it down by the system of cross-questioning, by which I have been a good deal tormented in the course of my life as a witness, and I shall give all those who are so desirous to put down vivisection, in brief words, a history of vivisection. When I went to Paris after graduating, and staying in London, I found all scientific Paris resounding with the recent experiments of Orfila on toxicology, by which he at once erected toxicology into the dignity of a science; and not only so, but, as is the invariable result of scientific investigation, he indicated most important practical results of his extensive experiments. I venture to say that there is not in the whole history of experimental medicine or vivisectionism so long, so numerous, and protracted a series of medical experiments as those performed by Orfila. But we know the result. Would any one wish that these experiments had not been made? I should think there can be but one answer to that question. A very short time before I went to Paris, in the same way, a great noise was made in the scientific world by experiments upon animals as to nutrition by substances which did not contain azote, upon which has been founded the accurate dietetic treatment of gout and gravel. I would like to know if the gravellish people who are antivivisectionists would desire these experiments undone, and that we should still be in ignorance of the proper dietary for gravel. Coming to myself, I conducted a series of experiments at one time as to oxalic acid, in the course of which we found the cause of the difficulty that had been found in treatment with oxalic acid. We found that it produced two sets of consequences, one corrosion and irritation, and the other, a most powerful action on the brain and spinal cord ; and it was found, that while certain antidotes destroyed the corrosive action, they made no impression upon the action on the nervous system, which was the source of danger. When the acid was neutralized by an alkali, the irritation and corrosion were put an end to, but without altering in the least the effect on the nervous system or the tendency to death. Here, then, was pointed out the practical conclusion that, in the treatment of poisoning with oxalic acid, we must not use alkalies, but must take the chemical counter poisons which produced an insoluble substance. Would any one desire that these experiments should not have been conducted ? Not long afterwards, in criminal trials, it came to my lot to inquire what was the duration of time between the administration of hydrocyanic acid and death. I made experiments upon animals, and found that when a large dose was given death ensued in four seconds. I do not suppose that these experiments would be much regretted, because they inflicted a very short torture upon the animals. Then, in the next place, there was a remarkable criminal action from an offence committed in the north of Scotland. The charge was that of poisoning with the laburnum bark, and I was consulted by the Crown in the matter. Curiously enough, nothing was known about the action of the laburnum bark. It was known that the seed, the flowers, and the leaves were poisonous ; but no experiments had been made as to the bark. You might form a probable conclusion on the matter ; but in a criminal prosecution a probability will not do. I therefore found it necessary to make experiments, and I found that when the bark was used it was a most powerful and most remarkable poison indeed. I do not suppose that any one would desire that these experiments had not been performed, when in this way you can either establish the guilt of a criminal or save a man's life. Then the Calabar bean was brought under my notice by some curious observations made by our missionaries in Old Calabar. I saw that it was a most dangerous poison to arrive here when people were in ignorance of its action. I resolved to make experiments, and I made, in the first instance, a very cruel experiment—as I suppose the anti-vivisectionists would believe—I made an experiment upon myself, and some of my friends thought that I had made a narrow escape. I did not think that my escape was very narrow, because I apportioned my dose with some care; but the effects were most violent. I then made a few experiments upon animals, and found that the effects upon them were identical. I therefore gave a short account of the matter, and afterwards remitted the further investigation to my assistant, Dr. Fraser, who was led to discover, in the course of his inquiry, the very remarkable action of the Calabar bean upon the pupil. I do not suppose that any one would say these experiments should not have been performed. But this is not all. A considerable time ago I thought I had invented a way by which I could settle what was at that time a very important and difficult question, whether certain medicines or poisons acted through the medium of the blood or through the nervous system. I made one experiment with a view to settle this question; but it was so cruel an experiment that I could not repeat it, and I abandoned the inquiry on account of the cruelty of the experiment. What are we to infer from this? That in a great school such as that of Edinburgh, where men of science know what they ought and what they ought not to undertake, nothing will be done that will be in the least degree offensive to public decency or public opinion; and further, that cruelty is just as disagreeable to vivisectionists as it is to all those super-delicate people who are offering twenty guineas reward for the discovery of a vivisectionist. You see that if the cruelty is greater than the object in view, the cruelty will prevail, and the investigation will be abandoned. I refer, lastly, to the investigation of Dr. Rutherford. We see what have been the results of that investigation. I do not say that Dr. Rutherford will say that these experiments were not cruel; but I will put against the cruelty the nauseousness of them to the investigator. Dr. Rutherford's experiments are fully justified by the importance of the conclusions to be drawn from them. The physiological results of these experiments are extremely interesting, but the practical results are of very great importance. I do not know how the antivivisectionists are to answer these statements; but I shall be very glad to see the answer as soon as they are prepared to give it."

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* "'Regel Garten Flora,' January, 1875, and tab. 819.

† "The cultivated plant in gardens has a somewhat more spreading panicle than the wild *palmatum* as figured by Maximowicz."

ADULTERATION OF OIL OF CLOVES.*

BY E. JACQUEMIN.

In Germany the adulteration of oil of cloves by the addition of carbolic acid has sometimes been met with. A test for this sophistication has been already devised by Flückiger,† based upon the fact noticed by Berthelot, that ammoniacal phenol is coloured blue by hypochlorite of lime. It consists in agitating 26 to 10 grams of the oil of cloves with fifty to one hundred times its weight of hot water, decanting after cooling, concentrating the clear liquor at a gentle heat to a few cubic centimetres, then adding one drop of ammonia and a pinch of chloride of lime. If the oil contain carbolic acid, the liquor on shaking acquires a green colour, which changes into blue, and remains persistent during several days. If the oil be pure no coloration takes place.

The method advocated by the author is, he considers, preferable, as being so delicate that the presence of carbolic acid can be demonstrated in a single drop of the essential oil. He adds a minute quantity of solution of aniline by means of a glass rod to a drop of the essential oil, and then shakes the mixture with 5 or 6 c.c. of distilled water. Upon the addition of a few drops of solution of hypochlorite of soda, if the oil contain no carbolic acid only the purple violet colour of the aniline appears; whilst if carbolic acid be present the beautiful persistent blue colour becomes manifest in a few minutes. The mixture should not be shaken upon the addition of the hypochlorite, but the reaction allowed to take place unassisted.

The author states that his experiments have demonstrated that in one drop of oil of cloves adulterated with 5 per cent. of carbolic acid, a deep colour is produced by this test; and that in a drop containing only 1 per cent. the blue colour is still developed very clearly.

PURIFICATION OF OLEIC ACID.*

BY CHARLES RICE.

Among the processes which have been proposed to obtain oleic acid sufficiently pure for the preparation of oleates in general, and oleate of mercury in particular, the following are the chief ones:—

(1) The process published in *Amer. Jour. Pharm.*, 1873, p. 1, by myself, which, however, effected only a separation of the portion remaining liquid between 40° and 50° F. from the more solid portion. Its defects became apparent after a time, for it was found almost impossible to effect solution of mercuric oxide without reduction. Now and then I succeeded in obtaining a small lot of very light-coloured crude oleic acid, of which one lot in particular gave no reduction whatever; but I could not again obtain any more of it.

(2) The method proposed some time ago of separating the oleic acid from castile soap. This process yields a tolerably handsome product, by dissolving *white* castile soap in water with the aid of heat, filtering, and, when *cold*, decomposing the solution with acetic acid, then separating the liberated fatty acids, and eliminating the portion remaining liquid at 45° F. The yield, however, is not very large.

(3) Mr. L. Dohme's process (*Amer. Jour. Pharm.*, 1873, p. 158), which, although not separating the acid itself, still deserves mention here, as it yields a tolerably good product, when properly managed. Mercuric oxide being dissolved in nitric acid, and the commercial oleic acid in a hydro-alcoholic solution of potassa, the first solution is added to the second, the resulting oleate of mercury washed, and finally made up with oleic acid to the desired bulk.

(4) A process published in the *Amer. Journ. Pharm.*, 1873, p. 97, by "F. and H.," which, however, is much too circumstantial, and very unsatisfactory in yield. It is a combination of several processes proposed for obtaining *pure* oleic acid, which is not so well adapted to the preparation of oleates on account of its dense consistence, at least for pharmaceutical purposes. The acid, when prepared according to the directions given, is not at all "thinner than almond oil;" on the contrary it is quite dense and prone to crystallize. A liquid, although less pure acid, is much preferable. For the sake of comparison I place here an outline of the principal methods for preparing the pure acid.

(*a*) Varrentrap's ('Ann. Pharm.,' vol. 35, p. 196; Gmelin, xvii, 63). Crude oleic acid is filtered at 0°, and converted into lead-salt; this is decomposed, the oleic acid set free, saponified with an alkali, and salted out with sodic carbonate and chloride.

(*b*) Berthelot's ('N. Ann. Chim. Phys.,' vol. 41, p. 243; Gmelin, xvii, 64). The crude oleic acid is twice filtered at 0°, neutralized with caustic potassa, dissolved in two parts alcohol, filtered cold, and precipitated with baric chloride; the precipitate is dried, boiled repeatedly with alcohol, and the salt which is deposited on cooling recrystallized once or twice from alcohol. It is then decomposed by tartaric acid, and the separated oleic acid is washed with water.

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* From the *Journal de Pharmacie et de Chimie* [4], vol. xxii., p. 100.

† *Pharm. Journ.* [3] vol. i., p. 321.

* Read before the American Pharmaceutical Association.

(*c*) Bromeis ('Ann. Pharm.' vol. 57, p. 38; Gmelin, xvii., 63). The crude acid is converted into the lead-salt, the lead-salt is decomposed, and the acid set free is cooled in small portions down to 6° or 7°, when it solidifies to a crystalline mass, which is pressed between folds of blotting paper. The solid and purer acid is thus separated from the fluid portion, which contains oxidized products. By repeatedly melting, cooling, and pressing the crystalline portion, at last with the addition of a little alcohol, the impurities are completely removed.

The desired aim is to obtain an acid which is liquid at ordinary temperatures, and is as free as possible from oxyoleic acid and colouring matter. After many trials and failures I finally succeeded in obtaining a satisfactory result by the following process:—

Take of commercial oleic acid ("red oil") any convenient quantity. Expose it repeatedly to a temperature of about 45° F., and express the liquid portion.* Mix this with an equal bulk of sulphurous acid solution, place it in the light, and shake frequently until no more colour is discharged. A crude acid, which was prepared from clean and fresh fats, and collected as the first run from the hydraulic press, before the pressure had been raised high, will discharge nearly all its colour; generally, however, the result is an acid of a light straw colour. Finally the oleic acid is separated, washed repeatedly with cold distilled water, and put into bottles, which should be kept full and in a cool place. Oleic acid thus prepared dissolves metallic oxides readily and completely, and mercuric oxide without reduction.

In conclusion I would state, that in making oleate of mercury, it is essential to use only such mercuric oxide as is *thoroughly dry*, and to sift it in small portions at a time upon the surface of the oleic acid, each fresh portion being well incorporated before another is added. Only in this way can an intimate mixture be made of the acid and the oxide, which latter has a great inclination to cake, thereby diminishing the surface upon which the acid could act. Solution should be promoted by frequent stirring, at ordinary temperatures, since experience has shown that all heating is positively injurious.

THE ROYAL COMMISSION ON SCIENTIFIC INSTRUCTION AND THE ADVANCEMENT OF SCIENCE.

Within the last few days the Sixth, Seventh, and Eight Reports of this Commission have been issued to the public. They form a valuable contribution to the literature of the subject, and they contain the conclusions at which the Commission has arrived at the termination of the final three sections of its inquiry.

The Sixth Report is devoted to the teaching of science in public and endowed schools. It is partly based upon replies to questions which had been sent to the principals of various schools, generally after the schools had been visited by the Secretary to the Commission, Mr. Norman Lockyer. These replies embody a vast amount of information upon the subject and together with the questions are given in an Appendix to the Report.

The public and endowed schools to which attention was specially directed were Eton College, Rugby School, St. Peter's College Westminster, Harrow School, Winchester College, Charterhouse School, Marlborough College, Dulwich College, City of London School, University College School, King's College School, Taunton College School, Wellington College, Rossall School, Clifton College, Cheltenham College, Christ's Hospital, and the Manchester Grammar School. Information was also sought from the head masters of the 202 schools which appear in the report of the Schools Inquiry Commission as possessing endowments of over £200 per annum, and from 128 of these schools replies were received.

The evidence thus obtained conclusively proves that in our public and endowed schools, science is as yet very far from receiving the attention to which it is entitled. For instance, the returns furnished show that, even where science is taught, from one to two hours' work per week may be regarded, with very few exceptions, as the usual time given to it in such classes as receive scientific instruction at all. Moreover, the instruction in science is generally confined to certain classes of the school.

Among the 128 endowed schools from which returns were received, science is taught in only 63, and of these only 13 have a laboratory, and only 18 apparatus, often very scanty. Out of the 128 schools, definite information was received from 87. Of these 30 allot no regular time whatever to scientific study; 7 only one hour a week; 15 only two hours; while out of the whole number only 18 devote as much as four hours to it. The neglect with which it is treated is also clearly shown by that portion of the Assistant Commissioner's Report in which the weight attached to science in the school examinations is stated, whence it appears that among the higher grade schools from which information has been received, only two attach a weight to science in the examinations equal to that of classics or mathematics; while in the case of the 128 endowed schools from which information has been received, only 13 give any weight at all to science in the examinations.

Languages and mathematics are by universal consent regarded as indispensable parts of a system of education, but, it is satisfactory to note that the Commissioners express a decided opinion that any system from which science is excluded must be incomplete and unsatisfactory.

This opinion on the importance of introducing science as an integral part of our public school instruction is in general accordance with the recommendations of two previous Royal Commissions—the Royal Commission appointed in 1861 to inquire into the revenues and management of certain colleges and schools (shortly styled the Public Schools Commission), and the Royal Schools Inquiry Commission appointed in 1864. The same view has been also adopted by the Special Commissioners appointed for the purposes of the Public Schools Act of 1868, and the Commissioners appointed for the purposes of the Endowed Schools Act of 1869.

The chief grounds of excuse given for the neglect of recommendations of so weighty and authoritative a character are the absence of funds; the uncertainty as to the educational value of science, particularly in the case of young pupils; and the difficulty of finding time for a new study in an already overcrowded curriculum.

With respect to the first the evidence received by the Commissioners conclusively proves that the apparatus requisite for elementary science teaching can be provided at a comparatively trifling cost; and that where there is a good teacher, the makeshift character of the appliances need not prevent efficient teaching. On the other hand, it is important to remember that the introduction of new subjects of study implies the introduction of teachers qualified to take charge of them; and that in many of the smaller and more poorly endowed schools there is difficulty in obtaining the requisite funds. At the same time the Commissioners are of opinion that no school which is forced to plead its poverty as an excuse for the neglect of natural science can pretend to complete efficiency.

With reference to the wealthier foundations, and the great proprietary schools considerable evidence of improvement in this respect is reported. Laboratories have been built, or are in the course of construction, at Eton, Harrow, and Rugby; and there is reason to hope that the example will be generally followed, as the Special Commissioners appointed for the purposes of the Public Schools Act of 1868 have included in their regulations a clause requiring the governing bodies of the nine public schools to which their powers extended to provide and maintain laboratories and collections of apparatus and of specimens. The Commissioners are of opinion that school laboratories should be constructed so as to supply accommodation for practical work in physics, as well as in chemistry.

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* Dr. E. R. Squibb stated to the writer that he finds it preferable to cool the crude acid first to 60° F., the liquid product of this to 50° F., and the remaining liquid product to 45° F.—C. R.

In their conclusions and recommendations to this Report the Commissioners state that on a review of the present state of the public and endowed schools, it appears that though some progress has no doubt been achieved, and though there are some exceptional cases of great improvement, still no adequate effort has been made to supply the deficiency of scientific instruction pointed out by the Commissioners of 1861 and 1864. They are compelled, therefore, to record their opinion that the *present state of scientific instruction in schools is extremely unsatisfactory.* The omission from a liberal education of a great branch of intellectual culture is of itself a matter for serious regret; and, considering the increasing importance of science to the material interests of the country, the Commissioners regard its almost total exclusion from the training of the upper and middle classes as little less than a national misfortune. They are also of opinion that scientific instruction ought to commence from the beginning of the school career.

The Commissioners, therefore, recommend that in all public and endowed schools, a substantial portion of the time allotted to study should throughout the school course be devoted to natural science; and that not less than six hours a week on the average should be appropriated for the purpose; that in all general school examinations not less than one-sixth of the marks be allotted to natural science.

The Seventh Report is upon the concluding portion of the inquiry as to what aid to scientific instruction and the advancement of science is derived from grants voted by parliament, or from endowments belonging to the several universities in Great Britain and Ireland, and the colleges thereof, and whether such aid could be rendered in a manner more effectual for the purpose. It deals with the University of London, the Universities of Scotland (Edinburgh, Glasgow, St. Andrew's, and Aberdeen), the University of Dublin and Trinity College, and the Queen's University in Ireland. It gives an exhaustive account of the provision for scientific teaching in these institutions, and recommends various modifications of present arrangements, and in some cases suggests increased aid from the public funds.

Incidentally it is mentioned that the total number of candidates who have obtained the degree of Bachelor in Science in the University of London, up to June last, is 157; the number of those who have obtained the degree of Doctor in Science is 21, of whom 11 presented themselves in one or other of the departments of Chemistry. With respect to this degree the Commissioners consider it worthy of the consideration of the senate whether candidates should not merely show proficiency of knowledge as tested by examination, but should also offer some original contribution to science.

The Eighth Report addresses itself directly to the relations of Government to science and to the advancement of scientific research; and the inquiry is divided into the following branches:—(1) The scientific work carried on by departments of the Government; (2) The assistance at present given by the State towards the promotion of scientific research; (3) The assistance which it is desirable the State should give towards that object; (4) The central organization which is best calculated to enable the Government to determine its action in all questions affecting science.

The principal branches of scientific work conducted by officers of the Imperial Government, and the departments by which they are administered, are as follows:—

Topographical Survey [Treasury (Office of Works)].
Hydrographical Survey [Admiralty].
Geological Survey [Privy Council].
Astronomical Observations:
  Greenwich and the Cape of Good Hope [Admiralty].
  Edinburgh [Treasury (Office of Works)].
Meteorological Observations:
  Greenwich [Admiralty].
  Edinburgh [Treasury (Office of Works)].
  The Meteorological Office.

[The Meteorological Office is not administered by any public department, but is directed by a committee which, although appointed by the Royal Society, is independent of that body.]

Botany.—Royal Gardens, Kew; Botanic Garden, Edinburgh; Botanic Gardens, Dublin [Treasury (Office of Works)].
The Chemical Department of the War Office.
The Standards Department of the Board of Trade.

Analogous work is carried on in some of the colonies and foreign possessions by departments of their respective Governments.

In one case, that of the Royal Observatory, Greenwich, the work is examined into and reported on to the Admiralty by a Board of Visitors composed of men of science.

When scientific questions arise on which the departments are not supposed to possess the requisite theoretical or practical information, special committees are appointed or the advice of individuals presumed to be specially qualified is obtained, either directly or through the Royal, the Geographical, or some other learned society.

The following is a statement showing the annual charges borne by Imperial funds, at the present time, to defray the expenses of such of these various investigations as appear separately in the estimates for the year 1874-75:—Topographical Survey, £132,000 (excluding military pay of men employed); Hydrographical Survey. £121,055; Geological Survey, £22,920; Astronomy, £9,703; Meteorology, £12,082; Botany, including the maintenance of botanical gardens as places of public recreation, £21,470; Standards Department of the Board of Trade, £2,063.

In addition to these recurring charges, sums are voted from time to time for various expeditions and for experiments incidental to the services of the various departments, such as the investigations concerning the causes and processes of disease carried on under the direction of the Lords of the Privy Council, and the various experimental researches carried on for the army and navy.

In the copious evidence taken as to the sufficiency or insufficiency of the work done for the advancement of science, including that of the Government departments, there is a general concurrence of opinion, that, even in the interests of the departments themselves, more ought to be done by the Government in the way of investigation, particularly in respect of those sciences the practical application of which has been developed, or the scope of which has been enlarged by discovery, within recent years. These opinions are entertained alike by persons engaged in scientific work under the various departments of the Government, and by scientific men having no official connection with the State. Numerous extracts from the evidence on this branch of the subject, are given in the report.

As an instance, Sir Henry Rawlinson, a member of the Indian Council, states that in that Council they perpetually have references before them which they are unable to deal with. He adds: "We have, for instance, Sir William Baker upon the Council, and General Strachey and Colonel Strange both attached to the office; yet, notwithstanding their valuable aid, there are many subjects referred to us with which we are quite incompetent to deal." He then refers to the following subjects among others:—The manufacture of iron and steel in India; the efflorescence of soda on irrigated land; the fermentation of beer, "which may involve a loss of 200,000*l.* or 300,000*l.* a year to the British Government;" the question of drought arising from the destruction of forests; the construction of harbours and of other hydraulic works; the founding of brass guns; tidal observations; the publication of works on the flora and fauna of India; geological and trigonometrical surveys; sea dredging; and observatories. He points out that many of these questions are practical and economical, but that still there is a scientific element in almost all of them.

Evidence was also taken as to the insufficiency of the present appliances for investigation and attention was especially directed to the want of laboratories for the use of the officials charged with scientific investigations urgently required for the economical management of the public departments.

Mr. Anderson, the superintendent of machinery at Woolwich, says, "I should like to see a grand laboratory fitted with everthing that would go towards the investigation of such matters, and at the same time a testing apparatus for getting at the physical facts as well. To get up the proper plant would be very expensive, but still I should like the nation to have it, so that any public department could go to this same laboratory and ask for assistance to investigate any doubtful point. In the Government service everybody who gets any work to do worth mentioning is overpowered with work—either they get too much or too little to do—and the investigator should not be bothered with such miscellaneous work."

Dr. Frankland thus refers to the various requirements of Government involving chemical investigations:—"The State requires many important investigations to be carried out. Such investigations are being continually conducted in buildings often very ill-adapted for the purpose, and which are fitted up for the purpose at a great cost. The laboratory of the Rivers Commission, for instance, which we have occupied for four years, was constructed in a house in Victoria Street; a rent of £200 a year is paid for it, and it is literally nothing more than a moderate sized room, and two smaller ones, very ill-adapted for the purpose. Consequently, this laboratory is not so efficient as a building erected for the express purpose of conducting such investigations should be."

After referring to the permanent assistance given by the State towards the promotion of scientific research, in the maintenance of the great national museums by the providing of certain learned societies with apartments free of rent, or with annual grants of money in lieu of such accommodation. and the grant of £1000 for researches carried on by private individuals, which is annually voted by Parliament, and administered by a committee of the Royal Society, the report states that the most important instances of the occasional assistance given by the State are expeditions for special researches and outfits of ships, and apparatus and grants of money for such researches. The Commissioners consider that these contributions are of great value, but that they do not appear to be granted or refused on any sufficiently well-defined principle.

The report further states that strong evidence has been given that it is the interest and within the proper function of the State to give efficient aid to the advancement of knowledge, even in those cases where such knowledge is not directly required for State purposes, and that some of the most decided expressions of opinion to this effect were those of statesmen, whose views, owing to their official experience and their intimate knowledge of the exigencies of parliamentary government, are entitled to great weight on points involving increased grants of public money.

Three distinct ways have been suggested in which the State might assist in providing the aids to investigation which are required by private individuals. It has been proposed: first, that competent investigators should receive grants in money enabling them to provide themselves with means for conducting their researches; secondly, that laboratories, designed primarily for the service of the State, and those of universities and other similar institutions receiving aid from the State, should be placed, under proper conditions, at the disposal of such inquirers; thirdly, that laboratories should be erected by the Government specially designed for the use of private investigators, though, of course, also available for the service of the State. Wherever the first of these methods can be conveniently and economically adopted, the Commissioners are disposed to consider that it is the simplest and the best; but since for many researches apparatus of a costly, but durable character, are among the primary requisites, and to provide these separately for each investigator would involve a large and unnecessary expenditure, they think that the difficulty thus arising might be adequately met by the adoption of the second of the above suggestions.

It has been a rule in the granting of Government aid to scientific investigators, subject, to few exceptions, that such aid should be limited to what was necessary to meet the expenditure actually incurred on instruments, materials, and assistance. The Commissioners however express their belief that there are many instances of unremunerative research in which the benefit conferred on the nation by those who have voluntarily engaged in it establishes a claim upon the State for compensation for time and labour. Without such compensation much important work must remain unperformed, because many of the best men are not in circumstances enabling them to devote long periods of time to unremunerated labour.

But perhaps the most important point in this Report is that the Commissioners express their conviction that the creation of a special ministry dealing with science and with education is a necessity of the public service. This ministry would be occupied (1) with all questions relating to scientific and general education, so far as these come under the notice of Government; (2) with all questions incidental to the application of national funds for the advancement of science; and (3) with all scientific problems in the solution of which the other departments may desire external scientific advice or information. The department should receive information as to scientific investigations proposed by other branches of the Government, and record their progress and results.

It was not thought within their province to express an opinion as to whether the subject of art should be included among the functions of this department, but the Commissioners are satisfied that the minister's attention should not be distracted by any immediate responsibility for affairs which have no connection with science, education, or art.

After having considered whether the official staff of such a ministry, however carefully selected, could be expected to deal satisfactorily with all the varied and complicated questions which would come before the department, and having given full weight to the objections which have been raised against the creation of a Special Council of Science, and to the arguments in favour of referring scientific questions to learned societies, or to special committees appointed for the purpose, or to private individuals, the Commissioners are of opinion that an additional organization would be required through which the minister of science might obtain advice on questions involving scientific considerations, arising in his own department or referred to him by other departments.

This Council the Commissioners think should represent the chief scientific bodies in the United Kingdom; its composition need not differ greatly from that of the present Government Grant Committee of the Royal Society. It might consist of men of science selected by the council of the Royal Society, together with representatives of other important scientific societies, and a certain number of persons nominated by the Government. Further, the Commissioners think that the functions at present exercised by the Government Grant Committee might be advantageously transferred to the proposed Council.

The Pharmaceutical Journal.

SATURDAY, AUGUST 21, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

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A PHARMACEUTICAL SCANDAL IN BELGIUM.

AN evil practice which appears to have obtained to some extent in Belgium—the carrying on of pharmacies by unqualified and unauthorized persons under cover of the names of authorized persons who have no further interest in such pharmacies—has resulted in a fatal accident which recently necessitated the appearance of the parties concerned before a criminal tribunal. There are circumstances in the case, moreover, which suggest suspicion of another reprehensible practice not unknown in this country, and which has been aptly designated the "secret alliance." The incidents of the case may be thus briefly described:—

A physician prescribing for a child supposed to be suffering from tænia, ordered a decoction of pomegranate root bark, and recommended the parents to obtain the medicine from a certain pharmacy at Laeken. This pharmacy was really owned by a Mr. KEMPENESS, who had never been even a student in pharmacy, though it was carried on under the nominal management of an authorized pharmacien named JANSEN. Little beyond Mr. JANSEN'S name, however, could have often appeared at Laeken, for besides "managing" by name a second pharmacy at Waremme, he was bodily in the service of the owner of a third pharmacy at Brussels.

Upon the prescription being presented, Mr. KEMPENESS expressed his decided preference for the bark of the fresh root, and in order to obtain some he asked for two hours to prepare the medicine, and intimated that the price for it would be forty francs! Eventually two bottles of decoction were supplied, with instructions to administer some every hour. The first spoonful having produced vomiting, followed by convulsions, the father communicated this fact to Mr. KEMPENESS, who merely replied, "It is the usual effect!" The continued administration of the medicine, however, produced such distressing results that the prescriber was called in. He evidently considered it to be an abnormal effect; but whilst he was seeking an antidote the child was seized by a terrible fit of convulsions and died.

The gratification of a natural curiosity with respect to the "fresh pomegranate root bark" used by Mr. KEMPENESS drove the authorities to the conclusion that the child had been poisoned by a decoction of false angustura bark (*Strychnos nux-vomica*), an opinion that was confirmed by the discovery of a large quantity of brucine in the stomach.

This disclosure led to the joint appearance of Messrs. KEMPENESS and JANSENS before the correctional police. The charges against Mr. KEMPENESS were that he had committed "homicide par imprudence," and that he had illegally practised pharmacy. Mr. JANSENS was charged with contravening the Belgian regulation which requires that pharmaciens should either themselves prepare physicians' prescriptions or cause them to be prepared under their personal supervision and responsibility. The Court convicted the defendants on all the charges. Mr. KEMPENESS was condemned to twenty-one months' imprisonment and a fine of 100 francs for the homicide, and a fine of 112 francs and confiscation of his drugs for the illegal practice of pharmacy. He was also ordered to pay 1000 francs damages in a civil suit. Mr. JANSENS, on his part, was sentenced to pay a fine of 212 francs, for having contravened the regulation.

In reply to a very proper censure from the judge, for having recommended a pharmacy which he knew to be carried on irregularly, the prescriber said that there were many others in the city of Brussels. We should think therefore that the regular Belgian pharmacists welcomed, as very timely, the judge's retort, "And it has been decided to prosecute them."

PROFESSOR POLLACCI ON SULPHUR.

THANKS to its services in the grape-rot, sulphur has lately received much attention—especially in Italy, where its repute as a remedy reinforces that which it has enjoyed as a source of national wealth. Professor EGIDIO POLLACCI, the well-known Tuscan chemist, has made it the subject of numerous experiments, and with results occasionally novel and generally satisfactory. Moist sulphur, exposed to the air at ordinary temperatures, is easily converted into sulphuric acid, though not associated with any other matter. This change, very gradual at low temperatures and active at from + 35° and + 50°, may be called rapid at from + 65° and + 70°. Producing sulphuric acid, as it does so easily, it explains the origin of many geological facts hitherto obscure. Not far from Siena, in Tuscany, there is an abandoned sulphur mine, yielding a certain quantity of free sulphuric acid, and though the greater part of this acid is combined with earth, yet there remains a sufficient excess of it to saturate some parts of the soil and to render extremely acid a mineral spring near Ajola. In the same way the water in the caves of Mount Etna, and in the Zoccolino mountain near Santa

Fiora, as well as that in some grottoes of Aix in Savoy, holds free sulphuric acid in solution. Strongly acidulated by the same acid are the waters of Bagnavigne, in India, and also in Java and Persia. In all these places, according to Professor Pollacci, the presence of the sulphuric acid is explained by the slow continous oxidation of the sulphur and not by the presence of sulphuretted hydrogen, as hitherto believed.

Formerly the sulphuric acid, as one of the chief impurities in the flowers of sulphur of commerce was considered due to the action of moist air on the sulphurous anhydride which remained adherent to the sulphur particles during the sublimation of the sulphur. It may, Professor Pollacci admits, be formed in this way ; but it is certain that, if not all, at least the greater part, of the sulphuric acid in question is derived from the oxidation of the sulphur metalloid, independently of the pre-existence of the sulphurous anhydride. Among commercial sulphurs, the sublimated variety acidifies much more easily than the others, and that is due to its property of condensing and keeping within itself a greater quantity of air and of watery vapour. In proof of these observations it would suffice to say that conditions of temperature and pressure being equal, 100 grammes of flowers of sulphur occupy a volume represented by 64 cubic cent. ; while the same quantity of Romagna sulphur occupies 50, and that of Sicily 45. Professor Pollacci has further demonstrated that even dried sulphur, by the contact of the air alone, provided it be not deprived of its watery vapour, gives rise to sulphuric acid, and that the quantity of this acid is in direct proportion to the absorbent power of the sulphur.

How is its action so destructive on the oïdium of the vine ? This question Professor Pollacci put to himself, and answered as far back as 1862. He then demonstrated that the sulphur kills the parasite by its production of sulphuric acid which alone possesses the destructive property. Seeing, however, that the facts he had brought together received less attention than he thought they deserved, and on the hypothesis that his conclusions might have been fallacious after all, he determined, in the July and August of last year, to repeat the experiments on a larger scale. Having done so he found his old conclusions more than confirmed : that is to say, the grape by contact with the sulphur under solar heat produces in abundance the sulphuric acid which destroys the oïdium. Results identical with those of Professor Pollacci were also obtained by Dr. Griffini in the laboratory of cryptogamic botany in the University of Pavia. Furthermore, Professor Pollacci observed that the grape, though cured of the malady, continued, during the contact of the sulphur, to develop sulphuretted hydrogen in abundance. Repeating, thereupon, with herbaceous plants the experiments made by Francesco Selmi with mould, he found that all the vegetables experimented on, if powdered with sulphur, generated sulphuric acid, and hence that the other plants as well as the moulds exhaled nascent hydrogen. To the elaborate paper which Professor Pollacci lately read on the subject before the Lombard Institute of Science and Literature, and to which we are indebted for many of the above details, the author adds : "It is true that this last conclusion rests on indirect experiments. Notwithstanding, after the results obtained by Selmi and myself, the emission of nascent hydrogen seems to me undeniable. Using such plants as are best adapted for the experiment, it will be easy to collect directly the hydrogen gas which they exhale, and so 'crown the edifice' of a discovery which, I believe, is destined to render no slight services to vegetable physiology and to practical agriculture."

HOW THE ENGLISH PALATE IS TICKLED.

A large business is now done] at Hamburg in the refining of potato and beet-root spirit. Much of this is exported to England in a pure state, but a considerable quantity appears to be used on the spot in the fabrication of spirituous liquors of various kinds, and the production of Hamburg sherry. Mr. Consul Annesley states that the largest producers of this article have informed him that they purchase cheap common wines in various sea-board countries, and prepare them for the English and American markets by the addition of spirit and sugar. Already there are two establishments in Hamburg where weak Spanish and other wines are thus fortified and stored, and a third is to be added shortly. The export of these wines from Hamburg is said to amount to from 4000 to 5000 butts annually.

PERFUMERY FROM ALGERIA.

In his report on the trade and commerce of Algiers for 1874, Mr. Consul-General Playfair says that the manufacture of essences ought to become an important branch of industry in Algeria. Already a large extent of land is under cultivation with geranium and the various kinds of orange, jasmine, tuberose, and thyme, and he thinks they will prove to be easily raised. Already one house at Boufarik is reported to manufacture 10,000 kilos of essences annually.

The Sale of Food and Drugs Bill has now been issued, and a copy of the text will be found at p. 154. We are informed that the Irish Pharmacy Act will not be issued before next week.

Provincial Transactions.

THE LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourteenth half yearly meeting of the above Association was held on Thursday evening, August 10th, at the rooms, Halford Street, Mr. Duncalf, President, occupying the chair, supported by the Vice-President, Mr. Shakespeare. Tea was provided at 8·30.

After tea the President delivered his inaugural address, which was listened to with marked attention.

The following Report having been read, was unanimously adopted :—

"It is with mingled feelings of pleasure and regret that your Committee review the proceedings and events of the thirteenth session of the Society's existence. They are gratified to think that so much has been accomplished—that amidst the numerous objects so calculated to engross the time and attention of the members, the Association still commands their interest and support, and that under its fostering care a desire on the part of the members to obtain that knowledge so requisite for the correct performance of the duties devolving upon them is becoming still more manifest.

"They are also extremely pleased to see that a former member and class teacher of the Association, Mr. J. A. Basker, has taken so honourable a position in the recent Major examination.

"At the same time they feel deeply sensible of the loss which all the members of the Association, and they especially, as a Committee, have sustained in the removal of one of the oldest and most respected members of the Society—Mr. T. Wright ; they take this opportunity of expressing their appreciation of the manifold services rendered by him to the Association, and their sincere wishes for his future success. They also regret to see that the influence which the new regulations have as yet exercised on the Local Association has not been beneficial, as some of the members seeing themselves debarred from becoming candidates for examination for several years, on account of their age, having given up all systematic study until some future time. The Committee desire to express their decided opinion that such a course will not only prove detrimental to the interests of the members themselves, but will frustrate the very purpose for which the regulations were passed, which was to prevent students from what is called cramming for their examinations, and by extending their studies over a lengthened period of time, to ensure a thorough and practical acquaintance with the subjects in which they are examined.

"Twenty-nine classes have been held during the session conducted by Messrs. Clark, Cadoux, Bishop, and Duncalf, and five lectures have been delivered on scientific subjects, by Messrs. E. Atkins, F. T. Mott, J. E. Weatherhead, and J. Young, Esquires.

"The Committee feel they are giving expression to the feeling of all the members when they acknowledge how deeply they are indebted to those gentlemen who have so generously placed their time and abilities at the service of the Association.

"The number of members at present on the books of the Society is thirty-one, and the attendance during the summer months has been much better than usual, owing to the fact that one class only has been held weekly, instead of two, as formerly.

"In conclusion, the Committee wish to express their pleasure at the hearty manner in which their efforts to make the society prosperous have been seconded by all, and to urge on the members the necessity for continued activity, in order to fit themselves for the positions they are destined to occupy."

The Treasurer's report showed that during the half-year the receipts had been £4 3*s.* 9*d.*, and the expenditure £13 11*s.* 4½*d.*, leaving a balance in hand of £2 4*s.* 7½*d.*, against £11 12*s.* 3*d.*, at the commencement of the half-year.

After the usual votes of thanks to the Retiring Committee and the class teachers, the members proceeded to elect the committee for the ensuing session, with the following result :—

Mr. Duncalf, President ; Mr. A. W. Shakespeare, Vice-President ; Mr. W. B. Clark, Treasurer ; Mr. W. Hammond, Honorary Secretary ; Mr. E. H. Butler ; Mr. J. Barrett ; and Mr. A. Nichols.

A programme of classes and lectures, extending from August 10, 1875 to February 1, 1876, has been issued.

During the remaining portion of the evening the company were entertained with songs and recitations by various members of the Association, and the proceedings were closed with the singing of the national anthem.

The past session may be designated one of the best, if not the best, since the formation of the Society, The classes never were attended better, notwithstanding the many counter attractions constantly existing in the town. The finances, too, though not very great, have always been sufficient and something to spare. It is believed, also, that the coming session will be a complete success. In addition to having a very efficient staff of teachers four prizes are offered for competition at the close of the session, two presented by the Association, and two by members of the Association.

BRISTOL PHARMACEUTICAL ASSOCIATION.

REPORT OF THE COUNCIL.

The Council of the Bristol Pharmaceutical Association have much pleasure in submitting their report of proceedings for the last year.

The general work of the Association has been conducted upon the plan pursued in previous years, no available opportunities for the introduction of any improvements having, as far as the Council could discover, come within their reach.

They are quite aware that in some directions that plan might be advantageously modified. They willingly endorse the opinion expressed by the president last year that it would be better could the course of lectures on botany be delivered in the spring and summer months instead of in the winter ; but the authorities at South Kensington, regarding the matter from their own point of view, decline to make the change, and as long as this Association makes use of their organization it must accept all their conditions, though some be attended with partial inconvenience.

The Council are glad to find that notwithstanding the disadvantages of a winter course, the class that attended Mr. Leipner's lectures appropriated his instruction so well, that of the *nine* students who went in for the examination *five* obtained a first class, *three* a second class, and *one* only failed to pass. They note this as an improvement upon the experience of last year, and they congratulate both the lecturer and the students upon the fact.

The classes on chemistry appear to have not been attended quite so well as in previous years, for although a slightly longer list appears for the organic chemistry class, that for inorganic chemistry is smaller.

On the whole, however, the courses of systematic instruction have been fairly attended, and both Mr. Coomber and Mr. Leipner report well of the attention and diligence of their pupils, and of the general progress they have made.

The following is the order of merit in which they stand in the several examinations :—

Inorganic Chemistry.

C. M. Luxmore	Advanced Grade	1st class.
J. W. Knight	„ „	2nd „
E. G. Appleby	Elementary Grade	1st „

	G. H. Morris	Elementary Grade	1st class.
	A. L. Savory	„ „	1st „
	W. G. Sanders	„ „	1st „
	R. F. Cuff	„ „	2nd „
	W. Jenks	„ „	2nd „

Organic Chemistry.

Equal.	C. M. Luxmore	Advanced Grade	1st „
	J. W. Hall	„ „	1st „
	E. G. Greatrex	Elementary Grade	1st „
	J. W. Knight	„ „	1st „
	W. J. Sanders	„ „	2nd „

Botany.

Chas. J. Miles	Advanced Grade	1st class.
J. W. Hall	Elementary Grade	1st „
C. M. Luxmore	„ „	1st „
W. Powell	„ „	1st „
C. Powell	„ „	1st „
J. F. Savory	„ „	2nd „
J. O. Smith	„ „	2nd „
T. E. Stubbs	„ „	2nd „

It will be remembered that a kind friend to our Association, Mr. Thos. Hyde Hills, presented a sum of money to be distributed, as the Council thought best, in prizes for the encouragement of study amongst our students and apprentices. After full consideration the Council, with the approbation of Mr. Hills, adopted and published the following scheme :—

HILLS PRIZE FUND.

"The Council have determined to apply a portion of this fund in the following manner :—

They offer Three Prizes, viz.,—

1st Prize ...	Value	Two-and-a-half Guineas.
2nd „ ...	„	One-and-a-half Guineas.
3rd „ ...	„	One Guinea.

to be competed for at an examination on the Chemistry, Botany, Materia Medica, and Pharmacy of the Pharmacopœia; and on the Reading and Comprehension of Prescriptions.

"This examination will be held, under the auspices of the Council, in the month of September, 1875, and will be open to all Associates who have not passed the Minor or Modified examination of the Pharmaceutical Society.

"The Council hope by this scheme to encourage young men to make diligent use of the opportunities which the ordinary routine of shop duties may be made to afford. Consequently, they intend that the examination shall be a thoroughly practical one, based on the Syllabus of the Minor examination,—for which it should prove a valuable preparatory training."

The whole series of prizes was announced at the commencement of the session and the conduct of the examination for the Hills Prizes, which will be held in September, has been placed in the hands of two gentlemen, highly qualified for the work—Dr. Tilden and Mr. Ekin. The Council desire in the warmest terms to thank those gentlemen for so kindly undertaking the duty.

The series of monthly evening lectures has again resulted in a number of useful and interesting gatherings, some old friends have once more given the Association their valuable help and some new names have been added to the already goodly list. The Council have for this kind help to thank the following gentlemen, Mr. Louis Siebold, Mr. Bolas, Dr. Spencer, and Mr. Wills.

The Council have once more to allude to the subject of a Library and Museum. The building in which their books and specimens are to be stored is now nearly completed, and the next Council may probably find themselves justified in commencing a work that has always been viewed as an important though necessarily postponed portion of the Association's programme.

Statement of Account.

TREASURER OF BRISTOL PHARMACEUTICAL ASSOCIATION.

Dr.

	£	*s.*	*d.*	£	*s.*	*d.*
59 Members' Subscriptions at 10*s.* 6*d.*	30	19	6			
36 Associates' ditto at 5*s.*	9	0	0			
Lecture Fees	7	5	0	47	4	6
				£47	4	6

MUSEUM ACCOUNT.

	£	*s.*	*d.*
To Balance from last year	37	16	0

THE HILLS PRIZE FUND.

	£	*s.*	*d.*
Amount from last year	10	10	

Cr.

	£	*s.*	*d.*	£	*s.*	*d.*
1874. By Balance due to Treasurer				2	12	1
„ Lecture fees, viz.:—						
Mr. Coomber	7	7	0			
„ Leipner	7	7	0	14	14	0
„ Expenses of Monthly Lectures, viz.:—						
Lecturer's Fees and Expenses	9	0	0			
Carriage of Apparatus, etc. ..	0	16	7			
Mr. Crocker	1	10	0	11	6	7
„ Printing and Stationery..				4	8	6
„ Miscellaneous Expenses				2	16	1
„ Treasurer of Bristol Museum and Library for use of offices, etc.				10	0	0
„ Balance in hand				1	7	3
				£47	4	6

Examined and found correct.

WM. BEING.

Parliamentary and Law Proceedings.

AN ACT TO REPEAL THE ADULTERATION OF FOOD ACTS, AND TO MAKE BETTER PROVISION FOR THE SALE OF FOOD AND DRUGS IN A PURE STATE.

[11th August 1875.]

Whereas it is desirable that the Acts now in force relating to the adulteration of food should be repealed, and that the law regarding the sale of food and drugs in a pure and genuine condition should be amended :

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :

1. *Repeal of statutes.*—From the commencement of this Act the statutes of the twenty-third and twenty-fourth of Victoria, chapter eighty-four, of the thirty-first and thirty-second of Victoria, chapter one hundred and twenty-one, section twenty-four, of the thirty-third and thirty-fourth of Victoria, chapter twenty-six, section three, and of the thirty-fifth and thirty-sixth of Victoria, chapter seventy-four, shall be repealed, except in regard to any appointment made under them and not then determined, and in regard to any offence committed against them or any prosecution or other act commenced and not concluded or completed, and any payment of money then due in respect of any provision thereof.

2. *Interpretation of words.*—The term "food" shall include every article used for food or drink by man, other than drugs or water :

The term "drug" shall include medicine for internal or external use :

The term "county" shall include every county, riding, and division, as well as every county of a city or town not being a borough :

The term "justices" shall include any police and stipendiary magistrate invested with the powers of a justice of the peace in England, and any divisional justices in Ireland.

Description of Offences.

3. *Prohibition of the mixing of injurious ingredients, and of selling the same.*—No person shall mix, colour, stain, or

powder, or order or permit any other person to mix, colour, stain, or powder, any article of food with any ingredient or material so as to render the article injurious to health, with intent that the same may be sold in that state, and no person shall sell any such article so mixed, coloured, stained, or powdered, under a penalty in each case not exceeding fifty pounds for the first offence; every offence after a conviction for a first offence, shall be a misdemeanor, for which the person, on conviction, shall be imprisoned for a period not exceeding six months with hard labour.

4. *Prohibition of the mixing of drugs with injurious ingredients, and of selling the same.*—No person shall, except for the purpose of compounding as hereinafter described, mix, colour, stain, or powder, or order, or permit any other person to mix, colour, stain or powder any drug with any ingredient or material so as to affect injuriously the quality or potency of such drug, with intent that the same may be sold in that state, and no person shall sell any such drug so mixed, coloured, stained, or powdered, under the same penalty in each case respectively as in the preceding section for a first and subsequent offence.

5. *Exemption in case of proof of absence of knowledge.*—Provided that no person shall be liable to be convicted under either of the two last foregoing sections of this Act in respect of the sale of any article of food, or of any drug if he shows to the satisfaction of the justice or court before whom he is charged that he did not know of the article of food or drug sold by him being so mixed, coloured, stained, or powdered as in either of those sections mentioned, and that he could not with reasonable diligence have obtained that knowledge.

6. *Prohibition of the sale of articles of food and of drugs not of the proper nature, substance, and quality.*—No person shall sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding twenty pounds; provided that an offence shall not be deemed to be committed under this section in the following cases that is to say,

(1) Where any matter or ingredient not injurious to health has been added to the food or drug because the same is required for the production or preparation thereof as an article of commerce, in a state fit for carriage or consumption, and not fraudulently to increase the bulk, weight, or measure of the food or drug, or conceal the inferior quality thereof;

(2) Where the drug or food is a proprietary medicine, or is the subject of a patent in force, and is supplied in the state required by the specification of the patent;

(3) Where the food or drug is compounded as in this Act mentioned;

(4) Where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation.

7. *Provision for the sale of compounded articles of food and compounded drugs.*—No person shall sell any compound article of food or compounded drug which is not composed of ingredients in accordance with the demand of the purchaser, under a penalty not exceeding twenty pounds.

8. *Protection from offences by giving of label.*—Provided that no person shall be guilty of any such offence as aforesaid in respect of the sale of an article of food or a drug mixed with any matter or ingredient not injurious to health, and not intended fraudulently to increase its bulk, weight, or measure, or conceal its inferior quality, if at the time of delivering such article or drug he shall supply to the person receiving the same a notice, by a label distinctly and legibly written or printed on or with the article or drug, to the effect that the same is mixed.

9. *Prohibition of the abstraction of any part of an article of food before sale, and selling without notice.*—No person shall, with the intent that the same may be sold in its altered state without notice, abstract from an article of food any part of it so as to affect injuriously its quality, substance, or nature, and no person shall sell any article so altered without making disclosure of the alteration, under a penalty in each case not exceeding twenty pounds.

Appointment and Duties of Analysts, and Proceedings to obtain Analysis.

10. *Appointment of analysts.*—In the city of London and the liberties thereof the Commissioners of Sewers of the city of London and the liberties thereof, and in all other parts of the metropolis the vestries and district boards acting in execution of the Act for the better local management of the metropolis, the court of quarter sessions of every county, and the town council of every borough having a separate court of quarter sessions, or having under any general or local Act of Parliament or otherwise a separate police establishment, may, as soon as convenient after the passing of this Act, where no appointment has been hitherto made, and in all cases as and when vacancies in the office occur, or when required so to do by the Local Government Board, shall, for their respective city, districts, counties, or boroughs, appoint one or more persons possessing competent knowledge, skill, and experience, as analysts of all articles of food and drugs sold within the said city, metropolitan districts, counties, or boroughs, and shall pay to such analysts such remuneration as shall be mutually agreed upon, and may remove him or them as they shall deem proper; but such appointments and removals shall at all times be subject to the approval of the Local Government Board, who may require satisfactory proof of competency to be supplied to them, and may give their approval absolutely or with modifications as to the period of the appointment and removal, or otherwise: Provided, that no person shall hereafter be appointed an analyst for any place under this section who shall be engaged directly or indirectly in any trade or business connected with the sale of food or drugs in such place.

In Scotland the like powers shall be conferred and the like duties shall be imposed upon the commissioners of supply at their ordinary meetings for counties, and the commissioners or boards of police, or where there are no such commissioners or boards, upon the town councils for boroughs within their several jurisdictions; provided that one of Her Majesty's Principal Secretaries of State in Scotland shall be substituted for the Local Government Board of England.

In Ireland the like powers and duties shall be conferred and imposed respectively upon the grand jury of every county and town council of every borough; provided that the Local Government Board of Ireland shall be substituted for the Local Government Board of England.

11. *Town council of a borough may engage the analyst of another borough or of the county.*—The town council of any borough may agree that the analyst appointed by any neighbouring borough or for the county in which the borough is situated, shall act for their borough during such time as the said council shall think proper, and shall make due provision for the payment of his remuneration, and if such analyst shall consent, he shall during such time be the analyst for such borough for the purposes of this Act.

12. *Power to purchaser of an article of food to have it analysed.*—Any purchaser of an article of food or of a drug in any place being a district, county, city, or borough where there is any analyst appointed under this or any Act hereby repealed shall be entitled, on payment to such analyst of a sum not exceeding ten shillings and sixpence, or if there be no such analyst then acting for such place, to the analyst of another place, of such sum as may be agreed upon between such person and the analyst, to have such article analysed by such analyst, and to receive from him a certificate of the result of his analysis.

13. *Officer named to obtain a sample of food or drug to*

submit to analyst.—Any medical officer of health, inspector of nuisances, or inspector of weights and measures, or any inspector of a market, or any police constable under the direction and at the cost of the local authority appointing such officer, inspector, or constable, or charged with the execution of this Act, may procure any sample of food or drugs, and if he suspect the same to have been sold to him contrary to any provision of this Act, shall submit the same to be analysed by the analyst of the district or place for which he acts, or if there be no such analyst then acting for such place to the analyst of another place and such analyst shall, upon receiving payment as is provided in the last section, with all convenient speed analyse the same and give a certificate to such officer, wherein he shall specify the result of the analysis.

14. *Provision for dealing with the sample when purchased.*—The person purchasing any article with the intention of submitting the same to analysis shall, after the purchase shall have been completed, forthwith notify to the seller or his agent selling the article his intention to have the same analysed by the public analyst, and shall offer to divide the article into three parts to be then and there separated, and each part to be marked and sealed or fastened up in such manner as its nature will permit, and shall, if required to do so, proceed accordingly, and shall deliver one of the parts to the seller or his agent.

He shall afterwards retain one of the said parts for future comparison, and submit the third part, if he deems it right to have the article analysed, to the analyst.

15. *Provision when sample is not divided.*—If the seller or his agent do not accept the offer of the purchaser to divide the article purchased in his presence, the analyst receiving the article for analysis shall divide the same into two parts, and shall seal or fasten up one of those parts, and shall cause it to be delivered, either upon receipt of the sample or when he supplies his certificate to the purchaser, who shall retain the same for production in case proceedings shall afterwards be taken in the matter.

16. *Provision for sending article to the analyst through the post office.*—If the analyst do not reside within two miles of the residence of the person requiring the article to be analysed, such article may be forwarded to the analyst through the post-office as a registered letter, subject to any regulations which the Postmaster General may make in reference to the carrying and delivery of such article, and the charge for the postage of such article shall be deemed one of the charges of this Act or of the prosecution, as the case may be.

17. *Person refusing to sell any article to any officer liable to penalty.*—If any such officer, inspector, or constable, as above described, shall apply to purchase any article of food or any drug exposed to sale, or on sale by retail on any premises or in any shop or stores, and shall tender the price for the quantity which he shall require for the purpose of analysis, not being more than shall be reasonably requisite, and the person exposing the same for sale shall refuse to sell the same to such officer, inspector, or constable, such person shall be liable to a penalty not exceeding ten pounds.

18. *Form of the certificate.*—The certificate of the analysis shall be in the form set forth in the schedule hereto, or to the like effect.

19. *Quarterly report of the analyst.*—Every analyst appointed under any Act hereby repealed or this Act shall report quarterly to the authority appointing him the number of articles analysed by him under this Act during the foregoing quarter, and shall specify the result of each analysis and the sum paid to him in respect thereof, and such report shall be presented at the next meeting of the authority appointing such analyst, and every such authority shall annually transmit to the Local Government Board, at such time and in such form as the Board shall direct, a certified copy of such quarterly report.

Proceedings against offenders.

20. *Proceedings against offenders.*—When the analyst having analysed any article shall have given his certificate of the result, from which it may appear that an offence against some one of the provisions of this Act has been committed, the person causing the analysis to be made may take proceedings for the recovery of the penalty herein imposed for such offence, before any justices in petty sessions assembled having jurisdiction in the place where the article or drug sold was actually delivered to the purchaser, in a summary manner.

Every penalty imposed by this Act shall be recovered in England in the manner prescribed by the eleventh and twelfth of Victoria, chapter forty-three. In Ireland such penalties and proceedings shall be recoverable, and may be taken with respect to the police district of Dublin metropolis, subject and according to the provisions of any Act regulating the powers and duties of justices of the peace for such district, or of the police of such district; and with respect to other parts of Ireland, before a justice or justices of the peace sitting in petty sessions, subject and according to the provisions of "The Petty Sessions (Ireland) Act, 1851," and any Act amending the same.

Every penalty herein imposed may be reduced or mitigated according to the judgment of the justices.

21. *Certificate of analyst primâ facie evidence for the prosecution, but analyst to be called if required. Defendant and his wife may be examined.*—At the hearing of the information in such proceeding the production of the certificate of the analyst shall be sufficient evidence of the facts therein stated, unless the defendant shall require that the analyst shall be called as a witness, and the parts of the article retained by the person who purchased the article shall be produced, and the defendant may, if he think fit, tender himself and his wife to be examined on his behalf, and he or she shall, if he so desire, be examined accordingly.

22. *Power to justices to have articles of food and drugs analysed.*—The justices before whom any complaint may be made, or the court before whom any appeal may be heard, under this Act may, upon the request of either party, in their discretion cause any article of food or drug to be sent to the Commissioners of Inland Revenue, who shall thereupon direct the chemical officers of their department at Somerset House to make the analysis, and give a certificate to such justices of the result of the analysis; and the expense of such analysis shall be paid by the complainant or the defendant as the justices may by order direct.

23. *Appeal to quarter sessions.*—Any person who has been convicted of any offence punishable by any Act hereby repealed or by this Act by any justices may appeal in England to the next general or quarter sessions of the peace which shall be held for the city, county, town, or place wherein such conviction shall have been made, provided that such person enter into a recognizance within three days next after such conviction, with two sufficient sureties, conditioned to try such appeal, and to be forthcoming to abide the judgment and determination of the court at such general or quarter sessions, and to pay such costs as shall be by such court awarded; and the justices before whom such conviction shall be had are hereby empowered and required to take such recognizance; and the court at such general or quarter sessions are hereby required to hear and determine the matter of such appeal, and may award such costs to the party appealing or appealed against as they or he shall think proper.

In Ireland any person who has been convicted of any offence punishable by this Act may appeal to the next court of quarter sessions to be held in the same division of the county where the conviction shall be made by any justice or justices in any petty sessions district, or to the recorder at his next sessions where the conviction shall be made by the divisional justices in the police district of Dublin metropolis, or to the recorder of any corporate or borough town when the conviction shall be made by any justice or justices in such corporate or borough town (unless when any such sessions shall commence within ten days from the date of any such conviction, in which case, if the appellant sees fit, the appeal may be made to the next succeeding sessions to be held for such division or town), and it shall be lawful for such court of quarter sessions or recorder (as the case may be) to decide such appeal, if made in such form and manner and with such notices as are required by the said Petty Sessions Acts respectively hereinbefore mentioned as to appeals against orders made by justices at petty sessions, and all the provisions of the said Petty Sessions Acts respectively as to making appeals and as to executing the orders made on appeal, or the original orders where the appeals shall not be duly prosecuted, shall also apply to any appeal made under this Act.

24. *In any prosecution defendant to prove that he is protected by exception or provision.*—In any prosecution under this Act, where the fact of an article having been sold in a mixed state has been proved, if the defendant shall desire to rely upon any exception or provision contained in this Act, it shall be incumbent upon him to prove the same.

25. *Defendant to be discharged if he prove that he bought the article in the same state as sold, and with a warranty. No costs except on issues proved against him.*—If the defendant in any prosecution under this Act prove to the satisfaction of the justices or court that he had purchased the article in question as the same in nature, substance, and quality as that demanded of him by the prosecutor, and with a written warranty to that effect, that he had no reason to believe at the time when he sold it that the article was otherwise, and that he sold it in the same state as when he purchased it, he shall be discharged from the prosecution, but shall be liable to pay the costs incurred by the prosecutor, unless he shall have given due notice to him that he will rely on the above defence.

26. *Application of penalties.*—Every penalty imposed and recovered under this Act shall be paid in the case of a prosecution by any officer, inspector, or constable of the authority who shall have appointed an analyst or agreed to the acting of an analyst within their district, to such officer, inspector, or constable, and shall be by him paid to the authority for whom he acts, and be applied towards the expenses of executing this Act, any Statute to the contrary notwithstanding; but in the case of any other prosecution the same shall be paid and applied in England according to the law regulating the application of penalties for offences punishable in a summary manner, and in Ireland in the manner directed by the Fines Act, Ireland, 1851, and the Acts amending the same.

27. *Punishment for forging certificate or warranty; for wilful misapplication of warranty; for false warranty; for false label.*—Any person who shall forge, or shall utter, knowing it to be forged for the purposes of this Act, any certificate or any writing purporting to contain a warranty, shall be guilty of a misdemeanor and be punishable on conviction by imprisonment for a term of not exceeding two years with hard labour;

Every person who shall wilfully apply to an article of food, or a drug, in any proceedings under this Act, a certificate or warranty given in relation to any other article or drug, shall be guilty of an offence under this Act, and be liable to a penalty not exceding twenty pounds;

Every person who shall give a false warranty in writing to any purchaser in respect of an article of food or a drug sold by him as principal or agent, shall be guilty of an offence under this Act, and be liable to a penalty not exceeding twenty pounds;

And every person who shall wilfully give a label with any article sold by him which shall falsely describe the article sold, shall be guilty of an offence under this Act, and be liable to a penalty not exceeding twenty pounds.

28. *Proceedings by indictment and contracts not to be affected.*—Nothing in this Act contained shall affect the power of proceeding by indictment, or take away any other remedy against any offender under this Act, or in any way interfere with contracts and bargains between individuals, and the rights and remedies belonging thereto.

Provided that in any action brought by any person for a breach of contract on the sale of any article of food or of any drug such person may recover alone or in addition to any other damages recoverable by him the amount of any penalty in which he may have been convicted under this Act, together with the costs paid by him upon such conviction and those incurred by him in and about his defence thereto, if he prove that the article or drug the subject of such conviction was sold to him as and for an article or drug of the same nature, substance, and quality as that which was demanded of him, and that he purchased it not knowing it to be otherwise, and afterwards sold it in the same state in which he purchased it; the defendant in such action being nevertheless at liberty to prove that the conviction was wrongful, or that the amount of costs awarded or claimed was unreasonable.

Expenses of executing the Act.

29. *Expenses of executing Act.*—The expenses of executing this Act shall be borne, in the city of London and the liberties thereof, by the consolidated rates raised by the Commissioners of Sewers of the city of London and the liberties thereof, and in the rest of the metropolis by any rates or funds applicable to the purposes of the Act for the better local management of the metropolis, and otherwise as regards England, in counties by the county rate, and in boroughs by the borough fund or rate; and as regards Ireland, in counties by the grand jury cess, and in boroughs by the borough fund or rate; all such expenses payable in any county out of grand jury cess shall be paid by the treasurer of such county; and

The grand jury of any such county shall, at any assizes at which it is proved that any such expenses have been incurred or paid without previous application to presentment sessions, present to be raised off and paid by such county the moneys required to defray the same.

Special Provision as to Tea.

30. *Tea to be examined by the Customs on importation.*—From and after the first day of January one thousand eight hundred and seventy-six all tea imported as merchandize into and landed at any port in Great Britain or Ireland shall be subject to examination by persons to be appointed by the Commissioners of Customs, subject to the approval of the Treasury, for the inspection and analysis thereof, for which purpose samples may, when deemed necessary by such inspectors, be taken and with all convenient speed be examined by the analysts to be so appointed; and if upon such analysis the same shall be found to be mixed with other substances or exhausted tea, the same shall not be delivered unless with the sanction of the said commissioners, and on such terms and conditions as they shall see fit to direct, either for home consumption or for use as ships stores or for exportation; but if on such inspection and analysis it shall appear that such tea is in the opinion of the analyst unfit for human food, the same shall be forfeited and destroyed or otherwise disposed of in such manner as the said commissioners may direct.

31. *Interpretation of Act.*—Tea to which the term "exhausted" is applied in this Act shall mean and include any tea which has been deprived of its proper quality, strength, or virtue by steeping, infusion, decoction, or other means.

32. *Provision for the liberty of a cinque port.*—For the purposes of this Act every liberty of a cinque port not comprised within the jurisdiction of a borough shall be part of the county in which it is situated, and subject to the jurisdiction of the justices of such county.

33. *Application of the Act to Scotland.*—In the application of this Act to Scotland the following provisions shall have effect:

1. The term "misdemeanor" shall mean "a crime or offence :"
2. The term "defendant" shall mean "defender" and include "respondent :"
3. The term "information" shall include "complaint:"
4. This Act shall be read and construed as if for the term "justices," wherever it occurs therein, the term "sheriff" were substituted:
5. The term "sheriff" shall include "sheriff substitute :"
6. The term "borough" shall mean any royal burgh and any burgh returning or contributing to return a member to Parliament :
7. The expenses of executing this Act shall be borne in Scotland, in counties, by the county general assessment, and in burghs, by the police assessment :
8. This Act shall be read and construed as if for the expression "the Local Government Board," whereever it occurs therein, the expression "one of Her Majesty's Principal Secretaries of State" were substituted :
9. All penalties provided by this Act to be recovered in a summary manner shall be recovered before the sheriff of the county in the sheriff court, or at the option of the person seeking to recover the same in the police court, in any place where a sheriff officiates as a police magistrate under the provisions of "The Summary Procedure Act, 1864," or of the Police Act in force for the time in any place in which a sheriff officiates as aforesaid, and all the jurisdiction, powers, and authorities necessary for this purpose are hereby conferred on sheriffs :

   Every such penalty may be recovered at the instance of the procurator fiscal of the jurisdiction, or of the person who caused the analysis to be made from which it appeared that an offence had been committed against some one of the provisions of this Act :

   Every penalty imposed and recovered under this Act shall be paid to the clerk of court, and by him shall be accounted for and paid to the treasurer of the county general assessment, or the police assessment of the burgh, as the sheriff shall direct :
10. Every penalty imposed by this Act may be reduced or mitigated according to the judgment of the sheriff :
11. It shall be competent to any person aggrieved by any conviction by a sheriff in any summary proceeding under this Act to appeal against the same to the next circuit court, or where there are no circuit courts to the High Court of Justiciary at Edinburgh, in the manner prescribed by such of the provisions of the Act of the twentieth year of the reign of King George the Second, chapter forty-three, and any Acts amending the same, as relate to appeals in matters criminal, and by and under the rules, limitations, conditions, and restrictions contained in the said provisions.

34. *Interpretation of terms in application of Act to Ireland.*—In the application of this Act to Ireland,—

The term "borough" shall mean any borough subject to the Act of the session of the third and fourth years of the reign of Her present Majesty, chapter one hundred and eight, intituled "An Act for the regulation of Municipal Corporations in Ireland:"

The term "county" shall include a county of a city and a county of a town not being a borough :

The term "assizes" shall, with respect to the county of Dublin, mean "presenting term :"

The term "treasurer of the county" shall include any person or persons or bank in any county performing duties analogous to those of the treasurer of the county in counties, and, with respect to the county of Dublin, it shall mean the finance committee :

The term "police constable" shall mean, with respect to the police district of Dublin metropolis, constable of the Dublin Metropolitan Police, and with respect to any other part of Ireland, constable of the Royal Irish Constabulary.

35. *Commencement of the Act.*—This Act shall commence on the first day of October one thousand eight-hundred and seventy-five.

36. *Title of the Act.*—This Act may be cited as "The Sale of Food and Drugs Act, 1875."

SCHEDULE.

Form of Certificate.

To*

I, the undersigned, public analyst for the do hereby certify that I received on the day of , 18 , from† , a sample of for analysis (which then weighed‡), and have analysed the same, and declare the result of my analysis to be as follows :—

I am of opinion that the same is a sample of genuine

or,

I am of opinion that the said sample contained the parts as under, or the percentages of foreign ingredients as under.

Observations.§

As witness my hand this day of
A.B.,
at .

PROSECUTION UNDER THE ADULTERATION ACT.

ALUM IN BREAD.

On Wednesday, August 18, James Wood Archer, of North Street, Chelsea, appeared at the Westminster Police Court, to answer a summons charging him with selling adulterated bread.—Mr. Russell appeared for the defendant.

Joseph M'Hugh, the inspector under the Act, proved the purchase of a 4lb. loaf at the defendant's shop, and handing half of it to the analyst, after taking the precautions usually observed, and giving the necessary intimation that it was going to be analysed, at the time of purchase.

Dr. A. W. Barclay, the medical officer for Chelsea, stated that half the loaf of bread was given him by the last witness. He found that the 4lb. loaf contained about 40 grains of alum. This was the second sample from the defendant's shop which had been analysed, and it was found that the previous sample contained exactly the same amount. The defendant's flour had also been analysed, and it was found not to contain alum.

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* Here insert the name of the person submitting the article for analysis.

† Here insert the name of the person delivering the sample.

‡ When the article cannot be conveniently weighed, this passage may be erased, or the blank may be left unfilled.

§ Here the analyst may insert at his discretion his opinion as to whether the mixture (if any) was for the purpose of rendering the article portable or palatable, or of preserving it, or of improving the appearance, or was unavoidable, and may state whether in excess of what is ordinary, or otherwise, and whether the ingredients or materials mixed are or are not injurious to health.

In the case of a certificate regarding milk, butter, or any article liable to decomposition, the analyst shall specially report whether any change had taken place in the constitution of the article that would interfere with the analysis.

In reply to Mr. Arnold, Dr. Barclay, said this proportion of alum would be detrimental to health, especially to children.—In cross-examination, Dr. Barclay said there might be a trace of alumina in wheat. He was not aware that the stones which were used for grinding were dressed with alum. He had allowed more than a grain for the normal alumina in the wheat. It was absurd to suppose that it could be as much as ten grains in a loaf.

Mr. Russell stated that many analysts of repute entirely disagreed with Dr. Barclay on this point. He asked for an independent analysis. He had no objection to anybody that his worship liked to mention.

The defendant said the loaf was purchased as long ago as the 25th of July, and he did not know that the half given to another analyst would be the same as purchased in his shop. Besides, he did not believe that a proper analysis could be made after such a length of time.

Dr. Barclay said the alum remained in the bread; there was no chance of its evaporating. It could as easily be analysed now as the day it was bought. The alum was used to make inferior flour look white.

Mr. Arnold thought it had been clearly proved that a large amount of alum had been put in the bread, and therefore he should convict the defendant. Being his first offence he should order him to pay a penalty of £5 and costs, or a month's imprisonment in default. The money was paid.

Poisoning by a Lotion.

Lady Cottesloe, of Swanbourne House, near Winslow, Bucks, the wife of Lord Cottesloe, died on Tuesday evening last from the effects of poison taken under the following circumstances:—For some time past her ladyship had been suffering from rheumatism, and on Saturday last consulted Dr. Ceely, of Aylesbury, who prescribed medicine and a lotion for outward application. On Sunday her ladyship, intending to take some of the former, unfortunately poured out some of the lotion instead, which contained poison, and in spite of medical assistance, died on Tuesday evening. At an inquest held at the Manor House, Swanbourne, on Wednesday, a verdict of accidental death was returned.

Reviews.

Insectivorous Plants. By Charles Darwin, M.A., F.R.S. London: J. Murray. 1875.

This new work of Mr. Darwin's will be of special interest to those who took part in, or followed the discussion which occupied our columns a few months ago, on the alleged carnivorous habits of the sundew, butterwort, and some other plants. Those who denied the alleged facts, from the absence of a digestive organ in these plants, will probably now see that they came to too hasty a conclusion. From a long series of experiments on *Drosera*, *Pinguicula*, *Utricularia*, *Dionœa*, and some other less known plants, extending, in the case of the first named genus, over fifteen years, and conducted with the patience and precision and a careful elimination of all sources of error which distinguish all Mr. Darwin's researches, he has shown, beyond apparently all controversy, that there are certain plants which have not only the power of absorbing nitrogenous nutrient substances through their leaves, but of absolutely digesting these substances by the secretion of a fluid, which, like the gastric juice, becomes distinctly acid when excited by the presence of food. This substance analogous in its functions to pepsine, has been analysed by Professor Frankland, though in too small quantities to obtain reliable results. His conclusion, however, is that an acid analogous to or identical with butyric is formed. The methods of capturing their prey vary in the different genera. *Utricularia* has bladders provided with a valve which allows the ingress but prevents the egress of small animals; *Dionœa* possesses sensitive hairs, irritation of which causes the sudden collapse of the leaf upon the imprisoned insect; *Drosera* has glandular hairs or "tentacles" which secrete a viscid juice, in the toils of which small animals are hopelessly entangled; in *Pinguicula* the margins of the leaf become gradually incurved. The infinitesimally small quantity of nitrogenous matter which causes inflection of the glands of *Drosera* is almost past belief, and would be regarded as altogether incredible were it not for the extreme care and accuracy with which Mr. Darwin is known to conduct his experiments. A dose of $\frac{1}{134.400}$ of a grain of carbonate of ammonia given to a single gland suffices to produce a well-marked effect; a minute drop containing the $\frac{1}{153.600}$ of a grain of phosphate of ammonia, if held for a few seconds in contact with the gland, causes it to be inflected; and if a leaf is left immersed for a few hours in a solution so weak that each gland could only absorb $\frac{1}{19{\cdot}760.000}$ of a grain sensible motion of the tentacles results.

It is impossible, in a short notice, even to allude to the various points of interest brought out in this volume, which may fairly be styled a chapter in the romance, or rather perhaps in the tragedy of natural history. One by one we see the artificial lines of demarcation which have been set up between the animal and vegetable worlds thrown down, and the uniformity of the laws of nature established. But even those who have had the least faith in an absolute distinction between the modes in which plants and animals obtain their food, have hardly been prepared for so close a simulation of the process of digestion to be discovered in plants. The present instance is not the first in which our great physiologist has acted as pioneer in looking up new tracks, and indicating the road to discoveries which have been most pregnant in increasing our knowledge of the phenomena of animal and vegetable life.

May's British and Irish Press Guide and Advertiser's Dictionary and Handbook for 1875. London: May and Co., 160, Piccadilly.

Even in the present day, when advertising has become an art, such a book as this excites wonder at the enterprise of its compilers. It professes to be a classified, concise, and comprehensive index to the newspaper press of the United Kingdom; to contain a complete list of the daily, weekly, and other newspapers, magazines, reviews, and periodical publications issued in the British islands; and to give in each case the name of the publisher, address of publishing office, day of issue, price, political or religious principles, date of establishment, and special features and characteristics. So far as we can judge the profession is well carried out, the result being a little book that must be invaluable to advertisers as well as acceptable to all who take an interest in current periodical literature.

BOOKS, PAMPHLETS, ETC., RECEIVED.

On the Relation between Diabetes and Food and its Application to the Treatment of the Disease. By Arthur Scott Donkin, M.D. London: Smith, Elder and Co. 1875.

The following journals have been received:—The 'British Medical Journal,' Aug. 14; the 'Medical Times and Gazette,' Aug. 14; the 'Lancet,' Aug. 14; the 'London Medical Record,' Aug. 14; 'Medical Press and Circular,' Aug. 14; 'Nature,' Aug. 14; 'Chemical News,' Aug. 14; 'Gardeners' Chronicle,' Aug. 14; the 'Grocer,' Aug. 14; 'Journal of the Society of Arts,' Aug. 14; 'Grocery News,' Aug. 14; 'Produce Markets Review,' Aug. 14; 'Practical Magazine,' for August; 'Educational Times,' for August; 'British Journal of Dental Science,' for August; 'Journal of Applied Science,' for August; 'American Journal of Pharmacy,' for August; 'Moniteur Scientifique,' for August; 'Pharmaceutische Zeitung,' for Aug. 11 and 14; 'Sanitary Record,' Aug. 14.

Notes and Queries.

[446]. GUM OF LIFE.—I should be glad to learn the botanical name and source of "Gum of Life":—

"Take 'Gum of Life,' well beat and laid to soak,
In oil well drawn from that which kills the oak."
(I. Walton, 'Complete Angler.')

George K. Durrant.

PHOSPHORUS PILLS.—After several trials I find the following excipient a very good one for phosphorus pills, by which they can be prepared without oxidization or fermentation if quickly coated:—

℞ Pulv. Hordei
Theriaca . . . . āā ʒj
Pu. Gum Tragacanth . . . . ʒiii ℈ij.

The theriaca must be heated to 110° Fahrenheit (not more), as phosphorus readily melts in that temperature, and after being stirred with the required quantity of phosphorus in a warm mortar until the phosphorus is dissolved, then add gradually the Pulv. Hordei and the Pu. Gum Tragacanth previously mixed.—John Brereton.

Obituary.

Notice has been received of the death of the following:—

On the 12th of July, 1875, Mr. William Medley, Pharmaceutical Chemist, of All Saints, Derby. Aged 49 years. Mr. Medley had been a Member of the Pharmaceutical Society since 1857.

On the 2nd of August, 1875, Mr. Henry Crispe, Chemist and Druggist, of Sutton Valence, Kent. Aged 59 years.

At 452, Edgware Road, Maida Vale, W., on Sunday, the 8th inst., of exhaustion, consequent on congestion of the lungs, Mr. William Windle, Pharmaceutical Chemist. Aged 52 years. Mr. Windle had been a Member of the Pharmaceutical Society since 1853.

On the 18th of August, 1875, Mr. William Haw, of Spalding, Lincolnshire, was drowned while bathing in the Nene River, Northampton. Aged 21 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Chloral as an Antidote to Strychnia.

Sir,—On Saturday last at about 11 o'clock, p.m., I was fetched by a gentleman to see his dog, which had suddenly manifested to him extraordinary symptoms. I found the dog to be suffering from the effects of poisoning by strychnia, which he had accidentally taken in the form of a vermin killer. The poor animal was strongly convulsed with tetanic spasms, and seemed to be on the point of death. Remembering that I had seen (in our Journal I believe) a notice of the antidotal effect of chloral I determined to try it. I therefore immediately prepared and administered what I considered would be a full dose (40 grains, the animal being about 30 pounds in weight). Whilst preparing it the dog was again strongly convulsed, the muscles being as hard as ropes, and the spine arched backwards. I administered the dose with some difficulty for the dog could scarcely swallow—but with almost immediate benefit, for there was no recurrence of the fits, although now and then there was spasm of the respiratory muscles, and he gradually improved and eventually passed into a sound sleep. I saw him the next morning, when he appeared little the worse for his indiscreet choice of food, being only a little stupid and weak. I thought it would not be amiss to communicate this corroborative evidence of the value of chloral in poisoning by strychnia, acting as it does as a complete antidote, the more valuable since emetics are of little use owing to the rapid absorption of the poison. I may mention that in a previous similar case I failed to produce vomiting, although I administered 3 grs. of tartar emetic, which was a good dose, the dog being about 20 pounds in weight, especially as vomiting is easily excited in the dog. The failure I imagined to be due to the opposite effect of the poison. From the above experience I have great hopes that this much praised, much abused chloral may render important service to humanity in this direction.

J. Gilbert Candy.

Wantage, Aug. 16, 1875.

Property in Prescriptions.

Sir,—I have read your letter on "Property in Prescriptions." Most physicians are doctors or, as the word implies, teachers of medicine, of course including hygiene.

If I went to a physician I should tell him my symptoms, and should trust to his learning and experience to see or hear the rest, aided I sincerely hope by unconscious cerebration, and I assume his mental process would be something after this manner:—"This man has no appetite except for fish, eggs, and bread and butter; tea makes him feel quite unwell, he cannot take beer, and yet judging from his circulation he requires a stimulant; I should like him to eat meat, etc., etc." And I assume he would advise me to take fish once or twice a week, beef tea at 11 a.m., brandy and milk twice a day, change of air after a week, and now the physician would say to himself, "Can I help this man at all by drug power? I will try five minims of dilute nitromuriatic acid in bitter infusion twice a day. The latter I could not get at the butcher's or fishmonger's—it is more abstruse and special;" so the physician writes it down in such a form that the pharmaceutist can easily and accurately understand the meaning.

What part of the preceding advice remains the property of the physician and how much of it have I bought with my guinea? Let each reader answer this to the best of the reason with which he is endowed. Often the very prescription itself is a copy.

George Mee.

79, *Grosvenor Road, Highbury, N.,*
Aug. 13, 1875.

"*Alpha.*"—According to Cooley such papers are prepared with "factitious bird lime."

"*Kino.*"—Candidates for admission to the Chemical Society are proposed according to a form of recommendation that can be obtained by an application to the Secretary, addressed to the Society's rooms, Burlington House, Piccadilly. The recommendation must be signed by five Fellows, to three at least of whom the candidate must be personally known.

"*Inquirers.*"—Persons wishing to become members of the British Pharmaceutical Conference should apply to either of the Honorary Secretaries, Professor Attfield, 17, Bloomsbury Square, or Mr. F. B. Benger, 7, Exchange Street, Manchester.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ.* A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

Communications, Letters, etc., have been received from Mr. Kaiser, Mr. Moore, Mr. Lewis, Minor Associate, Alpha, A.P.S.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 122.)

Mr. Louis Nickerson[*] has made good use of these methods in his examination of the law "of the lamination of material in planes perpendicular to the direction of the pressure exerted upon it," inquiring whether this law is "incidental to a periodic action of force, as pressure, or only consequential upon tangential stress, faults in the cohesion of material, or the running together of internal cells." I cannot pretend to give here, nor would it be proper to do so, any complete *résumé* of these researches, but Mr. Nickerson's methods are of general application, and will interest such readers as are of a mechanical turn of mind. He used as representatives of the actual beams and girders to which the accepted formulæ relate, miniature beams of glass. His justification of this use of a material so unsuitable for actual girder construction is worth stating, and may hereafter be taken into consideration. "The difference in effect between like action on two materials is not absolute, but relative, therefore the effect of the action of force in glass must be similar to its effect in other substances, excepting for amounts and confined qualities. One of these latter is transparency, but this becomes useful, and, moreover, as the particular results we wish to arrive at are derivable from certain general laws of the doctrine of forces, we may, in this case, completely ignore structural differences. So that having become satisfied as to the general law, we may be the better able to systematically admit the modifications. These he says, do not appear to be great "as glass, cast-iron, and steel are all amorphous bodies yet composed of segregated crystals, and during' the experiments a connection was established in the characteristic form of breakage. He used, as his polarizing and analysing apparatus, plates of heavy glass between which the beams and columns experimented upon were placed. One or two of his experiments may be given here as having an interesting bearing upon the nature of Roger de la Bastie's toughened glass, which has been so prominently before the public of late, and the subject of not a little controversy. He takes a small beam of glass and places it in the clamping apparatus, with supports at each end as shown in Fig. 8 (copied from the work cited), and tightens the clamping screw a little, the polarizer and analyser being crossed, when clear spaces are immediately seen with curved outlines at the top and bottom. The dark space of the middle portions in all its varied outlines shows the neutral or unstrained portions of the beam. If the pressure be increased coloured curves, each sharply distinct from the other, and having for their outlines the lines of strain, begin to make their appearance, and as the pressure is increased, they also increase in number and brilliancy. The form of the curves and their distribution evidently depend upon the pressure employed, the manner and place of its incidence, and the shape of the beam or column. These points are well shown in the figures, and have been reproduced from Nickerson's paper. This line of investigation is susceptible of enlarged application, and the principles involved lie at the bottom of nearly all, if not quite all, the phenomena of plane polarized light. Tyndall has turned them to good account in lecture experiments on the vibrations of sounding plates and rods. One such experiment is singularly interesting and instructive, but is not very suitable for the appliances of a small laboratory. A strip of glass six feet long, two inches wide, and a quarter of an inch thick, is introduced between the crossed Nicols at an angle of 45° to these planes, as in a former experiment, and clamped at its centre by a suitable vice. The free end is then briskly rubbed with a wet rubber, producing a sound more or less musical, but certainly sufficiently shrill. The previously dark field is instantly brightened by flashes of light succeeding one another so rapidly as to leave the visual impression of constant illumination, and by suitable appliances, the phases of these successive illumination flashes may be detected, and the rapidly succeeding states of strain and pressure to which the vibrating rod is subjected clearly comprehended, and if desired mapped down.

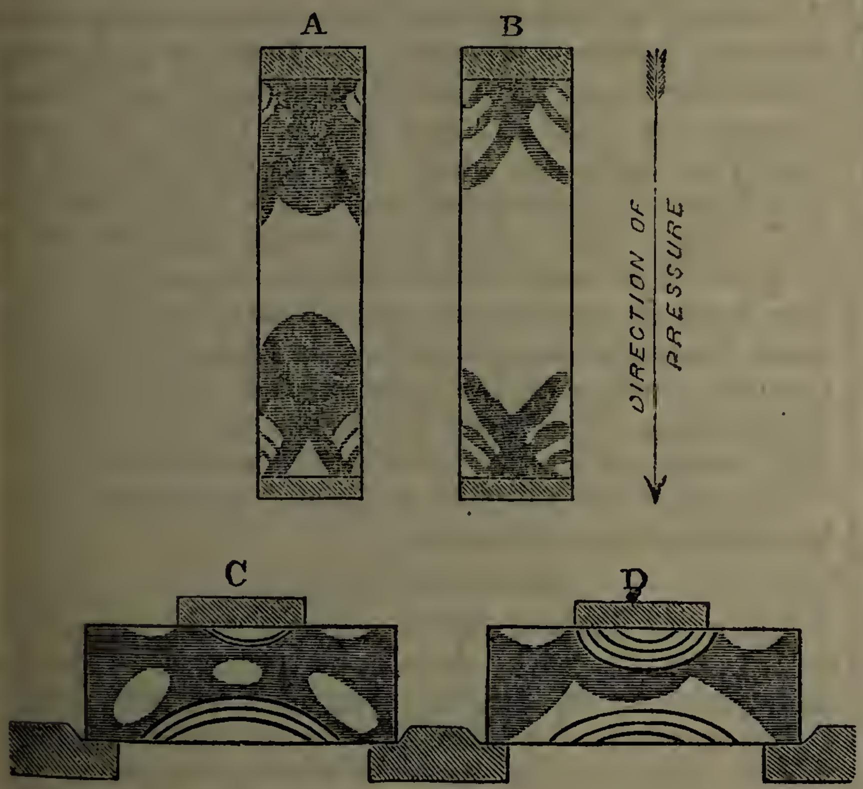

Fig. 8.

Another adaptation of the line of investigation is one that is just now especially interesting to me although I cannot from several reasons[*] give it for the moment the prominence I should wish. If we take a small square of moderately thick glass and examine it between our crossed Nicols we shall find, as we already know, that it is quite neutral to the polarized beam. If we remove it and heat a corner, or a side of it, and replace it between the Nicols, we observe that it has lost its neutrality, that from being singly refractive, some portions have become energetically doubly refractive, and we notice this also, that there is an intimate relation between the bi-refractive portions of the plate and the heated portions, leading us to assign the phenomena to the true cause, bi-refractive power induced by the stress and strain to which the molecules of the glass have been subjected by unequal heating. This observation is I believe due to Biot, but his original experiments have been much extended by later observers.

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[*] *Practical Magazine*, 1874, p. 406, *et seq.* Wertheim had previously indicated the path.

[*] One reason is that it will probably form the subject of a paper at the forthcoming Pharmaceutical Conference.

An experiment narrated by Tyndall in his American lectures on light is peculiarly suggestive. A small square of glass is perforated at the centre and a piece of copper wire is introduced into the orifice and heated, the square being between the crossed prisms. The heat spreads from the wire to the glass and from the centre of the glass outwards to the sides. As it does so we see "a dim cross bounding four luminous quadrants growing up and becoming gradually black by contrast with the adjacent brightness."

But these phenomena, beautiful as they may be, are far eclipsed by those afforded by suitable pieces of glass which has either not been subjected to the process of annealing or has been re-heated and rapidly cooled. Some idea as to the beauty of these phenomena may be gleaned from Figs. 8 and 9 (after Tyndall) but the cuts lack the gorgeous colour of the actual phenomena. The curves and iris fringes of Fig. 9 result from the crossing of two similar pieces of glass, but equally beautiful examples may frequently be observed in single pieces, albeit the curves are of different order and destitute of fringes. It may be mentioned that Bastie's toughened glass, as I have stated in a recent contribution to *Nature*, exhibits these phenomena in a marked degree, and very beautiful specimens can be prepared at the expenditure of little trouble and less cash.

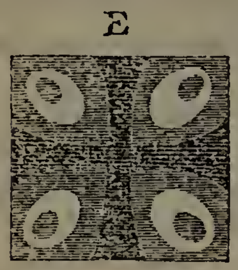

Fig. 9.

Practical applications of these principles were indicated many years ago by Dr. Pereira in his celebrated lecture before the Pharmaceutical Society, and by most authors since. One of the most important is the examination of the lenses of telescopes and other optical instruments to see whether they are subjected to undue and unequal strain in their cells. Other uses to which it may be put are the examination of bottle stoppers to discover false annealing, stress on glass plates in metal frames, and other purposes which will from time to time indicate themselves to the optical student.

(*To be continued.*)

ADDITIONS AND CORRECTIONS TO NOTES ON INDIAN SIMARUBEÆ.*

BY ALFRED W. BENNETT, M.A., B.SC., F.L.S.

Flückiger and Hanbury give the following account in their 'Pharmacographia' of the drug known as Lignum Quassiæ. Though its botanical origin is now *Picræna excelsa*, Linn., it was first derived from *Quassia amara*, Linn., and was introduced into the English Pharmacopœia about the year 1788; the wood of the former tree is still used in France and Germany. The article imported into Europe consists of the stem and large branches, and is formed for the most part of elongated pointed cells traversed by medullary rays. A longitudinal section exhibits numerous crystals of calcium oxalate, and sometimes deposits of yellow resin. The chemical composition of Quassiin as given by A. and Th. Husemann is now regarded as doubtful. The drug is employed as a stomachic and tonic. It is poisonous to flies and not without narcotic properties in respect to the higher animals.

Ailanthus excelsa.—Dr. Brandis, in his 'Forest Flora of North-West and Central India,' describes this as a tree 60—80 feet high, leafless during the early part of the cold season, the new leaves appearing in March and April, and flowering in April; it is easily propagated by seeds and cuttings. The wood is soft and white, and not much used except to make floats for fishing.

A. malabarica.—In his 'Flora Sylvatica for Southern India' Colonel Beddome says that this is a very lofty tree, common in the dense moist forests of the western ghats of the Madras Presidency up to 3000 ft., from South Canara down to Cape Comorin; also in Ceylon. In South Canara it is called Doop or Baga Doop, Matti pal on the Annamallays, and Kumbalu or Wal-biling in Ceylon. In Travancore the tree is only planted, and is very ornamental.

Samadera indica.—Flückiger and Hanbury attribute the bitter properties of this bark to a principle probably identical with quassiin.

Picrasma quassioides.—According to Dr. Brandis this tall scrambling shrub is found through the Himalayas from the Chenab to Nepal, between 3000 and 5500 ft., and ascending occasionally to 8000 ft. It flowers from April to June, and the bitter fruit ripens from July to September. The bark is smooth and brownish, with white specks.

P. nepalensis, Benn. Flor. Jav. 201, may perhaps be separated from *P. javanica* by its smaller and narrower leaflets, with larger points and slenderer branches to the panicle.

Harrisonia Bennetii, Hook. f. in Gen. Plant. i., 314; this name has the priority over *H. paucijuga*.

Balanites Roxburghii.—This is usually a scraggy shrub or, under favourable conditions, a small tree 30 ft. high with a short trunk 2 ft. or more in girth. According to Dr. Brandis it is common in many parts of India as far north as Delhi, in Rajputana, Bundelcund and the central provinces, the Northern Circars, the Dekkan, and South India. It grows chiefly in open dry places and on stiff clay soil, the new leaves appearing in March, the flowers in April and May. The roots spread far, and throw up suckers at a considerable distance from the trunk. The bark is smooth and yellow or cinereous. The wood is chiefly used for fuel. A fixed oil is pressed from the seeds, and the pulp is used to clean silk in Rajpootana. The seeds, the bitter bark, and the subacid leaves are employed in native medicine.

The following additional genus and species should be added after *Suriana*:—

IRVINGIA, *Hook. f.*

Glabrous insipid trees with simple coriaceous entire leaves with deciduous stipules. Flowers hemaphrodite in axillary panicles without bracts. Calyx small, 4—5-partite, imbricate. Disc very large, folded. Stamens 10, inserted beneath the disc; filaments long, slender. Ovary conical, compressed, 2-locular; style simple, terminal; ovules solitary. Fruit large, drupaceous, 1-seeded. Seed pendulous, exalbuminous.

Three or four species: all except the following natives of Tropical Africa. Of no known useful properties.

1. *I. malayana*, Oliv. in Hook. Flor. Brit. Ind. i. 522. Branches glabrous, striated. Leaves large, thick, 4 in. by 2 in., elliptic, acute, quite entire, stalked, with rounded and somewhat unequal base. Flowers small, hermaphrodite, in axillary racemes or panicles. Calyx persistent; calyx-lobes ovate, obtuse. Petals twice as long as the calyx-lobes, reflexed after flowering. Filaments as long as the petals. Ovary conical, rising from the centre of a very large disc and narrowing into a terminal style.

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* See *Pharmaceutical Journal*, 1873, pp. 801, 841 and 881.

The Pharmaceutical Journal.

SATURDAY, AUGUST 28, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

THE CONFERENCE MEETING.

During the past week the British Pharmaceutical Conference has held at Bristol its Twelfth Annual Meeting, and a most successful meeting on the whole it has proved. The number of members present apparently equalled the number on any previous occasion; the papers and the discussions which followed them were good and interesting; and although the Conference must now have become habituated to hospitable receptions, the kindness and forethought of the Bristol Local Committee have been such as to leave the pleasantest of souvenirs in connection with this meeting.

The general proceedings commenced with a very favourable report from the Committee, and the Treasurer announced that the balance in hand had increased from a nominal to a very respectable sum. An able address from the President, Mr. Groves, of Weymouth, followed, which, as last year, consisted in part of a *résumé* of the political history of pharmacy during the previous twelve months. It included some valuable remarks upon topics which might profitably be discussed at provincial meetings, and Mr. Groves also lent the weight of his official position to the advocacy of earlier closing. Of course in reviewing the pharmaceutical history of a year, the acts of the Council of the Pharmaceutical Society could scarcely be omitted, and following a tendency which has been manifested sometimes in the Presidents of the Conference to become the critics if not the censors of the Council, Mr. Groves expressed regret at its recent decision as to the establishment of a practical pharmaceutical laboratory, and also that after a "weak protest," the title of "pharmaceutical chemist" should have been conceded to Irish chemists. The correctness of the latter assumption however was afterwards challenged by Mr. Hills. Turning to more strictly scientific subjects, Mr. Groves expressed his opinion that the "crowning dignity" of being inserted in the Pharmacopœia awaited two articles that have come into considerable notoriety during the past year, jaborandi and salicylic acid. As the address is printed on another page, it is not necessary to give further details of it here. We would however call special attention to some interesting facts mentioned therein, in respect to the milligrade scale, recently suggested by Mr. John Williams.

The first paper read was on the Linimentum Terebinthinæ Aceticum and was a successful attempt to solve a problem suggested by Professor Redwood at a last meeting of the Conference, namely, how to prepare a more homogeneous liniment than the ordinary liniment of turpentine with acetic acid. This Mr. Symons has accomplished by taking advantage of the fact that any oil soluble in spirit vastly facilitates the mutual solution of turpentine and rectified spirit, and with this object he uses castor oil in the preparation. As the product was pronounced by Professor Redwood to be a perfectly satisfactory one, it may be that we have here another substance to which the "crowning dignity" will be awarded.

A report from Dr. Wright on the chemistry of the alkaloidal bodies obtained by Mr. Groves from aconite followed. It confirmed the discovery of the comparatively inert alkaloid mentioned in Mr. Groves's paper last year, but showed that it is not identical with Mr. Broughton's "atisine." Neither has Dr. Wright found "pseudo-aconitine" to be isomeric with "aconitine." But beyond this the report appeared to do little more than reveal how extremely little is yet known on the whole subject.

In a paper entitled "Pharmaceutical Experiments on the Bristol Rocks," Mr. Stoddart extended the papers formerly written by him on substances belonging to the organic kingdom to some belonging to the inorganic. How suited the neighbourhood of Bristol is for such experiments may be inferred from the fact that fifteen out of the twenty-three metals mentioned in the British Pharmacopœia may be obtained from its rocks. He mentioned the interesting fact that he had just succeeded in separating silver from a carboniferous limestone, it being, as he believed, the first time that silver had been found in that formation. Minute quantities of gold were also found with the silver.

Mr. Greenish called attention to the microscopy of Natal arrowroot, and pointed out certain peculiar characters which probably on more than one occasion have caused this article, although pure, to be condemned as adulterated. Mr. Greenish considers this arrowroot to be the product of *Maranta arundinacea*, but why it should differ from the product of the same plant grown in another country Mr. Greenish confesses himself unable to explain.

The next paper was by Dr. Tilden on a branch of the subject he has made peculiarly his own, the crystalline constituents of Barbadoes and Socotrine aloes. Dr. Tilden disagrees with Rochleder's suggestion that the aloins form a homologous series, but believes zanaloin to be identical with socaloin, and barbaloin (in the anhydrous state) isomeric with it, whilst nataloin is widely separated from the other crystalline principles.

The possible application of salicylic acid in pharmacy was the subject of a paper by Mr. BENGER. A number of pharmaceutical preparations were exhibited, all of them more or less prone to decomposition. Many of them which contained from ¼ to ½ a grain of salicylic acid to the ounce appeared perfectly good, although they had been prepared about four months. The freshly expressed juice of conium, hyoscyamus, and taraxacum proved to be exceptional in this respect. Some experiments with albumen had shown that salicylic acid does not prevent and only slightly retards the action of pepsine. In the discussion which followed, the antiseptic properties of boracic and benzoic acids were referred to.

In a report upon the magnesium carbonates of commerce, Mr. THRESH stated that the semi-ponderous variety appeared to be seldom met with in this country, that the heavy carbonates are as a rule satisfactory, but that much larger proportions of soluble salts were found in the light carbonates.

Mr. UMNEY continued his valuable series of suggestions for the improvement of the Pharmacopœia by advocating the substitution of the present official amorphous citrate of lithium by the crystals, which he stated were not deliquescent. In this he was confirmed by Mr. WILLIAMS, and Professor REDWOOD expressed his gratification that manufacturers now admitted that a permanent crystalline citrate of lithium could be prepared.

The first day's sitting was brought to an end by the reading of a paper on the cultivation of saffron in the Abruzzi, by Mr. HENRY GROVES of Florence. The great fluctuation of the gatherings may be inferred from the fact that one year's harvest has sometimes surpassed in value the soil in which it was grown, while in other years it is almost a failure.

On Wednesday morning, after the election of several members, the PRESIDENT read a paper describing a curious and rapid formation of herepathic in a mixture containing sulphate of quinine, iodide of potassium, and chloroform water. He was unable to suggest any explanation of the reaction except that it might have been caused by an impurity in the chloroform, nor was it accounted for by any person who took part in the discussion.

Mr. KINGZETT furnished a further contribution to the history of essential oils, and although the principal object of his research was a chemical one it will probably eventuate in rendering a service to pharmacy. Of a like nature was a paper by Messrs. BECKETT and WRIGHT on the camphor of Japanese oil of peppermint.

Mr. GERRARD presented a report on Jaborandi, in which he described his chemical investigation of the plant, from which he has come to the conclusion that it contains one well-marked alkaloid, non-crystalline but forming crystalline salts, possibly a second alkaloid forming acid salts, an aromatic essential oil solid at ordinary temperature, tannic acid, a peculiar volatile acid, and chloride of potassium.

The reading of a paper entitled "The HORSLEY-STODDART Method of Estimating Fat in Milk," by Mr. A. H. ALLEN, led to a lively but rather personal discussion. Irrespective of this unpleasant feature, it is pretty evident that if the field of the Conference be widened so as to include the numerous extra-pharmaceutical subjects which are at present bones of contention amongst public analysts, it will become necessary to prolong the meetings of the Conference. A rumour of the attack brought Mr. HORSLEY to the defence later in the day, but for details we must refer our readers to the fuller report, which will appear in due course.

In a report on the phosphate of calcium of commerce, Mr. J. F. BROWN called attention to the variable nature of the substance sold under this name as official, but there was a general expression of opinion that with so variable and little understood an article as bone ash to work upon it would be vain to expect a definite product at present.

A paper on the use of optical analysis in pharmacy, by Mr. HENRY POCKLINGTON, in which he discussed the application of the microscope, polariscope, and spectroscope, followed, and was supplemented, by some interesting remarks on the subject from Mr. STODDART. Mr. POCKLINGTON'S optical bent was also manifested in a paper on BASTIE'S toughened glass, and he stated that a considerable amount of toughness could be imparted to glass by heating it and allowing it to cool between metal plates.

Mr. WILLIAMS gave an account of further experiments as to the power of glycerine to prevent the loss of strength in hydrocyanic acid. These appear to have been very successful, though in one case a remarkable change took place, the liquid becoming converted into a solid mass of paracyanogen.

Then followed another report by Dr. WRIGHT on New Derivatives from the Opium Alkaloids, a subject that seems to be practically inexhaustible. The reading of papers was brought to a close by one on commercial compound colocynth pill, by Mr. W. LAIRD.

Finally, it was decided that the Conference should meet next year in Glasgow, under the Presidency of Professor REDWOOD.

After various votes of thanks were passed the meeting separated, with the understanding that as many members as were able would on Friday accompany the Local Committee on an excursion to the Cheddar cliffs.

MR. ALDERMAN THOMPSON, Pharmaceutical Chemist, has been appointed by the LORD CHANCELLOR on the Commission of the Peace for the borough of Richmond, Yorkshire.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

The twelfth annual meeting of the British Pharmaceutical Conference was commenced on Monday last, August 23, at the Bristol Museum and Library, under the presidency of Mr. T. B. Groves, F.C.S.

Meeting of the Executive Committee.

On Monday evening, a meeting of the Executive Committee was held. Present—Mr. T. B. Groves, President (in the chair); Messrs. Schacht, Stoddart, Boorne, Townsend, Pitman, Tilden, Brady, Ekin, Umney, Hills, Carteighe, Greenish, Martindale, and Attfield.

The minutes of the previous meeting were read and confirmed.

Professor Attfield reported that the usual "lists of subjects" and other printed matter had been sent to members, and also described means he had adopted to enlist the interest of scientific men not directly connected with pharmacy. About 300 subscriptions remained unpaid after repeated applications.

Mr. Benger read a draft report of the Executive Committee, which was accepted.

Professor Attfield submitted a "programme of proceedings" at the sittings of members during the two following days which with some additions was agreed to.

Mr. Siebold laid on the table the MS. of the Year-Book of Pharmacy for 1875.

Mr. Schacht, Treasurer, read a financial statement showing a very satisfactory balance in hand on the general account of the Conference. The Treasurer also submitted a statement showing the financial condition of the Bell and Hills Fund.

A question as to the advisability of continuing to receive advertisements in the Year-Book of Pharmacy, was introduced by Professor Attfield, and after discussion finally referred to the Year-Book Committee.

Tuesday, August 24th.

The first sitting, for the reading and discussion of papers, was held on Tuesday, at 10 a.m., when Mr. C. Boorne, as Chairman of the Local Committee, gave a hearty welcome to the members of the Conference.

A letter was read, signed by the President and Corresponding Secretary of the Philadelphia College of Pharmacy, inviting any members of the Conference who may be present at the International Exposition and Meeting of the American Pharmaceutical Association in Philadelphia next year, to make the College Building their headquarters.

Mr. Brady bore testimony to the kindness and hospitality shown to him by American pharmacists a few years since, and advised intending visitors to provide themselves with proper credentials as to their standing.

Professor Attfield said he would be happy to furnish any member of the Conference with such credentials.

The Secretaries were requested to acknowledge the receipt of the letter.

The Bell and Hills Fund.

Professor Attfield called attention to a copy of Watts' 'Chemistry,' including the supplementary volumes, which had been selected for presentation to the Bristol Pharmaceutical Association, in accordance with the regulations of the Bell and Hills Fund.

Mr. Boorne asked to be allowed to express the thanks of the Association for the timely gift. He said the Association had hitherto been without a library, but he hoped these volumes would prove to be a starting point for one.

Reception of Delegates.

The following list of delegates to the Conference from various associations was then read:—

North British Branch of the Pharmaceutical Society.—Mr. George Blanshard, Mr. Tait (Chairman of Edinburgh Board of Examiners), Mr. J. Young, Mr. John Mackay, Hon. Sec., N. B. Branch.

The Brighton Association of Pharmacy.—Mr. W. D. Savage, J.P., President.

Liverpool Chemists' Association.—Mr. Redford, Mr. Shaw.

Wolverhampton Chemists and Druggists' Association.—Mr. Stokes-Dewson, Mr. W. B. Cooley, Mr. F. S. Barrett, F.C.S., Hon. Sec.

Manchester Chemists and Druggists' Association.—Mr. Louis Siebold, Mr. F. Baden Benger, F.C.S., Hon. Sec.

Report of the Executive Committee.

Mr. Benger (Honorary Secretary) then read the following report:—

Your committee have little but congratulations to offer in their Eleventh Annual Report to the members of the British Pharmaceutical Conference. Since the last general meeting continued efforts have been made to bring the Conference and its aims as prominently as possible before the pharmacists of Great Britain, and the result has been highly satisfactory. At a meeting of the Executive Committee held in May, Professor Attfield reported that since the commencement of the Conference year he had received 2328 subscriptions, of which 1800 had been sent in response to a first appeal, 392 after applying a second time, 136 members required three applications, and 422 remained still unpaid. The total number of members was about 2750. He had been endeavouring to interest colonial pharmacists in the Conference, and as a result several Australian chemists had joined. Some of these had requested to be supplied with back volumes of the 'Year-Book,' and had offered to contribute any local information required in aid of research. Our list of members now includes the names of many eminent men of science only indirectly connected with pharmacy, but whose willingness to associate themselves with the Conference indicates a recognition of its aims and an appreciation of its efforts to advance pharmaceutical science, which will be gratifying and encouraging to all its members.

During the first eleven years of its existence, this Association has at its annual meetings made a clear addition of upwards of 250 original researches to the common stock of chemical and pharmaceutical knowledge, has organized in different parts of England four exhibitions of objects of interest relating to pharmacy, has latterly presented to every member in exchange for his subscription of 7*s.* 6*d.* a 'Year-Book' of 600 pages containing abstracts of researches at home and abroad, and has now gathered into membership, and thus permanently excited their interest in its department of applied science, nearly 3000 workers in pharmacy.

But whilst recording the increased prosperity and capabilities of our Association, the sad reflection is forced upon us that since the last annual meeting we have passed over the grave of Daniel Hanbury, one of our most revered presidents, and one of the most highly honoured amongst pharmacists.

As the Conference has grown and its influence widened, so has the individual responsibility of its members deepened. The transactions of the Conference receive considerable prominence through the English, Continental, and American pharmaceutical press, and in the 'Year-Book of Pharmacy,' they now find their way into the hands of pharmacists in almost every country. Our 'Proceedings' are perused by those competent to criticize as well as by those anxious for information and practical suggestions. Bearing in mind that the chief aims of the Pharmaceutical Conference is to encourage original research, your committee very earnestly appeal to the rapidly growing body of cultivated pharmacists to work out some of the problems which constantly present themselves. Ours is a branch of applied science so peculiarly rich in materials that "it supplies us," as Professor Hofmann recently said at an evening meeting of the Pharmaceutical Society, "with an endless variety of subjects," the most trivial being of sufficient importance to make every fragment of discovered truth concerning it valuable.

The establishment of an Irish Pharmaceutical Society, with an examining board, will probably develop a large amount of latent pharmaceutical talent in the sister isle, and your committee look for a great addition to our membership roll and to our list of contributors as amongst the possible results of recent pharmaceutical legislation in Ireland.

Your committee have already expressed their regret at the unavoidable delay in the publication of the 'Year-Book,' which occurred in consequence of the illness of the editor; but they are glad to announce that the MS. of the 1875 volume was laid on the table at the Meeting of the Executive Committee last evening. Its issue at an early date is therefore fully assured.

The salary of the assistant-secretary, Mr. R. H. Davies, has been increased from £25 to £40, dating from the commencement of the current year.

Several applications for grants from the Bell and Hills Library and Research Fund have been sent in to the general secretaries, and will be considered by the Committee during the meeting.

The Treasurer (Mr. G. F. Schacht, F.C.S.) presented the following balance-sheet:—

The Treasurer in Account with he British Pharmaceutical Conference.

Dr.	£	s.	d.
To Cash in hand, July 1, 1874	3	8	9
„ Sale of 'Year-Books' by Secretary	30	14	4
„ „ „ Publisher.........	13	0	0
„ Advertisements in 1872 'Year-Book'......	1	8	6
„ „ 1873 „	18	18	0
„ „ 1874 „	112	7	0
„ Subscriptions received from Members......	903	9	2
	£1083	5	9

Cr.				£	s.	d.
By Expenses connected with 'Year-Book':—						
Butler and Tanner, for printing, banding, and binding	£465	13	10			
Editor's Salary	100	0	0			
Messrs. Churchill–commission on advertisements...........	33	3	4			
Delivery of 2500 copies	80	0	0			
Advertising 'Year-Book' ...	2	16	0			
Foreign Journals (Nutt)	2	8	0			
				684	1	2
„ General Printing:—						
Butler and Tanner	4	4	0			
Stevens and Richardson	29	17	0			
Parkins and Gotto	14	7	8			
				48	8	8
„ Directing Circulars and Envelopes				4	8	1
„ Assistant Secretary's Salary.........				40	0	0
„ Postage				52	9	3
„ Sundries, including making of two large Cupboards, etc.				14	17	5
„ Balance in hand.........................				239	1	2
				£1083	5	9

The Bell and Hills Fund.

Dr.	£	s.	d.
To cash in hand, July 31, 1874	42	2	6
„ Dividends on Russian Bonds, September, 1874, and March, 1875	7	7	10
	£49	10	4

Cr.	£	s.	d.
By Grant of Books to Bristol	10	10	0
„ Balance	39	0	4
	£49	10	4

Examined and found correct,

Edward Smith, } Auditors.
Frederick Andrews, }

A motion that the report and balance-sheet should be accepted was agreed to unanimously.

Address of the President to the Members of the British Pharmaceutical Conference.

The President then delivered the following Address:—

In proceeding a second time to address you from the highly honourable position of the presidential chair, I feel compelled to allude to special circumstances investing this meeting of the British Pharmaceutical Conference with peculiar interest. We may, first of all, congratulate ourselves heartily that we are again united to our elder brother, the British Association for the Advancement of Science, and that circumstances do not now, as they did last year, impose an obstacle to that fraternal companionship. A meeting of the Conference in a provincial city, no matter how distinguished for devotion to our particular art, would, without such inducement to attendance, be I fear a comparative failure. Fortunately, we last year were spared such a reproach by the fact that the *locus in quo* was the Metropolis and our entertainers the Pharmaceutical Society of Great Britain. How nobly the latter performed their part has already been acknowledged by individual members of the Conference and by the pharmaceutical press, yet I would not omit the present opportunity of again testifying how deeply we are indebted to the Pharmaceutical Society for the timely and generous help afforded in what was really a time of embarrassment and need.

A second subject of congratulation is the fact that we are assembled in the ancient city of Bristol, that place of all others where good pharmacists abound, and where is exhibited the I fear solitary instance of a thriving, long-established and growing provincial Pharmaceutical Association. It is much to be regretted that the efforts made in other places to found similiar institutions should have so generally failed as regards permanency. As a rule too much has I think been attempted. Provincial schools of pharmacy, except they be in connection with a medical school, cannot be made self-supporting, when the students are drawn—as a rule they must be—from limited areas, where the attendance of classes can be combined with a reasonable amount of labour in the pharmacy. When the latter condition cannot be assured, and students in order to obtain systematic teaching are compelled to give up their situations, they will naturally gravitate to the larger centres where circumstances are more favourable, and the course of instruction more complete.

Since our last meeting we have witnessed the inauguration of what bids fair to be a worthy specimen of a provincial association. I refer to that established for the benefit of Wolverhampton and its district. Let us hope that under the guidance of its powerful directory it will succeed in avoiding the shoals upon which not a few of its predecessors, that commenced their voyage with equal promise, have been stranded.

The less ambitious Pharmaceutical Associations very generally find it difficult to maintain the interest of their evening meetings, and provide subjects for discussion. On that point I will venture a suggestion. It is comparatively rarely that I have an opportunity of attending the evening meetings of the Pharmaceutical Society; when I do I find almost invariably the following scene enacted. After the more formal business has been disposed of, the paper or papers of the evening are read, and discussion upon them invited. The invitation is at once responded to by the professors who, from the fact that they know more about the subject than probably any others present, and from their acquired habit of speaking diffusely, as when addressing students, occupy so large a share of the time at the disposal of the chairman, that before the questions have been half thrashed out, that functionary looks nervously at the clock and expressing a fear that if gentlemen are detained too long they will not readily put in a second appearance, dismisses the assembly.

My suggestion is this, that instead of insisting on something entirely new, they should more frequently than is now the case take up half debated questions where the Pharmaceutical Society dropped them, and not leave them to be completed by letters to the editor of the Journal, or by furnishing to that periodical a supplementary article. How much better to do this than, confessing one's poverty of resource, to implore the aid of a neighbouring medico and receive from him well meant but scarcely disinterested advice on how to conduct a pharmacy, or a lecture on a medical subject but remotely connected with the duties of a pharmacist!

Next to associations directly affiliated with pharmacy must be ranked those that aid it indirectly by fostering the sciences or some of them upon which our art is based. The pharmacists of Yorkshire are to be congratulated upon the establishment of the Yorkshire College of Science, where will be, in fact are, methodically taught experimental physics and chemistry, both practical and theoretical, by able professors on moderate terms. Pharmaceutical students who observe the signs of the times will not be slow to avail themselves of such advantages, and should any want reminding, the honorary Secretary of the College, our late joint Secretary, and, may I hope, future President, Richard Reynolds, will not fail to do it. Under such auspices the success of the Yorkshire College of Science may be regarded as an accomplished fact, and it may in addition be said that every member of the Conference will feel a personal interest in its prosperity.

An institution of a still more ambitious character has been projected—as yet it is only a project—for the West of England and South Wales. It is to be called the School of Science and Literature, and will be carried out in connection with certain colleges in the University of Oxford. As its name implies, it is intended to provide for the field embraced in its operations, a literary as well as scientific education, the latter being directed especially to the industrial wants of the important manufacturing and mining district, of which Bristol may be regarded as the centre. The School will, therefore, bear a close resemblance to Owens College, Manchester, and be, like a similar institution in Newcastle, connected with one of the Universities. Probably no provincial city equals Bristol in the extent and variety of its museums, libraries, and other aids to mental cultivation; it has, therefore, been rightly selected as the site of the new College. Part of the funds required for the carrying out of the scheme have been promised by Balliol and New Colleges, Oxford, and for the remainder an appeal is being made to the public. In this part of the work pharmaceutists will probably not take a prominent part, yet it is satisfactory to find on the list of the Provisional Local Committee the names of our energetic and able *confrères*, Messrs. Stoddart and Schacht, whose efforts in so good a cause we all, and especially the local men, hope to soon see crowned with merited success.

The trustees of the Gilchrist Fund, whose Secretary is Dr. Carpenter, have at their disposal no less than £4000 per annum, which by the terms of the trust deed they are bound to devote "to the benefit, advancement, and propagation of education and learning in every part of the world as circumstances permit." One thousand pounds of it has been placed in the hands of the Royal Society to be expended in grants to men of proved ability in scientific research to enable them to prosecute investigations of an expensive character, which without assistance they would not be justified in undertaking. It would be worth consideration whether scientific institutions, such as those I have mentioned, are not justified in asking the trustees to lend a helping hand to them during the few years of struggle that with the best of management generally precede success.

The question so often debated at this Conference (introduced originally, I believe, by Mr. S. Atkins, the present Mayor of Salisbury) as to the desirableness of transferring the conduct of the Preliminary Examination from the Board of Examiners to the College of Preceptors has, at last, received its solution. At the April meeting of the Pharmaceutical Council it was decided, by fifteen votes to two, on the motion of Mr. Atherton, "that the questions for the Preliminary Examination after the present year be prepared and reported on by the College of Preceptors." The Society does not give up its control over this examination, which would not be desirable, but will still continue to issue the questions, direct how, when, and where the examination shall be held, and doubtless interpose, should the questions set seem inappropriate.

Early closing has received this year a greater amount of attention than usual and powerful pens have been enlisted on either side in conducting the controversy.

It would be voted perfectly absurd were one to state the naked proposition that because the occupation of a dispensing chemist is, of all trades, the one that requires the most strict attention to accuracy, the greatest amount of mental effort, and is, consequently, the most exhausting, that, therefore, the said dispensing chemist should be kept at work for several hours longer than any other tradesman, except, I should explain, the publican. But the latter has some excuse,—with him it pays; the chemist, on the other hand, rarely earns after nine o'clock the cost of the extra gas he burns. How strong an instinct of trade must possess him and how ridiculous to talk of the "profession" of pharmacy under such circumstances. We are, however, improving in this respect, and London is setting, as it ought, a good example. Thanks to the efforts of a few leading pharmacists, arrangements have very generally been adopted by which the principal establishments are closed at a reasonable hour, varying necessarily somewhat, according to circumstances, but as a rule affording fair opportunities for recreation, and for preparing for the now inevitable examinations. To afford facilities for procuring necessary medicines at any time of the day or night is the duty of a pharmacist, but it is not essential to this that the shop should be kept open with lights burning and assistants in waiting, inviting apparently what ought to be conceded as a matter of favour rather than right.

At the July meeting of the Pharmaceutical Council, Mr. Schacht introduced a subject which seems to me one of extreme interest and importance, as it concerns the teaching of practical pharmaceutical chemistry as distinguished from the mere compounding and retailing of drugs, which ordinarily is the sole occupation of the so-called pharmaceutical chemist. It is quite true, as Mr. Schacht said, that very few students have had the advantage of working in a well-appointed laboratory during their apprenticeship, and, therefore the more desirable is it that the opportunity should be afforded them whilst passing through the curriculum at the Square. The rarity among pharmaceutists of laboratories even on the most moderate scale, is much to be deplored, and anything that would lead to their multiplication would, I am sure, tend greatly to the improvement of pharmacy and the raising of the status of pharmacists. The difficulty as regards space is often nearly insuperable, but I would remind those really in earnest that a laboratory cannot be too near the roof, and that should there not be space enough immediately under it, that the roof can be raised, as I myself have been compelled to do under the circumstances. But the space having somehow been acquired, how is it to be fitted with suitable apparatus? Your local tradesmen will here be of little use to you. They will be ready enough to execute your orders and even make suggestions, but you will be fortunate if you get what you want before two or three reconstructions. A good model pharmaceutical laboratory, established at the Square, would be not merely a laboratory for the students to work in, but a museum of pharmaceutical apparatus, where one could see at work every piece of apparatus likely to be required, could judge for himself of their usefulness, obtain information as to their cost, and ascertain where they could be procured.

Manufacturers would be only too glad to send their goods on exhibition to such a place, and the result would, I believe, be found highly beneficial to all parties. I was sorry, therefore, to observe in the report of the last meeting of the Council that the Committee, to which the subject was referred, was of opinion that it was not at present advisible to take any step in the matter.

The introduction by Sir Michael Hicks-Beach and the Attorney-General for Ireland of an Irish Pharmacy Bill, framed, I would observe, without consultation with the Pharmaceutical Society—whose interests it seriously affected, and of whose political power these gentlemen seemed quite unaware—has fortunately ended, after an infinite amount of negotiation and agitation, in the establishment of an independent Irish Pharmaceutical Society. Independent, I should observe, as regards ourselves, but most surely dependent on the Apothecaries' Company of Ireland, a contingency which seems not to have troubled our Celtic friends in the least, and need not concern us, except that it will, in all probability, have an injurious, if not destructive influence, on the future value of the title "pharmaceutical chemist," which, after a weak protest from the Pharmaceutical Society of Great Britain, has been conceded to the new society. One may be sure that the apothecaries will not put the examinations too high; in fact it is optional with them whether they have more than one; in which case it must, in order to render the Act in any way operative, be of the character of our Modified, so as to admit the class of chemists and druggists. Now no one fears an irruption of Irish pharmaceutists; that would be impossible without they first passed both the Preliminary and Minor of the English Society, but this may happen when the title "pharmacist," and its numerous and distracting aliases, become of sufficient value—the English Minor examinee, if sufficiently unscrupulous, may take a trip across St. George's Channel and there obtain the coveted initials without any further tax on his mental powers. He perhaps may have to add to them the initial I, or the word Ireland. Those skilful in arithmetic may amuse themselves by calculating how long it would take the British public to learn to discriminate between the title with and the title without the I, seeing that up to the present time they have failed to see any distinction between Member of the Pharmaceutical Society and Pharmaceutical Chemist. We have saved our "purse" and lost our chance of some day achieving a "good name."

The fourth International Pharmaceutical Congress, which met at St. Petersburg shortly after our last meeting of Conference, appears not to have quite satisfied the anticipations of Englishmen who, as a rule are not distinguished for love of symmetry, method or completeness, and consequently are unable to share the feeling of those who, like the French, enter with zest into minutiæ that would appear to them but trivial and troublesome. It is amusing when reading the report, to observe how tenderly the susceptibilities of the Russian Government are treated. For instance, the question "Ought women to be allowed to practise Pharmacy" was withdrawn from discussion altogether. Another question: "Is it *indispensable* that the chair of pharmacy should be occupied by a pharmacist?" was put in the doubtful form for the same reason, although no one present had the least doubt upon the subject, and resolutions affirming its desirableness were duly voted. The discussion of the limits of the responsibility of the principal and his assistant respectively, issued in the passing of a resolution to the effect that the principal ought to be held liable for the quality of his drugs and preparations and for all infractions of the law either by himself or his subordinates with his consent. Then commences the exclusive responsibility of the assistant, who is liable in his own person for the mistakes he commits, and of course also for wilful infractions of the law. This seems very fair, but it must be remembered that by the term assistant is not meant an errand boy, advanced to a position at the counter, but a regularly educated and examined student of pharmacy.

The last question is that which has interested us most and caused, alas, the most decided feelings of disappointment—"Has the time arrived for the preparation of an International Pharmacopœia?"

The previous Congress of Vienna had somewhat anticipated the answer to be given by requesting the Société de Pharmacie de Paris to prepare a project for the work in question, and accordingly M. Méhu, the French delegate, presented to the Congress a huge manuscript as the result of its labours. This having been remitted to a commission for examination, in due time five propositions were voted; the first of which declared that the time had arrived for the preparation of an International Pharmacopœia; that such pharmacopœia should in no ways suppress national pharmacopœias, but, that when new editions of these works were required the general principles and directions of the International Pharmacopœia should be inserted in them without modification. Mr. Sutton estimates the size of the report when printed at half that of the Codex of 1866. The preparations in the Pharmacopœia proper, numbering over 300, are intended to form the basis of every pharmacopœia and supersede similar preparations of the same name, and to them may it seems be added the special remedies thought necessary by each individual nation. A vast number of these so-called preparations are definite chemical substances, such as Acetate of Morphia, Acetate of Potassium, Acetate of Sodium, etc., etc., which surely do not call for international interference; we are also to have international lard, butter of cacao, and cane sugar, whilst plasters and ointments are inserted by the score, the majority of them being unknown to the British Pharmacopœia. Mr. Sutton was not far out when he stated his opinion "that it would be at least twenty years before the work could be brought to fruition." But that is not what Englishmen expected; they wished, as I believe, that a general agreement should at once be come to as to the strength of a limited number of the more potent remedies, which might, if thought desirable, be introduced into the national pharmacopœias, and until then should be known and recognized as "international" remedies. Thus we should have Tinct. Opii (Int. Ph.), Acid. Hydrocy. Dil. (Int. Ph.), and so on. If such an idea could be carried out there are not a few British pharmacists who would at once arrange a shelf for the international remedies. The principles upon which the Committee recommended that the future pharmacopœia should be constructed are such as will meet with a very general assent. They are as follow:—The use of the Latin language, the decimal system, uniform system of nomenclature, conciseness of description, indication of the minimum of active principles for each poisonous drug, simplicity, as far as possible, in the composition of galenicals, indication of the maxima of impurities to be tolerated in chemicals.

It may be taken, I presume, as a matter of course that the indication of extreme doses will be made compulsory on the prescriber, as is the case now in Germany and elsewhere. It is much to be regretted that the action taken in the matter by the Conference last year has hitherto been fruitless, much to the annoyance and discomfort of both dispensers and prescribers, and also, it is to be feared, to the danger of patients—not so much of their getting a poisonous dose as of their getting a safe one, and less than the prescriber intended. We must not give up the idea, however, but when the time comes for the revision of the Pharmacopœia, urge it forcibly upom the General Medical Council, and upon the Government if necessary.

Taken as a whole, I fear that the Fourth International Pharmaceutical Congress has, by entering too fully into minutiæ, attempting, in fact, too much, postponed indefinitely the achievement of the universal pharmacopœia. It still may fall back as a last resource, on the amusing proposition of some of its members, and by the fusion of the French and German pharmacopœias, hope for a good result!

The numerous *résumés* of the scientific work of the year to be found in various publications and notably in our own "Year-Book," render it unnecessary for me to attempt anything like a complete account of work relating to pharmacy; indeed, it would be a work of supererogation to indicate another royal road to that branch of knowledge. I shall, therefore, content myself with referring to some few of the more remarkable facts and discoveries that have been brought to light since our last meeting.

It may, I think, with truth be said that we have had during the past year an unusual number of additions made to our list of drugs, and that not a few of them seem destined to take a more permanent place in the practice of medicine than falls to the lot of the great bulk of new remedies, which although vaunted highly by their discoverers or promoters, enjoy, as a rule, but a short-lived popularity, and fail to justify their pretensions to supersede the better known and trusted remedies that have come down to us from the time of Dioscorides.

It is no easy matter for a drug to find its way into a pharmacy, more difficult still for it to achieve the honour of a place in the national pharmacopœia, most difficult of all for it to engage the attention of the ordinary apothecary, and take a place in his list of "good things." Yet this crowning dignity may with safety be prophesied of jaborandi, salicylic acid, and perhaps some others.

The extended commerce of this country, the possession of numerous colonies, the propensity for foreign travel that characterizes the Englishman, conduce to bring to our markets a greater number, probably, of new productions, vegetable and mineral, than fall to the lot of the whole world beside.

It is to be feared that not a few of these novelties fail to excite a due degree of attention, are never tested with scientific accuracy, and so fail to achieve the position they deserve. Others, again, fall into the hands of speculators, are puffed inordinately, and, having thus obtained a spurious currency, are finally abandoned as worthless. Condurango is an example that will occur to every one, of a remedy thrust without any justification of merit upon the attention of the medical faculty; raising, it is to be feared, false hopes in the breasts of the afflicted and causing the loss of valuable time in the treatment of disease.

Were it possible to find a sufficient number of competent physiologists to investigate and report on the action of new remedies as soon as introduced, a vast amount of good might be effected, charlatanry would be exposed, and an end summarily put to the false pretensions of unscrupulous speculators, to whom not even disease is sacred.

It is, I suppose, hopeless to expect to find in the ranks of hard-worked medical men experimenters able and willing to cope with the great amount of this kind of work which may be said to be daily and hourly accumulating. Take such a series of investigations as those of Wright on the Alkaloids, where, in a single page, we may find described perhaps half a dozen bodies of definite composition, distinctive crystalline form, and endowed with potencies differing both in kind and degree each from the others. What proportion of substances such as these are *adequately* tested, how many are not tested at all, possibly to the great loss of medical science? Parliament has more than once voted £2000 to defray the cost of investigating the sources of certain diseases of an infectious character, and it would, I think, not be amiss to ask it to supplement the grant in future years with another £2000 to defray the cost of the physiological testing of new remedies proposed for the treatment of disease generally. The appointment of such a commission would also enable one at once to grapple with that monster evil, the unrestricted sale of the so-called patent medicines. Patent they are not, they are the reverse of it—secret. I would make them in fact what they are in name; their composition should be divulged to the commission, and some control thereupon exercised upon the publication of advertisements respecting them. It would not, of course, do to license puffs of any kind, but the power of preventing the more scandalous and destructive of the lies from being obtruded on one's attention from every hoarding and almost every publication should be vested in some one. Care for the public health demands some interference; for example, with the sale of certain hair restorers, which vaunted as not being dyes and uninjurious, are found when chemically examined to contain poisonous combinations of lead. Indeed, there is scarcely a chemist or a doctor who could not adduce from his own experience instances of their poisonous action on the persons of their customers or patients. Another glaring instance is that of the "sure cure for the opium habit,"—it was found to contain per dose two grains of sulphate of morphia, to be taken three times a day. I will not pursue the subject further than to suggest the patent medicine question as a hopeful one for any Member of Parliament in want of a hobby to get astride upon.

Jaborandi first introduced to the notice of Europeans by Dr. Coutinho, of Pernambuco, deserves certainly the premier place among the new remedies of the year. Rarely has it happened that so much attention has been lavished on a new product whether of vegetable or mineral origin; this being probably due to the extremely marked character of its action, and the fact that it came opportunely to supply the want long felt of a direct acting and trustworthy sudorific.

Its name, a most barbarous one, is applied in its native country, Brazil, to a class of remedies possessed of sudorific, stimulant and sialogogue properties, hence the difficulty experienced at first by botanists in determining the true source of the remedy, a difficulty enhanced by the fact that the leaves and twigs, of which the first importations consisted, were not in a satisfactory condition for examination. M. Gubler was, however, enabled to decide at once against their piperaceous origin (though it is certain that that order furnishes some of the plants to which the name jaborandi has been applied), and assisted by M. Baillon, assigned them to the Rutaceæ—to *Pilocarpus pennatifolius*. Several botanists in this country also carefully examined them, and Mr. Holmes of the Pharmaceutical Society's museum having fortunately obtained fruit-bearing specimens was enabled authoritatively to state that the plant was rutaceous, and of the genus *Pilocarpus*. As to the species it was thought premature to attempt its identification before the receipt of well authenticated specimens of the flowers.

As chemists, we of course have little to do with the physiological action of drugs, except when regarded as an aid, and a very important one it often is; to identification of species or determination of quality, yet one cannot omit referring to Mr. Martindale's bold experiment upon himself, and the interesting account of the result which he sent to the *Pharmaceutical Journal*. The subject has been practically exhausted by the labours of Dr. Ringer in this country, and Professor Gubler in France.

The chemists were not slow to perceive nor backward in working the new field of inquiry opened to them. In January, 1875, Parodi communicated to the Revista Farmaceutica of the Pharmaceutical Society of the Argentine Republic the results of his examination of the jaborandi used by the natives of Paraguay From the leaves and spikes of this plant he succeeded in extracting an alkaloid of feeble basic properties which he, using his right as a discoverer, named jaborandine. It was obtained in prismatic crystals belonging to the rhombic system, and in sufficient state of purity it seems to justify its combustion and the adoption of the formula $C_{20}H_{12}N_2O_6$. From the description which he supplies of the plant he used it is certain that he did not employ true jaborandi, as we understand the term, but a species of *Piper*. It is therefore unfortunate scientifically that he should have chosen for its alkaloid the name he did; on the other hand it is comforting to reflect that in consequence of his mistake, our ears will be spared the infliction of a word eminently cacophonous. In March, M. Byasson submitted to treatment a sample of the true drug obtained from the fountain-head, Dr. Coutinho, and obtained therefrom a small quantity of a substance of alkaloidal character possessing the characteristic activity of the parent drug. He described it as a liquid, viscid, aromatic alkaloid, having an acrid and bitter taste, and capable like nicotine of being carried over with water by distillation. He called it jaborandine, but leaving out of the question the prior adoption of that name by Parodi, he was scarcely justified in giving a name at all to a substance so ill-defined and of which he could tell so little, either of its physical or chemical characters.

In May, Mr. Gerrard, indicated a simple method of extracting from jaborandi an alkaloid which, in accordance with Mr. Holmes' advice he named pilocarpine, and in June he was enabled to announce the crystallization of its nitrate in sufficient quantity for the determination of its more important reactions, and to fix its dose at half a grain as a medium quantity. Dr. Attfield will I hope be able to give us the rational formula of this substance, derived from combustions, which I understand he has undertaken to perform.

English pharmacists will then have reason to feel proud of the share taken by them in the elucidation of the interesting problems connected with the introduction of jaborandi. Of course there is plenty of room for further experiment. In all probability more than one alkaloid is present, and it might be discovered that the sialogogue and sudorific properties are resident in distinct substances. Should this be the case it would be most fortunate, as the simultaneous production of extreme salivation and perspiration seems to be the "amari aliquid" of the administration of the new drug.

The Brazilian drugs recently presented to the Pharmaceutical Society by Messrs. Cyriax and Farries, and reported on by Mr. Holmes, contain among them several that seem to call for further inquiry and examination on the part of pharmacists. It seems, indeed, that South America, to which we are indebted for some of the most destructive diseases, is endeavouring to balance the account by providing the means of effecting their cure.

The statement respecting butea, "that it contains a basic substance which, combined with sulphuric acid, is white almost like that of cinchona, and is exported to Europe in great quantities to adulterate quinine," deserves to be taken note of, though one part of it seems highly improbable.

Erva de Rato, a cinchonaceous plant used in Brazil for killing rats and mice, exerts, it is said, on the heart an action similar to that of digitalis. This statement certainly deserves careful examination; should the action not be identical, probably it is only similar, it might furnish another means of alleviating a class of disease of a peculiarly painful and hitherto intractable character.

To Dr. Fayrer, of Calcutta, is mainly due the introduction to European medical practice of Goa powder, called also Bahia powder, and Araroba powder, a potent remedy in certain skin diseases—herpes circinatus, chloasma, etc. This, too, has a Brazilian origin and seems to have been an article of export from Bahia to Goa, when both were Portuguese colonies. Its origin long remained a profound secret, and its employment was confined to those irregular practitioners of medicine whose untrammeled intellects have so often opened a path for the more staid and methodical practitioners of the schools. Dr. J. F. da Silva Lima has traced the substance from its place of production to its place of sale, and made evident the fact that the Goa, Bahia, and Araroba powders are one and the same, and the produce of a leguminous plant growing in Bahia, where several species of it are to be found, all, with characteristic Brazilian indifference, called by the same name, "araroba," or tawny-coloured. Some plants of araroba are now, thanks to Dr. da Silva Lima, growing in the Royal Botanical Gardens of Edinburgh, so that it will not be long before botanists will be able probably to give a complete account of the true source of this interesting remedy. Professor Attfield, in a paper read before a meeting of the North British branch of the Pharmaceutical Society of Great Britain described fully the chemical characters of the pure powder sent to him by Mr. David Kemp, of Bombay, by whom it had been christened, with the view to doing away with troublesome synonyms, chrysarobin. The one remarkable fact connected with a most patient and able analysis, is this, that chrysarobin contains from 80 to 84 per cent. of pure chrysophanic acid. This acid, long known as a constituent of rhubarb roots, Parmelia parietina, and perhaps also senna leaves, had never been suspected of possessing powers such as now it must be credited with. Should the price of chrysarobin ever became disproportionately high, it will always be possible to revert to its active principle derived from well-known and native sources, but that contingency seems remote, as, according to Dr. da Silva Lima, it is obtainable in Brazil in any reasonable quantity. Possibly its wonderful properties as a dyeing material may eventually be made use of. It is a singular fact, referred to by Mr. Holmes in his paper on the identity of Goa and Araroba powders, that dock-root, a well-known but poor source of chrysophanic acid, was used in the time of Gerrard for the treatment of certain skin diseases, and Professor Bentley affirms that it is still used in Sweden for scurvy, and in many cutaneous disorders.

Gurgun balsam, a fluid oleoresin, attained by incisions of the bark of *Dipterocarpus lævis*, has, until recently been regarded solely as an object of suspicion and a possible adulterant of copaiba. It now is in a fair way of being recognized as a most valuable agent in the treatment of skin diseases, and especially of that most horrible one, leprosy. Dr. Dougall, a medical officer of the Indian government first conceived the idea of so employing it, and having observed decided mitigation of the worst symptoms of the cases first experimented upon, carried out on an extensive scale a series of trials of the remedy at the Haddo Leprous Hospital, Andaman Islands. In his report to government he gives details of the remarkable results of the treatment, leaving no doubt that the doctor has hit upon a most valuable agent which renders tractable a most loathsome disease, that hitherto has defied human efforts at removal, and it may almost be said of alleviation. The balsam emulsed with lime water is given to the extent of twelve drachms daily, and at the same time the whole body is anointed with a similar emulsion night and morning. The Indian Government attaches so much importance to the discovery, that it has instructed the keeper of medical stores at Calcutta to collect a large supply of the balsam, for distribution wherever competent persons can be found to administer and report upon it. The issue of these reports will be awaited with interest, more especially since the balsam has been found by so trustworthy an observer as Erasmus Wilson to exercise a beneficial influence in the treatment of a disease of equally painful character affecting Her Majesty's European subjects, viz., cancer.

More than fifteen years ago, Kolbe and Lautermann demonstrated the possibility of preparing from carbolic acid, the then little esteemed salicylic acid. The process adopted was one suggested by Wanklyn, who in the same year discovered that when carbonic acid was passed into sodic alcohol propionate of soda was formed, and similarly when methylic alcohol was used instead of ethylic, acetic acid was the result. More recently the reaction has been carefully studied by Kolbe with the view of procuring the acid at a cheap rate for the economical uses which Professor Kolbe was the first to recognize in it. He imagined that seeing their easy convertibility, the two acids carbolic and salicylic might probably be endowed with similar physiological properties, and that idea he has since fully demonstrated the truth of by experiment. As an antiseptic, salicylic acid is a formidable rival to carbolic acid, preventing and destroying with equal certainty the action of both organized and inorganized ferments. Thus it destroys the activity of the alcoholic ferment in saccharine fluids, and the ammoniacal ferment in solutions of urea, whilst it equally prevents the decomposing action of emulsion on amygdalin, and of synaptase on myronic acid. Its power as an antiseptic when used instead of carbolic acid for the dressing of wounds is considered by Mr. Lister to be scarcely equal to that of the latter substance. This inferiority possibly depends on its less volatility, which, whilst offering the advantage of absence of disagreeable smell, entails the disadvantage of limiting seriously its action on the atmosphere surrounding the diseased surface. On this account we may expect that as a general disinfectant carbolic acid will continue to hold its ground; and that, notwithstanding its extremely poisonous character, a fact of which we are now and then reminded painfully by the occurrence of loss of life through its accidental administration.

Salicylic acid, on the contrary, is comparatively innocuous, and being a solid does not invite the attention of drinkers and others too apt to conclude that a carefully hidden bottle must conceal something nice. The antiseptic action of salicylic acid is not shared with its salts, so that when the saturation of the acid accidentally occurs through the evolution of ammonia generated by putrefaction, its utility ceases, or at least is suspended until the addition of an acid sets it free again. Nothing could more forcibly illustrate the non-poisonous nature of salicylic acid, than the fact that it has been recommended to be added in minute quantities to the water in which leeches are preserved. It is said that their mortality is in that way very much lessened. The future of salicylic acid seems to point rather in the direction of internal than external applications. It has been suggested as likely to be a potent remedy in diseases of zymotic character; perhaps its exhibition in conjunction with sulphurous acid, would be more beneficial than when given alone, as the sulphurous acid would not only directly assist it, but by preventing its neutralization, conduce to the permanence of its action. Mr Jno. Williams, at a recent meeting of the Pharmaceutical Society, exhibited oil of wintergreen (salicylate of methyl) prepared from the artificial acid, and possessing perfectly the taste and odour of the oil yielded by the plant on distillation. The methylic element was probably obtained in the usual way from wood spirit, but it would not have been difficult to prepare this from purely inorganic sources as Berthelot pointed out some years ago.

Salicylic acid is now quoted in the price lists at 8*s.* per oz. for the natural product; 2*s.* per oz. for the artificial.

In October, 1871, Dr. Broughton, of Ootacamund, presented to the museum of the Pharmaceutical Society, a very pure and interesting specimen of carbolic acid derived indirectly from the essential oil of *Andromeda Leschenaultii*, a plant that grows in inexhaustible profusion on the Neilgherrie Hills. This oil is nearly identical with that of Wintergreen, and consists almost wholly of salicylate of methyl. The production of carbolic acid is effected by first saponifying the oil with potash, then adding a mineral acid which precipitates the salicylic acid in a state of purity, and finally distilling the dry acid with lime and sand. The result is pure carbolic acid which crystallizes at once on reaching the receiver. Dr. Broughton calculates that by pursuing this method, pure carbolic acid could be produced at from five to seven shillings per pound. It is obvious that by dispensing with the last operation, and stopping at salicylic acid, that acid could be rendered at a price considerably less than the figures I have quoted—possibly at 4*s.* per lb. Here then is a hopeful source of a cheap and pure supply of this valuable drug. I have written to Dr. Broughton with reference to it, and hope to have in time for this Conference, a note from him respecting it. Dr. de Vrij, has also pointed out a new source of oil of Wintergreen—*Gaultheria punctata*, a plant growing in great abundance in Java, and yielding on distillation as much as 1·15 per cent. of crude oil. This might possibly be similarly utilized.

Mr. John Williams, who has so often contributed to our transactions, recently read before the Chemical Society an important paper on a physical subject of the highest interest, viz., the graduation of thermometers. The scale adopted by Fahrenheit seems to be purely arbitrary, unless, indeed, he fancied some connection to exist between the interval between the melting and boiling points of water, and the number of degrees in a semicircle Such an idea would not seem absurd 150 years ago. His assumption that no lower temperature than that caused by mixing ice and salt, could be produced, was of course incorrect, and why he numbered 32 degrees between that, his zero, and the melting of ice, is not apparent. However, his mode of graduating held its ground until the introduction of the centigrade method, which divided the interval between the boiling and melting points into 100 degrees, and started from the latter point as zero. The division was certainly decimal, if that be an advantage, but beyond that the only real improvement was the establishing the fact that all minus numbers represented degrees below the freezing point of water. On the other hand it entailed the disadvantage of lengthening the degree and necessitating the frequent use of fractional numbers.

It was the consideration of these inconveniences that first induced Mr. Williams to think of a remedy, which he found in taking for his scale the interval between the boiling and freezing points of mercury and dividing it into 1000 degrees. Hence the name he has given it, the milligrade.

According to Dulong and Petit mercury boils at 360° C., and freezes at—39·44° C. The interval is therefore nearly 400° C. Probably this number is quite as accurate as 399·44°—it cannot be supposed that either is absolutely exact. The whole number being adopted, it follows that 2½ degrees milligrade equal 1 degree centigrade. The following curious results are obtained on carrying out the necessary calculations. The freezing point of water is 100° M.; the boiling point, 350° M.; the interval, 250°, being just one fourth of the interval between the freezing and boiling points of mercury. This last coincidence had not, I believe, been noticed before, but it would, of course, be the same for any graduation whatever. Benzole melts at 100° M., boils at 300° M. Nordhausen sulphuric acid melts at 100° M., boils at 200° M. Bihydrated sulphuric acid melts at 122·5° M., boils at 622·5° M., the interval being exactly 500° M.

Many of the volatile metallic chlorides such as those of arsenic, antimony, etc., have intervals between their melting and boiling points which appear to have some simple relation to the interval between the melting and boiling points of mercury. However, the great points achieved, and these are independent of all theoretic considerations, are the shortening of the degree, thereby lessening the frequency of the employment of fractional numbers, and the abolition for all temperatures above that of the freezing point of mercury, of minus numbers. It would be too sanguine to expect the milligrade to supersede the centigrade in our day, but that there is much merit in the conception and much of interest in the results cannot be questioned.

M. Nativelle, who discovered in 1872 a method of preparing from the leaves of *Digitalis purpurea* a crystalline substance possessing the physiological properties of the plant, and which he named digitalin, has had a hard time of it lately in the defence of his position. In the April number of the J. de Ph. et de Ch. he repels the attack of M. Kosman who had re-asserted his belief that the true active principle of foxglove is an amorphous body and affirmed that M. Nativelle's digitalin was a product of change, such as might take place, such is the instability of the true digitalin, either inside or outside the plant. To attempt to give an outline, even of the results described by Nativelle, Kosmann, Homolle, Walz, and Schmiederberg would occupy much longer time than I could devote to this subject. Probably not less than a dozen definite principles, if one could believe their discoverers, would have to be examined. Certain it is one could not find *digits* enough to count them upon, and moreover the greater number of them seem possessed of toxic properties. Schmiederberg's last announcement, digitoxin, is so poisonous that he doubts whether it is fit for medicinal use. It moreover is completely insoluble in water, in that respect agreeing with the digitalin of Nativelle which Schmiederberg declares to be a mixture of digitoxin and paradigitogenin. Anyhow Nativelle was the first to produce and exhibit a crystalline principle derived from foxglove, and representing with tolerable exactness its physiological action, and while such can be obtained of constant composition and definite form, that assuredly is the article that ought to be employed and not an amorphous substance possessing no definite characters by which it might be recognized. Doubtless the more complex of the vegetable alkaloids are extremely prone to alteration and until we know more of the true constitution of that class of bodies it will be useless to attempt to decide as to which is the mother substance of such series as are met with in foxglove, aconite, cinchona. This Conference has already made a money vote towards the elucidation of the aconite mystery, and will probably be asked for a second grant, but it would in my humble opinion be more usefully devoted to the determination of the exact chemical position occupied by one or two of the more stable alkaloids. It doubtless is very interesting to ring the changes upon such a substance as morphia but this might go on for ever, and I have failed to perceive that up to this time any consensus of opinion has been arrived at, on what may be termed the previous question,—what is an alkaloid ?

It would not be difficult to extend this imperfect notice of the science of the year to a great length, but experience warns us not to devote too much time to the preliminaries of our Conference. I had intended giving a *résumé* of the very interesting controversy on the question of ferments, of which the last word was spoken by Pasteur, in April of this year. The debate was sustained during a number of years by such men as Pasteur, the author of the modern theory of ferments, Fremy, his chief and not altogether ingenuous opponent, Dumas, Liebig, Berthelot, Bechamp, Lechartier, and Bellamy, and therefore could not fail to be instructive. But the mass of materials collected could not be reduced within such limits as to allow for the introduction of other subjects of more immediate importance.

I, therefore, reluctantly pass on to the least agreeable part of my task, the record of the loss we have sustained by death during the year. And that loss, I refer to that of one only, is truly enormous, and I fear irreparable. In the later numbers of the issue of the *Pharmaceutical Journal* (of March 27), appeared a short announcement of the death of Daniel Hanbury, and such was the reluctance to believe news so disastrous, that it was, I believe, very generally discredited as too bad to be true. Such, however, was the fact; Daniel Hanbury, *facile princeps* of British pharmacologists, had died on the 24th, of typhoid fever, in the prime of life, the very plenitude of his powers and height of usefulness. His friends had looked forward confidently to the time, assuredly as they thought, not far distant, when he would be acknowledged as the chief authority on drugs in Europe, but that was not to be. The fatal hour had struck, he had joined the ranks of "those other living called the dead," and as if to show the vanity of earthly things, the vast stores of knowledge which his active mind had accumulated were at once lost to his friends and the world. It was this sense of loss, a selfish one I admit, that at first overbore every other feeling—one could not help asking the question, To what purpose is this waste ? Who is there left to whom the perplexed student can appeal with certainty of a courteous reply, and an indication where recondite information is to be found ? The marvellous knowledge of books he possessed and his methodical way of conducting his reading of them, made his friendship, in that respect, invaluable. Able and willing as he was to communicate information, he was not above taking the opinion of those he considered better informed on special subjects than himself. The consciousness of power did not inflate his vanity ; he was to the last, when Fellow of the Royal and Linnean Societies, as accessible as when he worked as a student in the laboratory of the Pharmaceutical Society. The scientific journals of this country, and especially those of the Pharmaceutical and Linnean Societies, contain abundant evidence of his painstaking assiduity and conscientious use of mental powers of a high order. Most fortunately for us and for his own fame, he had in the previous year in conjunction with his friend, Professor Flückiger, completed the 'Pharmacographia,' which will ever remain a worthy monument to his memory. Without wishing to detract in any way from the merit of his collaborator it is evident that the work was very greatly indebted to Mr. Hanbury's researches and especially to the correspondence he had established in all parts of the world, and by means of which he had succeeded in solving so many pharmacological mysteries. Not a few young men now occupying positions of importance owe their success in life to his kindly help and wise counsel, but these cases though not rare were rarely heard of. In his acts of charity he observed strictly the injunction—let not thy left hand know what thy right hand doeth.

As President of this Conference, Mr. Hanbury achieved a success that will not again in all probability be equalled. As a contributor to its proceedings, and to the discussions arising therefrom, his aid was invaluable. In the latter capacity he was unrivalled, as he could generally manage in a few well-chosen words, and those not hastily put forward, either to give himself or elicit from others the information that seemed wanting to complete the knowledge of the subject before the meeting.

His work as a member of the Pharmaceutical Council and as an examiner I need not refer to here, except in order to express a hope that his services will secure him a place in the Walhalla of pharmaceutical worthies by the side of his predecessor,—William Allen.

At the conclusion of this address, Mr. C. Boorne said: We have all listened with deep interest to the address which our President has just read to us. It is one full of useful information, and it shows a large amount of scientific research. There is a point touched upon in the address which I should like to refer to; the importance of it was impressed upon me as a young man by an incident which occurred in my apprenticeship. I am referring to what the President said about prescriptions of extreme doses. When I was an apprentice I was required to dispense prescriptions, and those of some careless prescribers. One day I was called upon to dispense 3 drachms of potassio-tartrate of antimony, and on reference to the prescriber it turned out that it should be the liquor. Some time afterwards, while yet a raw recruit, I was left in charge of a business while the master took an excursion into the country. I remember being called up at three o'clock one morning, when a prescription was brought to me to dispense. It included 3 grains of hydrochlorate of morphia. I felt great difficulty about it. The prescription was brought to me by a gentleman's servant; he could tell me nothing more than that his master was ill: he could not tell me who wrote the prescription. After some consideration I did what I do not mean to justify: I put in 2 grains. I went to bed, but not to sleep, with lively apprehensions of a coroner's inquest; for I might have killed the gentleman by giving him too much, or I might have defeated an effort to save his life by not giving him enough. I afterwards learned that the medical man intended it to be 3 grains, because it happened to be a case of delirium tremens. If there had been opposite to the doubtful line a note of admiration, or something to indicate that the apparently extreme dose of 3 grains was really meant, it would have been a great relief to my own mind as a young dispenser. In the absence of any such assurance the pharmacist is often placed on the horns of a dilemma. I move a vote of thanks to the President for his able and interesting address.

Mr. Young seconded the motion, and said they were all indebted to Mr. Groves for the admirable *résumé* of various matters embodied in his address. It was no easy matter to treat the topics of the year with such freshness as to command the attention of such a meeting as the Conference. There was something sad and mysterious in the fact that many of them whose hairs were grey should be called upon to listen to an elegy on their deceased friend Daniel Hanbury. The President was well fitted to do justice to his memory, and they had been gratified by the way in which he had described their deceased friend's character.

Mr. Stoddart put the question, and the vote of thanks to the President was carried with acclamation.

The President responded and said he was very much obliged for the appreciation of his efforts to interest the members of the Conference.

Mr. Hills rose to offer a word of explanation in reference to a subject touched upon by the President, viz., the papers which were read at evening meetings of the Pharmaceutical Society. He admitted the Society might not have secured so many good papers as those read at the Conference; but that was the fault of the friends who did not offer such papers to the Society. As President of the Pharmaceutical Society for the year he should be happy to receive a paper from every gentlemen in the room; and he would promise not to look at the clock in the manner described by the President. There was, however, this to be said, the really true scientific man was very exact; he must have exact observation; and unless they had that they would never get through their work. Although he had not given many papers to the Pharmaceutical Society, he had set a good example in one respect —he had missed only four meetings in thirty-three or thirty-four years; and he had gained a great deal of information. He never was influenced in going or stopping away by any consideration as to whether the paper would be good or bad. He always got information; and he recommended his friends to go to every meeting, and, if possible, to emulate the local associations which were doing so well. With reference to the Irish Pharmacy Act, he wished to explain that the Council did all they could; but this, world as they all knew, was made up of compromises and none could have their own way entirely. They were told at first that the Bill should be carried as it was introduced with reciprocity and everything of the kind. The Chief Secretary for Ireland told them he meant to carry the Bill as it stood. The Council knew the Government was strong, but the deputation went direct from the Chief Secretary for Ireland to the lobby and told members of the House of Commons, and even some members of the Government, that the Bill could not be allowed to pass with the reciprocity clause in it. The result was, that clause was withdrawn at once. He did not think the measure would make much difference; the pharmacists of Ireland would never interfere with those of England. He was glad that the question was settled. Fearing, however, that the President's words would leave an impression that the Council had not done all they ought to have done, he desired to assure the Conference that all was done that it was possible for them to do.

Professor Attfield said the President of the Pharmaceutical Society would be glad to hear that a member of the Conference had promised to contribute a paper at the Society's evening meeting in November. He would also be glad to know that an examination of the journals for the past 20 years showed that since the establishment of this Conference the original contributions to the local societies had trebled in number, and the journals of pharmacy had been supplied to four times the extent they were 15 years ago. And yet the Conference had a yearly increasing number of papers to discuss. These facts showed that the Conference acted only as a healthy stimulus to the local societies.

(*To be continued.*)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The forty-fifth Annual Meeting of this Association was commenced at Bristol, during the present week. The first General Meeting was held on Wednesday evening, in the Colston Hall, when Professor Tyndall, the retiring President, introduced his successor, Sir John Hawkshaw, F.R.S., who then proceeded to give the following address:—

The President's Address.

Gentlemen,—To those on whom the British Association confers the honour of presiding over its meetings, the choice of a subject presents some difficulty.

The presidents of sections, at each annual meeting, give an account of what is new in their respective departments; and essays on science in general, though desirable and interesting in the earlier years of the Association, would be less appropriate to-day.

Past presidents have already discoursed on many subjects, on things organic and inorganic, on the mind and on things perhaps beyond the reach of mind, and I have arrived at the conclusion that humbler themes will not be out of place on this occasion.

I propose in this address to say something of a profession to which my lifetime has been devoted—a theme which cannot perhaps be expected to stand as high in your estimation as in my own, and I may have some difficulty in making it interesting; but I have chosen it because it is a subject I ought to understand better than any other. I propose to say something on its origin, its work, and kindred topics.

Rapid as has been the growth of knowledge and skill as applied to the art of the engineer during the last century, we must, if we would trace its origin, seek far back among the earliest evidences of civilization.

In early times, when settled communities were few and isolated, the opportunities for the interchange of knowledge were scanty or wanting altogether. Often the slowly accumulated results of the experience of the wisest heads and the most skilful hands of a community were lost on its downfall. Inventions of one period were lost and found again. Many a patient investigator has puzzled his brain in trying to solve a problem which had yielded to a more fortunate labourer in the same field some centuries before.

The ancient Egyptians had a knowledge of metallurgy, much of which was lost during the years of decline which followed the golden age of their civilization. The art of casting bronze over iron was known to the Assyrians, though it has only lately been introduced into modern metallurgy; and patents were granted in 1609 for processes connected with the manufacture of glass, which had been practised centuries before.[*] An inventor in the reign of Tiberius devised a method of producing flexible glass, but the manufactory of the artist was totally destroyed, we are told, in order to prevent the manufacture of copper, silver, and gold from becoming depreciated.[†]

Again and again engineers as well as others have made mistakes from not knowing what those had done who have gone before them, and have had the same difficulties to contend with. In the long discussion which took place as to the practicability of making the Suez Canal, an early objection was brought against it that there was a difference of 32½ feet between the level of the Red Sea and that of the Mediterranean. Laplace at once declared that such could not be the case, for the mean level of the sea was the same on all parts of the globe. Centuries before the time of Laplace the same objection had been raised against a project for joining the waters of these two seas. According to the old Greek and Roman historians, it was a fear of flooding Egypt with the waters of the Red Sea that made Darius, and in later times again Ptolemy, hesitate to open the canal between Suez and the Nile.[‡] Yet this canal was made, and was in use some centuries before the time of Darius.

Strabo[§] tells us that the same objection, that the adjoining seas were of different levels, was made by his engineers to Demetrius,[‖] who wished to cut a canal through the Isthmus of Corinth some two thousand years ago. But Strabo[¶] dismisses at once this idea of a difference of level, agreeing with Archimedes that the force of gravity spreads the sea equally over the earth.

When knowledge in its higher branches was confined to a few, those who possessed it were often called upon to perform many and various services for the communities to which they belonged; and we find mathematicians and astronomers, painters and sculptors, and priests called upon to perform the duties which now pertain to the profession of the architect and the engineer. And as soon as civilization had advanced so far as to admit of the accumulation of wealth and power, then kings and rulers sought to add to their glory while living by the erection of magnificent dwelling-places, and to provide for their aggrandisement after death by the construction of costly tombs and temples. Accordingly, we soon find men of ability and learning devoting a great part of their time to building and architecture, and the post of architect became one of honour and profit. In one of the most ancient quarries of Egypt a royal high architect of the dynasty of the Psammetici has left his pedigree sculptured on the rock, extending back for twenty-three generations, all of whom held the same post in succession in connection with considerable sacerdotal offices.[**]

As there were in these remote times officers whose duty it was to design and construct, so also there were those whose duty it was to maintain and repair the royal palace and temples. In Assyria, 700 years before our era as we know from a tablet found in the palace of Sennacherib by Mr. Smith, there was an officer whose title was the Master of the Works. The tablet I allude to is inscribed with a petition to the king from an officer in charge of a palace, requesting that the master of works may be sent to attend to some repairs which were much needed at the time.[††]

Under the Roman Empire there was almost as great a division of labour in connection with building and design as now exists. The great works of that period were executed and maintained by an army of officers and workmen, who had special duties asssigned to each of them.

Passing by those early attempts at design and construction which supplied the mere wants of the individual and the household, it is to the East that we must turn if we would find the earliest works which display a knowledge of engineering. Whether the knowledge of engineering, if we may so call it, possessed by the people of Chaldæa and Babylonia was of native growth or was borrowed from Egypt is, perhaps, a question which cannot yet be answered. Both people were agricultural, dwelling on fertile plains intersected by great rivers, with a soil requiring water only to enable it to bring forth inexhaustible crops. Similar circumstances would create similar wants, and stimulate to action similar faculties to satisfy them. Apart from the question of priority of knowledge, we know that at a very early period, some four or five thousand years ago at least, there were men in Mesopotamia and Egypt who possessed considerable mechanical knowledge, and no little skill in hydraulic engineering. Of the men themselves we know little: happily, works often remain when the names of those who conceived and executed them have long been forgotten.

It has been said that architecture had its origin not only in nature, but in religion; and if we regard the earliest works which required mechanical knowledge and skill, the same may be said of engineering. The largest stones were chosen for sacred buildings, that they might be more enduring as well as more imposing, thereby calling for improvement and invention of mechanical contrivances, to assist in transporting and elevating them to the position they were to occupy; for the same reason the hardest and most costly materials were chosen, calling for further improvement in the metal forming the tools required to work them. The working of metals was further perfected in making images of the gods, and in adorning with the more precious and ornamental sorts the interior and even external parts of their shrines.

The earliest buildings of stone to which we can assign a date, with any approach to accuracy, are the pyramids of Gizeh. To their builders they were sacred buildings, even more sacred than their temples or temple palaces. They were built to preserve the royal remains, until, after a lapse of 3000 years, which we have reason to believe was the period assigned, the spirit which had once animated the body should re-enter it.[*] Although built 5000 years ago, the masonry of the Pyramids could not be surpassed in these days; all those who have seen and examined them, as I myself have done, agree in this; moreover, the design is perfect for the purpose for which they were intended, above all to endure. The building of pyramids in Egypt continued for some ten centuries, and from 60 to 70 still remain, but none are so admirably constructed as those of Gizeh. Still, many contain enormous blocks of granite from 30 to 40 feet long, weighing more than 300 tons, and display the greatest ingenuity in the way in which the sepulchral chambers are constructed and concealed.[†]

The genius for dealing with large masses in building did not pass away with the pyramid builders in Egypt, but their descendants continued to gain in mechanical knowledge, judging from the enormous blocks which they handled with precision. When the command of human labour was unlimited, the mere transport of such blocks as the statue of Rameses the Great, for instance, which weighed over 800 tons, need not so greatly excite our wonder; and we know how such blocks were moved from place to place, for it is shown on the wall paintings of tombs of the period, which still remain.

But as the weight of the mass to be moved is increased, it becomes no longer a question of only providing force in the shape of human bone and muscle. In moving in the last century the block which now forms the base for the statue of Peter the Great, at St. Petersburg, and which weighs 1200 tons, force could be applied as much as was wanted, but great difficulty was experienced in supporting it, and the iron balls on which it was proposed to roll the block along were crushed, and a harder metal had to be substituted.* To facilitate the transport of material, the Egyptians made solid causeways of granite from the Nile to the Pyramids; and in the opinion of Herodotus, who saw them, the causeways were more wonderful works than the Pyramids themselves.†

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[*] Layard's 'Nineveh and Babylon,' p. 191; Beckman's 'History of Inventions,' vol. ii. p. 85.

[†] Pliny, 'Nat. Hist.' Bk. xxxvi. c. 66.

[‡] Pliny. 'Nat. Hist.' Bk. vi. c. 33.

[§] Strabo, c. iii. § 11.

[‖] Demetrius I., King of Macedonia, died 283 B.C.

[¶] Strabo, c. iii. § 12.

[**] 'Discoveries in Egypt, Ethiopia, &c.,' by Dr. Lepsius, 2nd edit., p. 318.

[††] Smith's (G.) 'Assyrian Discoveries,' 2nd edit., p. 414.

[*] Fergusson's 'History of Architecture,' vol. i. p. 83; Wilkinson's 'Ancient Egyptians,' 2nd series, vol. ii. p. 444.

[†] Vyse's 'Pyramids of Gizeh,' vol. iii, pp. 16, 41, 45, 57.

The Egyptians have left no record of how they accomplished a far more difficult operation than the mere transport of weight—that is, how they erected obelisks weighing more than 400 tons. Some of these obelisks must have been lifted vertically to place them in position, as they were by Fontana in Rome in later times, when the knowledge of mechanics, we know, was far advanced.‡

The practice of using large blocks of stone either as monoliths or as forming parts of structures has existed from the earliest times in all parts of the world.

The Peruvians used blocks weighing from 15 to 20 tons, and fitted them with the greatest nicety in their cleverly designed fortifications.§

In India, large blocks were used in bridges when the repugnance of Indian builders to the use of the arch rendered them necessary, or in temples, where as in the Temple of the Sun at Orissa, stones weighing from 20 to 30 tons form part of the pyramidal roof at a height of from 70 to 80 feet from the ground.‖ Even as late as the last century, Indians, without the aid of machinery, were using blocks of granite above 40 feet long for the door posts of the gateway of Seringham, and roofing blocks of the same stone for a span of 21 feet.¶

At Persepolis, in the striking remains of the palaces of Xerxes and Darius, more than one traveller has noted the great size of the stones, some of which are stated to be 55 feet long and 6 to 10 feet broad.

So in the Greek temples of Sicily, many of the blocks in the upper parts of the temples are from 10 to 20 tons weight.

The Romans, though they did not commonly use such large stones in their own constructions, carried off the largest obelisks from Egypt and erected them at Rome, where more are now to be found than remain in Egypt. In the temples of Baalbek, erected under Roman rule, perhaps the largest stones are to be found which have been used for building since the time of the Pharaohs. The terrace wall of one of the temples is composed of three courses of stones, none of which are less than 30 feet long; and one stone still lies in the quarry squared and ready for transport, which is 70 feet long and 14 feet square, and weighs upwards of 1135 tons, or nearly as much as one of the tubes of the Britannia Bridge.

I have not mentioned dolmens and menhirs, rude unhewn stones often weighing from 30 to 40 tons, which are found from Ireland to India, and from Scandinavia to the Atlas, in Africa. To transport and erect such rude masses required little mechanical knowledge or skill, and the operation has excited more wonder than it deserves. Moreover, Fergusson has gone far to show that the date assigned to many of them hitherto has been far too remote; most, and possibly all, of those in northern and western Europe having been erected since the time of the Roman occupation. And to this day the same author shows that menhirs, single stones often weighing over 20 tons, are erected by hill tribes of India in close proximity to stone buildings of elaborate design and finished execution, erected by another race of men.*

For whatever purpose these vast stones were selected—whether to enhance the value or to prolong the endurance of the buildings of which they formed a part—the tax on the ingenuity of those who moved and placed them must have tended to advance the knowledge of mechanical appliances.

The ancient Assyrians and Egyptians had possibly more knowledge of mechanical appliances than they are generally credited with. In the wall paintings and sculptures which show their mode of transporting large blocks of stone, the lever is the only mechanical power represented, which they appear to have used in such operations; nor ought we to expect to find any other used, for, where the supply of human labour was unlimited, the most expeditious mode of dragging a heavy weight along would be by human power; to have applied pulleys and capstans, such as would now be employed in similar undertakings, would have been mere waste of time. In some countries, even now, where manual labour is more plentiful than mechanical appliances, large numbers of men are employed to transport heavy weights, and they do the work in less time than it could be done with all our modern mechanical appliances. In other operations, such as raising obelisks, or the large stones used in their temple palaces, where human labour could not be applied to such advantage, it is quite possible that the Egyptians used mechanical aids. On one of the carved slabs which formed part of the wall panelling of the palace of Sardanapalus, which was built about 930 years before our era, a single pulley is clearly shown, by which a man is in the act of raising a bucket—probably drawing water from a well.†

It has sometimes been questioned whether the Egyptians had a knowledge of steel. It seems unreasonable to deny them this knowledge. Iron was known at the earliest times of which we have any record. It is often mentioned in the Bible, and in Homer; it is shown in the early paintings on the walls of the tombs at Thebes, where butchers are represented as sharpening their knives on pieces of metal coloured blue, which were most probably pieces of steel.‡ Iron has been found in quantity in the ruined palaces of Assyria; and in the inscriptions of that country fetters are spoken of as having been made of iron, which is also so mentioned in connection with other metals as to lead to the supposition that it was regarded as a base and common metal. Moreover, in the Great Pyramid a piece of iron was found in a place where it must have lain for 5000 years.§ The tendency of iron to oxidize must render its preservation for any long period rare and exceptional. The quality of iron which is now made by the native races of Africa and India is that which is known as wrought iron; in ancient times, Dr. Percy says the iron which was made was always wrought iron. It is very nearly pure iron, and a very small addition of carbon would convert it into steel. Dr. Percy says the extraction of good malleable iron directly from the ore "requires a degree of skill very far inferior to that which is implied in the manufacture of bronze."‖ And there is no great secret in making steel; the natives of India now make excellent steel in the most primitive way, which they have practised from time immemorial. When steel is to be made, the proportion of charcoal used with a given quantity of ore is somewhat larger, and the blast is applied more slowly than when wrought iron is the metal required.¶ Thus, a vigorous native working the bellows of skin would make wrought iron where a lazy one would have made steel. The only apparatus required for the manufacture of the finest steel from iron ore is some clay for making a small furnace four feet high, and from one to two broad, some charcoal for fuel, and a skin with a bamboo tuyere for creating the blast.

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* Rondelet's 'Traité de l'Art de Bâtir,' vol. i., p. 73.

† Herodotus, bk. ii., c. 124.

‡ For obelisk erected at Arles, 1676.—See Rondelet's 'L'Art de Bâtir,' vol. i., p. 48. Its weight was nearly 200 tons, and it was suspended vertically by eight ships' masts.

§ Fergusson's 'History of Architecture,' vol. ii., p. 779; Squier, 'Peru,' p. 24.

‖ The Temple of the Sun was built 1237—1282 A.D.—Hunter's 'Orissa' vol. i., pp. 288, 297.

¶ Fergusson's 'Rude Stone Monuments,' p. 96.

* Fergusson's 'Rude Stone Monuments,' pp. 461—465.

† Layard's 'Nineveh and its Remains,' vol. ii., p. 31.

‡ Wilkinson's 'Ancient Egyptians,' vol. iii., p. 247.

§ Vyse's 'Pyramid of Gizeh,' vol. i., p. 275.

‖ Percy's 'Iron and Steel,' p. 873.

¶ *Ibid.*, p. 259.

The supply of iron in India as early as the fourth and fifth centuries seems to have been unlimited. The iron pillar of Delhi is a remarkable work for such an early period. It is a single piece of wrought iron 50 feet in length, and it weighs not less than 17 tons.[*] How the Indians forged this large mass of iron and other heavy pieces which their distrust of the arch led them to use in the construction of roofs, we do not know. In the temples of Orissa iron was used in large masses as beams or girders in roof-work in the thirteenth century.[†]

The influence of the discovery of iron on the progress of art and science cannot be over-estimated. India well repaid any advantage which she may have derived from the early civilized communities of the West if she were the first to supply them with iron and steel.

An interesting social problem is afforded by a comparison of the relative conditions of India and this country at the present time. India, from thirty to forty centuries ago, was skilled in the manufacture of iron and cotton goods, which manufactures, in less than a century, have done so much for this country. It is true that in India, coal is not so abundant or so universally distributed as in this country. Yet, if we look still further to the East, China had probably knowledge of the use of metals as soon as India, and moreover had a boundless store of iron and coal. Baron Richthofen, who has visited and described some of the coal fields of China, believes that one province alone, that of Southern Shansi, could supply the world at its present rate of consumption for several thousand years. The coal is near the surface, and iron abounds with it. Marco Polo tells us that coal was universally used as fuel in the parts of China which he visited towards the end of the fourteenth century, and from other sources we have reason to believe it was used there as fuel 2000 years ago. But what progress has China made in the last ten centuries? A great future is undoubtedly in store for that country; but can the race who now dwell there develop its resources, or must they await the aid of an Aryan race? Or is anything more necessary than a change of institutions, which might come unexpectedly, as in Japan?

The art of extracting metals from the ore was practised at a very early date in this country. The existence long ago of tin mines in Cornwall, which are so often spoken of by classical writers, is well known to all. That iron was also extracted from the ore by the ancient Britons is most probable, as it was largely used for many purposes by them before the Roman conquest. The Romans worked iron extensively in the Weald of Kent, as we assume from the large heaps of slag containing Roman coins which still remain there. The Romans always availed themselves of the mineral wealth of the countries which they conquered, and their mining operations were often carried out on the largest scale, as in Spain, for instance, where as many as forty thousand miners were regularly employed in the mines at New Carthage.[‡]

Coal, which was used for ordinary purposes in England as early as the ninth century, does not appear to have been largely used for iron smelting until the eighteenth century, though a patent was granted for smelting iron with coal in the year 1611.[§] The use of charcoal for that purpose was not given up until the beginning of this century, since which period an enormous increase in the mining and metallurgical industries has taken place; the quantity of coal raised in the United Kingdom in 1873 having amounted to 127 million tons, and the quantity of pig iron to upwards of 6½ million tons.

The early building energy of the world was chiefly spent on the erection of tombs, temples, and palaces.

While, in Egypt, as we have seen, the art of building in stone had 5000 years ago reached the greatest perfection, so in Mesopotamia the art of building with brick, the only available material in that country, was in an equally advanced state some ten centuries later. That buildings of such a material have lasted to this day shows how well the work was done; their ruinous condition even now is owing to their having served as quarries for the last three or four thousand years, so that the name of Nebuchadnezzar, apparently one of the greatest builders of ancient times, is as common on the bricks of many modern towns in Persia as it was in old times in Babylon. The labour required to construct the brick temples and palaces of Chaldæa and Assyria must have been enormous. The mound of Koyunjik alone contained 14½ million tons, and represents the labour of 10,000 men for twelve years. The palace of Sennacherib, which stood on this mound, was probably the largest ever built by any one monarch, containing as it did more than two miles of walls, panelled with sculptured alabaster slabs, and twenty-seven portals, formed by colossal bulls and sphinxes.[*]

The pyramidal temples of Chaldæa are not less remarkable for the labour bestowed on them, and they far surpass the buildings of Assyria in the excellence of their brick-work.

The practice of building great pyramidal temples seems to have passed eastwards to India and Burmah, where it appears in buildings of a later date, Buddhist topes and pagodas; marvels of skill in masonry, and far surpassing the old brick moulds of Chaldæa in richness of design and in workmanship. Even so late as this century a king of Burmah began to build a brick temple of the old type, the lagest building, according to Fergusson, which has been attemped since the Pyramids.[†]

The mere magnitude of many of these works is not so wonderful when we take into account the abundance of labour which those rulers could command. Countries were depopulated, and their inhabitants carried off and made to labour for the conquerors. The inscriptions of Assyria describe minutely the spoils of war and the number of captives; and in Egypt we have frequent mention made of works being executed by the labour of captive peoples. Herodotus tells us that as many as 360,000 men were employed in building one palace for Sennacherib.[‡] At the same time, it must not be forgotten that the very character of the multitude would demand from some one the skill and brain to organize and direct, to design and plan the work.

It would be surprising if men who were capable of undertaking and successfully completing unproductive words of such magnitude did not also employ their powers on works of a more useful class. Traces still remain of such works; enough to show, when compared with the scanty records of the times which have come down to us, that the prosperity of such countries as Egypt and Mesopotamia was not wholly dependent on war and conquest, but that the reverse was more likely the case, and that the natural capabilities of those countries were greatly enlarged by the construction of useful works of such magnitude as to equal, if not in some cases surpass, those of modern times.

Egypt was probably far better irrigated in the days of the Pharaohs than it is now. To those unacquainted with the difficulties which must be met with and overcome before a successful system of irrigation can be carried out, even in countries in which the physical conditions are favourable, it may appear that nothing more is required than an adequate supply of unskilled labour. Far more than this was required: the Egyptians had some knowledge of surveying, for Eustathius says they recorded their marches on maps;* but such knowledge was probably in those days very limited, and it required no ordinary grasp of mind to see the utility of such extensive works as were carried out in Egypt and Mesopotamia, and, having seen the utility, to successfully design and execute them. To cite one in Egypt—Lake Mœris, of which the remains have been explored by M. Linant, was a reservoir made by one of the Pharaohs, and supplied by the flood waters of the Nile. It was 150 square miles in extent, and was retained by a bank or dam 60 yards wide and 10 high, which can be traced for a distance of thirteen miles. This reservoir was capable of irrigating 1200 square miles of country.† No work of this class has been undertaken on so vast a scale since, even in these days of great works.

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[*] Fergusson's 'History of Architecture,' vol. ii., p. 460; and 'Rude Stone Monuments,' pp. 481—3. Cunningham's 'Archæological Survey of India,' vol. i., p. 169.

[†] Hunter's 'Orissa,' vol. i., p. 298.

[‡] Strabo, bk. iii., c. ii., § 10.

[§] Percy's 'Iron and Steel,' p. 882.

[*] Layard's 'Nineveh and Babvlon,' p. 589.

[†] Fergusson's 'History of Architecture,' vol. ii. p. 523.

[‡] Rawlinson's 'Herodotus,' vol. i., p. 389, 2nd edit.

The prosperity of Egypt was in so great a measure dependent on its great river, that we should expect that the Egyptians, a people so advanced in art and science, would at an early period have made themselves acquainted with its *régime*. We know that they carefully registered the height of the annual rise of its waters; such registers still remain inscribed on the rocks on the banks of the Nile, with the name of the king in whose reign they were made.‡ The people of Mesopotamia were equally observant of the *régime* of their great rivers, and took advantage, in designing their canals, of the different periods in the rising of the waters of the Tigris and Euphrates. A special officer was appointed in Babylon, whose duty it was to measure the rise of the river; and he is mentioned in an inscription found in the ruins of that city, as recording the height of the water in the temple of Bel.§ The Assyrians, who had a far more difficult country to deal with, owing to its rocky and uneven surface, showed even greater skill than the Babylonians in forming their canals, tunnelling through rock, and building dams of masonry across the Euphrates. While the greater number of these canals in Egypt and Mesopotamia were made for the purpose of irrigation, others seem to have been made to serve at the same time for navigation. Such was the canal which effected a junction between the Mediterranean and the Red Sea, which was a remarkable work, having regard to the requirements of the age in which it was made. Its length was about 80 miles; its width admitted of two triremes passing one another.|| At least one of the navigable canals of Babylonia, attributed to Nebuchadnezzar, can compare in extent with any work of later times. I believe Sir H Rawlinson has traced the canal to which I allude throughout the greater part of its course, from Hit on the Euphrates to the Persian Gulf, a distance of between four and five hundred miles.¶ It is a proof of the estimation in which such works were held in Babylonia and Assyria, that, among the titles of the god Vul were those of "Lord of Canals," and "The Establisher of Irrigation Works."**

The springs of knowledge which had flowed so long in Babylonia and Assyria were dried up at an early period. With the fall of Babylon and destruction of Nineveh the settled population of the fertile plains around them disappeared, and that which was desert before man led the waters over it became desert again, affording a wide field for, and one well worthy of, the labours of engineers to come.

Such was not the case with Egypt. Long after the period of its greatest prosperity was reached, it remained the fountain head from whence knowledge flowed to Greece and Rome. The philosophers of Greece and those who, like Archimedes, were possessed of the best mechanical knowledge of the time, repaired to Egypt to study and obtain the foundation of their knowledge from thence.

Much as Greece and Rome were indebted to Egypt, it will probably be found, as the inscribed tablets met with in the mounds of Assyria and Chaldæa are deciphered, that the later civilizations owe, if not more, at least as much, to those countries as to Egypt. This is the opinion of Mr. Smith, who, in his work describing his recent interesting discoveries in the East, says that the classical nations "borrowed far more from the valley of the Euphrates than that of the Nile."*

In the science of astronomy, which in these days is making such marvellous discoveries, Chaldæa was undoubtedly pre-eminent. Among the many relics of these ancient peoples which Mr. Smith has recently brought to this country is a portion of a metal astrolabe from the palace of Sennacherib, and a tablet on which are recorded the division of the heavens according to the four seasons, and the rule for regulating the intercalary month of the year. Not only did the Chaldæans map out the heavens and arrange the stars, but they traced the motion of the planets, and observed the appearance of comets; they fixed the signs of the zodiac, and they studied the sun and moon and the periods of eclipses.†

But to return to that branch of knowledge to which I wish more particularly to draw your attention, as it grew and spread from East to West, from Asia over Europe. Of all nations of Europe, the Greeks were most intimately connected with the civilization of the East. A maritime people by the nature of the land they lived in, colonization followed as a matter of course on the tracks of their trading vessels; and thus, more than any other people, they helped to spread Eastern knowledge along the shores of the Mediterranean, and throughout the South of Europe.

The early constructive works of Greece, till about the seventh century B.C., form a strong contrast to those of its more prosperous days. Commonly called Pelasgian, they are more remarkable as engineering works than admirable, as those which followed them were, for architectural beauty. Walls of huge unshapely stones—admirably fitted together however—tunnels, and bridges, characterize this period. In Greece, during the few and glorious centuries which followed, the one aim in all construction was to please the eye, to gratify the sense of beauty; and in no age was that aim more thoroughly and satisfactorily attained.

In these days, when sanitary questions attract each year more attention, we may call to mind that twenty-three centuries ago the city of Agrigentum possessed a system of sewers, which, on account of their large size, were thought worthy of mention by Diodorus.‡ This is not, however, the first record of towns being drained; the well-known Cloaca Maxima, which formed part of the drainage system of Rome, was built some two centuries earlier, and great vaulted drains passed beneath the palace mounds of unburnt bricks at Nimroud and Babylon; and possibly we owe the preservation of many of the interesting remains found in the brick mounds of Chaldæa to the very elaborate system of pipe drainage discovered in them, and described by Loftus.§

Whilst Pelasgian art was being superseded in Greece, the city of Rome was founded in the eighth century before our era; and Etuscan art in Italy, like the Pelasgian art in Greece, was slowly merged in that of an Aryan race. The Etruscans, like the Pelasgians and the old Egyp-

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* Rawlinson's 'Herodotus,' vol. ii., p. 278, 2nd edit.

† M. Linant's 'Mémoire sur le lac Mœris.'

‡ Lepsius' 'Discoveries in Egypt, etc.,' p. 268.

§ Smith's 'Assyrian Discoveries,' pp. 395-7, 2nd edit.

|| Herodotus, bk. ii., c. clviii.

¶ Rawlinson's 'Herodotus,' vol. i., p. 420, 2nd edit.

** *Ibid.*, p. 498.

* Smith's (G.) 'Assyrian Discoveries,' p. 451, 2nd edit.

† Smith's (G.) 'Assyrian Discoveries,' p. 451, 2nd edit.

‡ Agrigentum was a celebrated Greek city, founded B.C. 582, population 200,000 (Diodorus, 406 B.C.), drained by Phœax, who lived B.C. 480.

§ Rawlinson's 'Five Ancient Monarchies,' vol. i., pp. 89, 90, 2nd edit.

tians, were Turanians, and remarkable for their purely constructive or engineering works. Their city walls far surpass those of any other ancient race, and their drainage works and tunnels are most remarkable.

The only age which can compare with the present one in the rapid extension of utilitarian works over the face of the civilized world, is that during which the Romans, an Aryan race, as we are, were in power. As Fergusson has said, the mission of the Aryan races appears to be to pervade the world with useful and industrial arts. That the Romans adorned their bridges, their aqueducts, and their roads; that with a sound knowledge of construction they frequently made it subservient to decoration, was partly owing to the mixture of Etruscan or Turanian blood in their veins, and partly to their great wealth, which made them disregard cost in their construction, and to their love of display.

It would be impossible for me to do justice to even a small part of the engineering works which have survived fourteen centuries of strife, and remain to this day as monuments of the skill, the energy, and ability of the great Roman people. Fortunately, their works are more accessible than those of which I have spoken hitherto, and many of you are probably already familiar with them.

Conquerors of the greater part of the civilized world, the admirable organization of the Romans enabled them to make good use of the unbounded resources which were at their disposal. Yet while the capital was enriched, the development of the resources of the most distant provinces of the empire was never neglected.

War, with all its attendant evils, has often indirectly benefited mankind. In the long sieges which took place during the old wars of Greece and Rome, the inventive power of man was taxed to the utmost to provide machines for attack and defence. The ablest mathematicians and philosophers were pressed into the service and helped to turn the scale in favour of their employers. The world has to regret the loss of more than one, who, like Archimedes, fell slain by the soldiery while applying the best scientific knowledge of the day to devising means of defence during the siege.* In these days, too, science owes much to the labours of engineers and able men, whose time is spent in making and improving guns, the materials composing them, and armour plates to resist them, or in studying the motion of ships of war in a seaway.

The necessity for roads and bridges for military purposes has led to their being made where the necessary stimulus from other causes was wanting; and so means of communication, and the interchange of commodities so essential to the prosperity of any community, have thus been provided. Such was the case under the Roman Empire. So, too, in later times, the ambition of Napoleon covered France and the countries subject to her with an admirable system of military roads. At the same time, we must do Napoleon the justice of saying that his genius and foresight gave a great impetus to the construction of all works favourable to commercial progress. So, again, in this country, it was the rebellion of 1745, and the want felt of roads for military purposes, which first led to the construction of a system of roads in it unequalled since the time of the Roman occupation. And lastly, in India, in Germany, and in Russia, more than one example could be pointed out where industry will benefit by railways which have originated in military precautions rather than in commercial requirements.

But to return to Rome. Roads followed the tracks of her legions into the most distant provinces of the empire. Three hundred and seventy-two great roads are enumerated, together more than 48,000 miles in length, according to the itinerary of Antoninus.

The water supply of Rome during the first century of our era would suffice for a population of seven millions, supplied at the rate at which the present population of London is supplied. This water was conveyed to Rome by nine aqueducts; and in later years the supply was increased by the construction of five more aqueducts. Three of the old aqueducts have sufficed to supply the wants of the city in modern times. These aqueducts of Rome are to be numbered among her grandest engineering works.* Time will not admit of my saying anything about her harbour works and bridges, her basilicas and baths, and numerous other works in Europe, in Asia, and in Africa. Not only were these works executed in a substantial and perfect manner, but they were maintained by an efficient staff of men divided into bodies, each having their special duties to perform. The highest officers of state superintended the construction of works, were proud to have their names associated with them, and constructed extensive works at their own expense.

Progress in Europe stopped with the fall of the Roman Empire. In the fourth and succeeding centuries the barbarian hordes of Western Asia, people who felt no want of roads and bridges, swept over Europe to plunder and destroy.

With the seventh century began the rise of the Mohammedan power, and a partial return to conditions apparently more favourable to the progress of industrial art, when widespread lands were again united under the sway of powerful rulers.† Science owes much to Arab scholars, who kept and handed on to us the knowledge acquired so slowly in ancient times, much of which would have been lost but for them. Still, few useful works remain to mark the supremacy of the Mohammedan power at all comparable to those of the age which preceded its rise.

A great building age began in Europe in the tenth century, and lasted through the thirteenth. It was during this period that those great ecclesiastical buildings were erected, which are not more remarkable for artistic excellence than for boldness in design.

While the building of cathedrals progressed on all sides in Europe, works of a utilitarian character, which concern the engineer, did not receive such encouragement, excepting perhaps in Italy.

From the twelfth to the thirteenth centuries, with the revival of the arts and sciences in the Italian republics, many important works were undertaken for the improvement of the rivers and harbours of Italy. In 1481 canal locks were first used; and some of the earliest of which we have record, were erected by Leonardo da Vinci, who would be remembered as a skilful engineer had he not left other greater and more attractive works to claim the homage of posterity.

The great use that has since been made of this simple means of transferring floating vessels from one water level to another, in connection not only with inland navigation, but in all the great ports and harbours of the world, renders it all the more deserving of remark.

In India, under the Moguls, irrigation works, for which they had a natural aptitude, were carried on during these centuries with vigour, and more than one emperor is noted for the numerous great works of this nature which he carried out. If the native records can be trusted, the number of hydraulic works undertaken by some rulers is surprising. Tradition relates that one king who reigned in Orissa in the twelfth century made one million tanks or reservoirs, besides building sixty temples, and erecting numerous other works.‡

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* Archimedes, B.C. 287-212; killed at the siege of Syracuse by the Roman soldiers.

* Total length 250 miles; 50 on arches, 200 underground.

† "Under the last of the house of Ommiyah (750 A.D.) one command was obeyed almost along the whole diameter of the known world, from the banks of the Sihon to the utmost promontory of Portugal."—'Hallam's Middle Ages,' vol. ii., p. 120, 2nd edit.

‡ King Bhim Deo, A.D. 1174, 60 temples, 10 bridges, 40 wells stone cased, 152 landing stairs, and one million tanks. —Hunter's 'Orissa,' vol. i., p. 100,

In India, the frequent overflow of the great rivers and the periodical droughts, which rendered irrigation necessary, led to extensive protective works being undertaken at an early period; but as these works have been maintained by successive rulers, Mogul and Mohammedan, until recent times, and have not been left for our inspection, deserted and useless for 3000 years or more, as is often the case in Egypt and Mesopotamia, there is more difficulty in ascertaining the date of such works in India.

Works of irrigation were among the earliest attempts at engineering undertaken by the least civilized inhabitants in all parts of the world. Even in Australia, where savages are found as low as any in the scale of civilization, traces of irrigation works have been found; these works, however, must be taken to show that the natives were once somewhat more civilized than we now find them. In Feejee, our new possession, the natives occasionally irrigate their land,* and have executed a work of a higher class, a canal some two miles long and sixty feet wide, to shorten the distance passed over by their canoes.† The natives of New Caledonia irrigate their fields with great skill.‡ In Peru, the Incas excelled in irrigation as in other great and useful works, and constructed most admirable underground conduits of masonry for the purpose of increasing the fertility of the land.§

It is frequently easier to lead water where it is wanted than to check its irruption into places where its presence is an evil, often a disaster. For centuries the existence of a large part of Holland has been dependent on the skill of man. How soon he began in that country to contest with the sea the possession of the land we do not know, but early in the twelfth century dykes were constructed to keep back the ocean. As the prosperity of the country increased with the great extension of its commerce and land became more valuable and necessary for an increasing population, very extensive works were undertaken. Land was reclaimed from the sea, canals were cut, and machines were designed for lifting water. To the practical knowledge acquired by the Dutch, whose method of carrying out hydraulic works is original and of native growth, much of the knowledge of the present day in embanking and draining, and canal making, is due. The North Holland Canal‖ was the largest navigable canal in existence until the Suez Canal was completed; and the Dutch have just now nearly finished making a sea canal from Amsterdam to the North Sea, which, though not equal to the Suez Canal in length, will be as great in width and depth, and it involves perhaps larger and more important works of art. This country was for many years beholden to the Dutch for help in carrying out hydraulic works. In the seventeenth century much fen land in the eastern counties was drained by Dutch labour, directed by Dutch engineers, among whom Sir Cornelius Vermuyden, an old campaigner of the Thirty Years' War, and a colonel of horse under Cromwell, is the most noted.

While the Dutch were acquiring practical knowledge in dealing with water, and we in Britain among others were benefiting by their experience, the disastrous results which ensued from the inundations caused by the Italian rivers of the Alps gave a new importance to the science of hydraulics. Some of the greatest philosophers of the seventeenth century—among them Torricelli, a pupil of Galileo,¶ were called upon to advise and to superintend engineering works; nor did they confine themselves to the construction of preventive works, but thoroughly investigated the condition appertaining to fluids at rest or in motion, and gave to the world a series of valuable works on hydraulics and hydraulic engineering, which form the basis of our knowledge of these subjects at the present day.

(*To be continued.*)

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* Erskine's 'Western Pacific,' p. 171. † Seemann, p. 82.

‡ Erskine's 'Western Pacific,' p. 355.

§ Markham's 'Cieza' (note), p. 236.

‖ North Holland Canal, finished in 1825.

¶ Galileo, b. 1564; Torricelli, b. 1608.

Parliamentary and Law Proceedings.

PROSECUTION UNDER THE PHARMACY ACT.

In the Sheffield County Court, on Wednesday, August 1-25, Robert Henson, "herbalist," of 29, Fowler Street, Pye Bank, was sued by the Pharmaceutical Society of Great Britain, to recover the sum of £5, which the plaintiffs alleged he was liable to, as a fine under certain sections of the Pharmacy Act, for having sold poisons without being properly registered under the Act. Mr. Lucas, from the firm of Messrs. Flux and Co., of London, appeared for the plaintiffs, and Mr. Smith for the defence.

Mr. Lucas said the charge was that the defendant had, contrary to the provisions of the Act, sold a packet of red precipitate or oxide of mercury, which was a very acute poison, and which was often used for homely purposes. It was admitted, he believed, that the precipitate had been sold, but he thought it was intended by Mr. Smith to contend that it was sold inadvertently and without his knowledge. A large number of these cases had occurred in Sheffield, and several persons had been proceeded against, but the whole of the cases had been settled by payment except the present one.

The facts having been proved, Mr. Smith, for the defence, said that the defendant bought the precipitate from Mr. Dyson, chemist, for use in his own family. He told his wife and servant distinctly that they were on no account to sell it, but in his absence the servant-girl, who was thirteen years of age, sold a packet of it.

The defendant was called and corroborated this, and in cross-examination he said he was a herbalist.—Mr. Lucas: Will you tell me what that is? Defendant: It is one who is skilled in herbs.—What do you mean by being "skilled" in herbs? I have a knowledge of herbs, and when they are growing I can point out the different herbs and the applications to which those herbs might be put.—Do you mean medically? Yes; as a curative agent in cases of disease.—You said just now very boldly that you did not keep a shop for the sale of poisons. Now, are not herbs poisonous in the majority of instances? I sell none that are poisonous. I don't sell any herb which is poisonous within the meaning of the Act, such as belladonna and aconite. I bought the red precipitate for the use of my family.

Mr. Dyson, chemist, proved the selling of ths precipitate to the defendant, and in answer to a question from his Honour, he said that it was his candid opinion at the time of selling it, that it was intended to be made into ointment and sold in the defendant's shop. The defendant, however, said it was for his own use.

The defendant's wife was called and corroborated his evidence. The servant alluded to was also called, and admitted having sold castor-oil, Epsom salts, and other drugs.

His Honour said he would consider the case, and give judgment at his next court, on the 7th October.—*Sheffield Evening Star.*

The following journals have been received:—The 'British Medical Journal,' Aug. 21; the 'Medical Times and Gazette,' Aug. 21; the 'Lancet,' Aug. 21; the 'London Medical Record,' Aug. 21; 'Medical Press and Circular,' Aug. 21; 'Nature,' Aug. 21; 'Chemical News,' Aug. 21; 'Gardeders' Chronicle,' Aug. 21; the 'Grocer,' Aug. 21; 'Journal of the Society of Arts,' Aug. 21; 'Grocery News,' Aug. 21; 'Produce Markets Review,' Aug. 21; 'Practical Magazine,' for August; 'Educational Times,' for August; 'British Journal of Dental Science,' for August; 'Journal of Applied Science,' for August; 'American Journal of Pharmacy,' for August; 'Moniteur Scientifique,' for August; 'Pharmaceutische Zeitung,' for Aug. 18 and 21; 'Sanitary Record,' Aug. 28.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

CHLORAL AS AN ANTIDOTE TO STRYCHNIA.

Sir,—In confirmation of Mr. J. G. Candy's testimony as to the remarkable effects of chloral hydrate, last summer there was a mania in this district for dog poisoning, the favourite drug being strychnia, in form of vermin-killers, mercurials in some instances being employed. My own dog was one of the unfortunates, and when I was called to see her she was to all appearance dying from strychnia poisoning, and although we had no hope of her recovery, with difficulty we succeeded in administering about 30 grains of chloral hydrate in solution. In a few minutes the effect was marvellous, and although she had several slight relapses of the tetanic convulsions, a second dose of about 10 grains administered about an hour after the first had the effect of throughly subduing them, and before the day was over she was a marvel to ourselves and others.

As the dog poisoning still continued, and our own case being well made known, we had many opportunities of trying the remedy, and with exceptions of a few instances in which distance and the non-discovery of the mischief until the vital powers were too much exhausted to permit of recovery, success was most marked, relief being given in all cases; in most perfect recovery.

W. S. GREAVES.

Ironville, August 21, 1875.

THE PROPERTY IN PRESCRIPTIONS.

Sir,—In your last issue you invite opinion upon the above subject.

Mr. Bidwell, in his letter, inclines to the opinion that a prescription is a confidential communication from the prescriber to the dispenser, and that the latter is entitled to retain the original, subject to giving a copy to the patient.

This may be quite correct as regards practice in America, but I do not think that it applies to practice in this country.

A patient may consult a medical man, who may give him a prescription, at the same time telling him to take it either to his own surgery or to a certain pharmacy where he will be supplied with the necessary medicine; if to the latter, in all probability there is a pecuniary arrangement between the pharmacist and himself, and in either case the patient may not be entitled either to a copy of the prescription or a repetition of the medicine without again consulting his doctor, and probably paying another fee. In this case the prescription is clearly a confidential communication from the prescriber to the dispenser, and any further appropriation of it on the part of the latter without permission from the former constitutes a breach of trust.

This class of practice is mostly confined to general practitioners, who either directly or indirectly supply the medicine themselves, and the fee usually includes the charge both for the medicine and the advice.

Again, a patient may consult a physician who, after investigating his case, writes him a prescription and receives in return a fee of one guinea, or any other sum which he may consider an equivalent, and each professes to be satisfied with the exchange. The physician may possibly recommend his patient to go to a certain pharmacist merely because he knows that his prescription will be faithfully dispensed, but not for any pecuniary advantage to himself. He has now parted with all future right in the prescription, just as much as his patient has parted with his interest in the fee which he paid for it; it is exclusively the patient's property to make any use he likes of it, and it is not in the least a confidential communication to the pharmacist, as the latter may be a man whose existence is altogether unknown to the prescriber, and it is not usual to write confidential letters to unknown individuals. As is customary, the pharmacist who dispenses the prescription copies it into his prescription book (a voluntary act on his part, but found from experience to be almost a necessary one) and returns the original document to its rightful owner. If at any time the owner should request a copy for himself or a friend, it will be to the interest of the pharmacist to oblige him with one, and I do not think that he can reasonably expect a fee, seeing that it entails no greater sacrifice for the accommodation of his customer than he originally imposed upon himself by retaining a copy for his own convenience.

In this case, the pharmacist becomes the confident of the person who entrusts him with the prescription, and not of the prescriber; and if he appropriates it either for the benefit of himself or others without the owner's permission he is guilty of a flagrant breach of trust. As regards the interest in the advice about the diet, I think it need not be discussed, as it is not likely to be the subject of a dispute so long as the butcher is punctually paid for his mutton chops.

JAS. SWENDEN.

Darlington.

Sir,—I enclose an extract from a paper read before the Rochdale Chemists' Association, on "Medical and Pharmaceutical duties," which bears on the subject of the "Property in Prescriptions." In my opinion a thorough understanding must be come to on this head before the dispensing of medicines generally will be handed over to the chemists.

"It must be borne in mind that the prescriptions then should be retained by the dispenser and there would be the time and expense saved in copying them. In order to meet the requirements of the Pharmacy Act it would be necessary to preserve them, this could be done by pasting them in a book. This brings us to another part of the subject, and that is the great necessity there would be for the dispenser to act in good faith towards the prescriber. It would have to be thoroughly understood that medicines were not to be repeated, except on the written instructions from the medical adviser. Otherwise the arrangement might work injuriously both to the prescriber and his patient alike. There might be some who would call in their medical man, and after getting his prescription have the medicine prepared from it time after time without further consultation, and would thus deprive him of his usual fees, and just as likely take a quantity of medicine which did them more harm than good. They might also get the medicine prepared for their friends, thinking that they were suffering from the same disease, but we all know that it requires much study and experience to form a proper diagnosis. In this the members of the medical profession might not be losers, and undoubtedly the chemists would be gainers, but it would be no less a breach of faith towards the prescriber and probably an injury to the customer. There would be a difficulty as regards the prescriptions of physicians practising as such at present. People now pay them one, two, and three guineas and have the medicine dispensed according to the prescription for generations. But even these should come under a similar rule as regards being repeated. There are cases when the patient travels a long distance to consult some eminent physician, and when, in the prescriber's opinion it is not necessary to see the patient for weeks. In cases of this sort the prescriber might order the medicine to be repeated for a stated period."

P. Q. R.

August 24, 1875.

J. W. Yeats—Mineral naphtha, rock oil, and petroleum are synonymous terms. Benzoline is the more volatile portion of petroleum.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ*. A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Johnson, Mr. Jarvis, Mr. Sheppard, Mr. Rimmington, Mr. Stephens, Mr. Jones, Mr. Harley, Mr. Christmas, Mr. Hustwick, Thirty Years M.P.S., Helena, G.

THE INDIA MUSEUM AT SOUTH KENSINGTON.

(Continued from page 102.)

The number of non-official drugs in the India Museum is very large and includes many curious substances concerning some of which a certain amount of mystery still exists. As instances of these may be mentioned a blackish, wrinkled substance called "mucherus." At first sight it looks like a piece of dried fruit, but when broken open it has the appearance of an extract. It has been considered by some to be the gum of a tree and by others to be a kind of gall growing on the *Areca catechu*, but nothing certain is known of its origin.

Another drug, called "safed musli," occurring in small pieces, consists of a pale root somewhat resembling in appearance the rhizome of Solomon's seal, and has been variously referred to *Asparagus sarmentosus*, L., *Curculigo orchioides*, Gaertn., and *Bombax malabaricum*, DC., is chiefly interesting on account of being sometimes sold under the name of "utees," and in this way becoming substituted for the more valuable drug, atis (*Aconitum heterophyllum*, Wall.).

Next in order to these, and belonging to the same natural order as guaiacum, will be found some singular prickly little fruits which are much esteemed in Southern India as a diuretic. This drug is there known under the name of "nerinji," and is the fruit of *Tribulus lanuginosus*, L. It is used also in China for similar purposes, and is said by Hanbury to have been formerly official in Europe. It is supposed that the Chinese derived the form of the caltrops, the spiked iron instrument which they throw on the ground to hinder the march of an enemy, from these remarkable fruits.

The rue family is represented by several drugs. The small pungent fruits of *Zanthoxylon alatum*, Roxb., and other species, consist of a small split carpel containing one polished black seed; the husk or carpel has a very pleasant taste somewhat resembling that of lemon or citron. Harmel seed (*Peganum Harmala*, L.) has long been used in the East as an emmenagogue and anthelmintic, and in Morocco as a disinfectant and charm against the evil eye; it is remarkable for its general resemblance in size and shape to the seeds of *Nigella sativa*, L.

Another drug, which in appearance closely resembles gum arabic, and is said by Hanbury to form a portion of the East Indian gum of commerce, is the produce of *Feronia elephantum*, Cor. The fruit of this tree somewhat resembles Indian Bael in appearance, but has a more terebinthinous taste. In accordance with the views of those botanists who group the Aurantiaceæ and Rutaceæ together, this tree is placed in the Indian Pharmacopœia in the latter family.

A remarkable substance, having the appearance of an extract or gum resin, and the chemical composition of which deserves investigation, is derived from the *Ailanthus malabarica*, D.C., a tree belonging to the quassia family. The drug is known under the name of "matti-pawl;" it is used in dysentery and as incense, and has been considered to be an excellent stimulant in bronchitis. Another tree belonging to the same genus, *A. glandulosus*, is remarkable for being the food of the silkworm moth (*Bombyx Cynthia*), although other insects will not eat the leaves.

In the same case may be observed several specimens of the Indian bdellium or gúgul, which is one of the substitutions used in India for true myrrh and occasionally sent over to this country. It has a more sticky appearance than true myrrh and a somewhat cedar-like odour, and is usually made up in great measure of aggregated small grains.

The mastich family yields several interesting drugs. Kakra-singhi is the name applied to the remarkable galls of *Rhus succedanea*, L. These are of a reddish tint, hollow, thin, cylindrical, somewhat contorted, and as long as the fore-finger. Another curious gall, the native name for which is "gul-i-pista," is pear shaped, also of a reddish tint, and hollow, but much smaller than the last, being only half an inch in length. It is formed upon the *Pistacia Khinjuk*, Stocks, a tree which, as well as *P. Cabulica*, Stocks, yields a resin closely resembling mastich, and is used in Scinde and Persia for the same purpose. The sample exhibited consists of smaller grains than true mastic, and is of a deeper yellow colour.

The curious stones or endocarps of the mango fruit next attract attention from their singular appearance, looking as they do, owing to the dense fibrous covering which they possess, like the large cocoon of some insect. The fruit or drupe is to the natives of India what the peach is to Europeans, but it is the kernel of the drupe which is valuable in a medicinal point of view, this being used both in India and Brazil as a vermifuge, chiefly for lumbrici. The powdered seed is taken in doses of 20—30 grains. The seeds are also useful for hæmorrhoids on account of the quantity of gallic acid they contain.

Also belonging to the same natural order (Anacardiaceæ), will be noticed the kidney shaped fruits, known as cashew nuts, or sometimes as monkey nuts (*Anacardium occidentale*, L.), which are occasionally to be seen in the shop windows of seaport towns in this country. These nuts, as well as the flat black fruits of the *Semecarpus anacardium*, L., or marking nuts, which often come over to this country mixed with Myrabolans, contain between the inner and outer layer of the shell or pericarp, a remarkably caustic blackish oily fluid which is apt to blister or greatly inflame the lips of those who attempt to crack the nuts. In persons of erysipelatous tendency the inflammation is often considerable, and even dangerous. This acrid oily liquid forms an excellent marking ink, which when first used writes brown, but afterwards becomes black. The writing may be turned black at once by the addition of ammonia. Possibly the sap of the tree might answer the same purpose for marking ink, and could be obtained more easily and in larger quantity. Liquor plumbi is said to be the best application to allay the irritation caused by the juice of the nut, but a strong decoction of teak wood, or of *Lobelia inflata* is worthy of trial. The latter plant is said to allay the irritation caused by *Rhus toxicodendron*, a plant of the same family as the Cashew nut.

The black varnish, or "thit-tsi," of the Burmese, a viscid fluid of the consistence of treacle derived from the *Melanorrhœa usitatissima*, Wall., is deserving of chemical investigation. The juice when fresh is greyish, but turns black in the air, and is apt, like that of other plants of this order (Anacardiaceæ), to cause erysipelatous swellings which may, however, be removed by an infusion of teak wood. For this purpose the wood is rubbed down into a paste with water on a stone. The native varnish is used as a lacquer and as a substitute for gold size. Its chief disadvantage is that it takes very long in drying. It mixes well with benzol and gold size, but turpentine is apt to turn it brown. This substance is also used as a vermifuge and is said to expel the worms in a lifeless state. It is usually given mixed with an equal quantity of honey, but its nauseous taste and the large quantity which it is necessary to take (one to three tablespoonfuls) render its use rather objectionable. If the active principle could be separated in a concentrated state it might possibly form a valuable remedy.

The gum of *Odina Wodier*, Roxb., which looks like small dirty gum arabic, resembles that substance in its properties, but on account of its also possessing some astringency is used as a gargle. For the same reason it might perhaps form a useful substitute for gum arabic in the manufacture of ink.

The root of *Moringa pterygosperma*, Gaertn., belonging to the small natural order, Moringaceæ, is remarkable for having the taste and smell of the horseradish, and for this reason the tree goes by the name of the "horseradish tree." The root is used as a rubifacient and vesicant, but its application causes great pain. The seeds are about the size of a large pea, and have three angles, each with a white papery wing, giving them a striking appearance. The leaves, flowers, and young seed vessels are said by Decaisne to be eaten by the natives in their curries. From a nearly allied species (*M. aptera*, Gaertn.) is obtained the oil of ben, which is said to be the basis of Rowland's macassar oil, and is used by watchmakers on account of its fluidity and its property of not readily turning rancid.

(*To be continued.*)

SNOW-WHITE SALICYLIC ACID.*

BY DR. AUG. RAUTERT.

It is well known that the salicylic acid prepared by Kolbe's process does not possess a pure white colour, but is more or less yellow. The salicylic acid manufactured and furnished to the trade by Dr. F. von Heyden, in Dresden, according to the above patent, is a whitish powder with a strongly yellow hue, from which by recrystallization tolerably coloured crystals are obtained. Kolbe himself says that, in order to obtain snow-white salicylic acid, the crude acid should be converted into an ether by the usual method, and this again decomposed by caustic soda, and so on, However, the boiling point of the ethylic as well as the methylic ether is so high that at this temperature a portion of the salicylic acid begins to decompose. For my part, I have never succeeded in obtaining in this way more than one-fourth of the quantity of salicylic acid originally employed in the form of a chemically pure product.

As the use of salicylic acid for medicinal and surgical purposes is constantly increasing, a method of purification whereby the yield is much larger and almost the entire quantity of salicylic acid present can be separated from its coloured impurities with little trouble and at a small expense, will be welcome. Salicylic acid, we know, cannot be sublimed without decomposition. It splits up into carbonic and carbolic acids. On the other hand, salicylic acid volatilizes in a space filled with any gas or vapour at a temperature far below its boiling point, and even far below its melting point. If the vapour from a boiling aqueous solution of salicylic acid be condensed, it readily gives the reaction of this acid; and if salicylic acid is exposed to a current of air heated to 212° Fah., it rapidly loses weight.

I made use of this phenomenon in the process here described for the preparation of pure salicylic acid, and found, after many unsuccessful experiments, that superheated steam was best adapted to the distillation of salicylic acid. For this purpose I had made a little double-walled copper boiler, by placing two copper tubes of unequal diameter, one within the other, and closing the ends with plates of copper soldered with hard solder. The space between the two tubes was filled through a suitable opening with melted paraffin, and in this opening was placed a thermometer so that I could continually observe the temperature. The interior of this double boiler held the crude salicylic acid, and to the highest part were attached two tubes. One tube served to introduce the superheated steam; through the other the boiler was filled with crude salicylic acid, and it afterwards served as exit for the steam laden with acid. This tube should have a diameter of at least 0·6 inch, because otherwise it is easily stopped up by the escaping salicylic acid. The double-walled boiler used in my experiments was so large that I could operate on about as much as two pounds of crude acid at one time. To the last-mentioned tube of at least 0·6 inch diameter, is attached a straight tin tube of the same width, passing through a Liebig's condenser and kept always cold. On the upper end of the tin tube, where it is connected with the copper boiler, a small lead tube with a funnel is soldered on; and through this, cold distilled water is allowed to drop continually during the distillation.

When the apparatus is all arranged, the boiler is heated until the thermometer in the paraffin marks 338° Fah. Superheated steam at 338° Fah. is allowed to enter the interior space through the narrower tube. This steam is generated in a glass flask of $3\frac{2}{3}$ pints capacity, and is superheated by passing it through a long thin lead pipe coiled in an iron pot containing paraffin, which is heated to 338° Fah. As soon as the crude salicylic acid has acquired the temperature of the surrounding paraffin, which always takes some time, its distillation begins, the acid passing off with the accompanying steam so rapidly that the tin tuble would be stopped up very soon, in spite of the continually dropping water, unless the pipe is continually cleared by means of a glass tube, or, better still, a split stick of well-boiled pine wood, which reaches all the way to the boiler. The salicylic acid appears at the lower end of the tin cooling pipe as a thick magma of snow-white colour, and is caught in a beaker glass placed under it. At the close of the operation the temperature of both paraffin baths is raised to 365° Fah. In about two hours the operation is finished. Only a slight black resinous residue remains in the boiler. The salicylic acid which goes over has only a slight odour of carbolic acid. By pressing out the crystalline mass, boiling it in distilled water and recrystallizing, it is easily freed from the carbolic acid. By recrystallization from distilled water (well water, or a filter which has not been washed with hydrochloric acid, contains enough iron to impart to it a reddish colour), it can be obtained in beautiful, absolutely white crystals. One must not neglect to carefully clean the tin tube with ether before beginning the operation, to remove the grease that always accompanies the manufacture.

In the manufacture on a large scale high pressure steam could be substituted for the paraffin baths. In high pressure steam itself, employed directly, the salicylic acid scarcely distils at all. I tried, among other things, to distil the acid by the direct action of steam at a pressure of five atmospheres, at which pressure the temperature is 320° Fah., but did not succeed; the steam scarcely carried a trace of acid with it. Evidently the boiling point of the acid was correspondingly raised by the increased pressure. I conjecture that the distillation of salicylic acid under diminished pressure, say half an atmosphere, would take place still more readily.

I would further recommend a stirrer for the salicylic acid boiler, so as to give it more opportunity for contact with the vapour passing through it.

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* From the *Polytechniehes Notizblatt* (*Pharmacist* for August).

The Pharmaceutical Journal.

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SATURDAY, SEPTEMBER 4, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

REPORTS OF THE GOVERNMENT VISITORS UPON THE SOCIETY'S EXAMINATIONS.

THE relief from the necessity for discussing " harrassing legislation," which the rising of the House has afforded to the Council of the Pharmaceutical Society, was manifest on Wednesday, in the small attendance of members and light " agenda." Nevertheless, the account of the meeting, which will be found on p. 184, contains matter of primary interest to pharmacists, since it includes the first reports which the Government Visitors have made upon the Society's examinations since the late alteration in the regulations came into force.

The close interest in this subject that has been evidenced in former reports by these gentlemen would lead us to expect that the large proportion of failures that marked the examinations during a portion of last year would be commented upon. As these failures have been at various times the subject of almost angry comment by correspondents, it will probably be useful to direct attention to the judgment that is passed upon them by the representatives of the public at these examinations.

Dr. GREENHOW, the visitor at the London Board, points out that the per-centage of failures in the Preliminary examination rose from 38 per cent. in 1872 to upwards of 50 per cent. last year. Admitting that part of this result may have been due to candidates prematurely attempting to qualify themselves for passing the Minor before the new requirements, he broadly claims that the failures have been mainly due to changes in the examinations themselves. But how necessary he considers those changes to have been, may be gathered from his remark that the large increase in the proportion of failures that has taken place since the changes made in the system of marks with the view of securing a better knowledge of Latin seems to him the fullest justification for the course adopted. Latin however does not appear to be the chief stumbling-block in Scotland, and Dr. MACLAGAN calls attention to the somewhat unexpected fact that whilst there only 21·5 per cent. failed in Latin, no less than 78 per cent. failed in arithmetic. In Scotland however, last year the total failures in the Preliminary only amounted to 43 per cent., and since it appears that, with the same papers, 52 per cent. failed in England and Wales, this fact may throw some light upon the question mooted by Mr. GREENISH at the commencement of the meeting last Wednesday. But with respect to arithmetic, Dr. MACLAGAN says he has no intention to suggest that the standard of the questions should be lowered, and he thinks the English and Latin papers "do not err on the side of severity." Dr. GREENHOW speaks with approval also of the decision to depute the practical conduct of the Preliminary examination to the College of Preceptors.

Alluding to the proportion of failures to pass the Minor examination during 1874 (69·38 per cent.), Dr. GREENHOW states that the examinations were exactly the same as in previous years, and he expresses himself as being satisfied that nothing in the mode of conducting the examinations contributed to the large proportion of rejections. He attributes the result entirely to a great many youths, quite incompetent to pass, having presented themselves with a view of avoiding the practical examination in chemistry and the restriction as to age which was shortly to come into force. With this opinion Dr. MACLAGAN evidently coincides.

Both the Visitors speak with approval of the introduction of practical work into the Major examination under the new regulations. Dr. GREENHOW says it is obvious that this practical work is much better test of a candidate's qualification for the business of a chemist and druggist than any written examination can be. He notes also that candidates find no difficulty in accommodating themselves to the change, and points out that the proportion of failures in the Major examination has fallen from 43 per cent. in 1872 to 26 per cent. in 1874.

The general terms of these reports must, we should think, prove eminently satisfactory to the Board of Examiners. It is true that Dr. MACLAGAN suggests that greater finish both in Latin and Practical Chemistry is desirable. But like his colleague he endorses in the most perfect manner the past action of the Board. Dr. MACLAGAN also reverts to the subject of the use of the microscope at the examinations, and whilst he defers to the objections raised in " some quarters," he argues cogently for making the use of the microscope a portion of at least the Major examination. In this opinion we doubt not that he will find general concurrence. In fact the objections that have been raised, so far as we have understood them, appear to have been directed, not against the use of the microscope as being a fit subject of examination, but against its being sprung upon a candidate unexpectedly, and thereby unfitting him for coping with difficulties he expected to meet. Evidently the introduction of this and cognate subjects is only a question of time; meanwhile the successive favourable reports of the Government Visitors will strengthen the hands of the Board in attaining that end, and thus they afford ground for congratulation to all who have the progress of pharmaceutical education at heart.

THE CONFERENCE EXCURSION.

THE proceedings of the Pharmaceutical Conference for 1875 were on Friday brought to a happy termination by an excursion to Wells and Cheddar, in which about one hundred ladies and gentlemen took part. The good management and consequent success which have been noticeable throughout the whole of this year's meeting were manifest to the close. An examination of the cathedral and a short ramble through the BISHOP'S grounds at Wells were followed by three or four hours' wandering through the caves and gorge at Cheddar. After this the company met in the station for refreshment, when the Bristol pharmacists again proved their hospitality to their guests. Sundry toasts given and responded to, including a well-deserved one to Mr. PITMAN, the local secretary of the Conference, brought round the time for a return home at the close of a most enjoyable day.

THE BRITISH ASSOCIATION.

THE meeting of the British Association at Bristol, the commencement of which we chronicled last week, closed on Wednesday last. On the whole it has been a very successful gathering. The number of tickets issued has been 2232 against 1938 last year at Belfast. Besides some interesting addresses of Presidents of Sections, there have been several able papers, abstracts of some of which we hope to present to our readers. Lectures have been delivered by Dr. CARPENTER, on "A Piece of Limestone," and by Mr. SPOTTISWOODE, on the "Colours of Polarized Light." Further, there were two successful soirées in the Colston Hall, one mainly devoted to microscopy and the other to electricity. At the concluding meeting, after the usual votes of thanks, it was decided to meet in Glasgow on the 6th of September, 1876. The President-Elect for the year is Sir ROBERT CHRISTISON. Plymouth has been chosen for the place of meeting in 1877.

THE DENTAL PROFESSION.

NOW that Conferences are the order of the day, it is not surprising to learn that so aspiring a body of men as the dentists have met to confer as to the future position of their profession. On Tuesday last a considerable number of gentlemen residing in Manchester, with several representatives from other parts of the kingdom, met for this purpose in that city under the presidency of Mr. CHARLES JAMES FOX, the Editor of the *British Journal of Dental Science.* The CHAIRMAN claimed that protection is required for the "legitimate dentist" against the men, who without the least previous training are daily entering their names in the public directories as surgeon-dentists. This he proposed to effect by registration and the passing of an Act, providing that no unregistered person should be able to recover fees as a surgeon dentist. The suggestion naturally met with the approval of all present, and a resolution was passed authorizing the opening of a subscription list for defraying the expenses of an appeal to Parliament.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, September 1st, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present — Messrs. Greenish, Hampson, Hanbury, Mackay, Rimmington, Robbins, Shaw, and Williams.

The minutes of the previous meeting were read and confirmed.

NORTH BRITISH BRANCH.

In accordance with the recommendation of the Council of the North British Branch, Mr. Robert Stenhouse was appointed Assisting Secretary, Librarian, and Curator of the branch, at a salary of £120 per annum, and to find security for £150, his duties to commence on October 1st.

Mr. GREENISH took the opportunity of Mr. Mackay being present, of asking if he could give any explanation of the fact which was continually forced upon the attention of the Council, that the number of candidates who passed the Society's examinations in Edinburgh was relatively much larger than in England.

Mr. MACKAY said this question had been brought forward again and again, and it placed him in a somewhat awkward position to be called upon to explain it. He could only say that deputations had more than once visited Edinburgh for the purpose of inquiring into the mode of conducting the examinations there, and ascertaining whether they were similar in all respects to those which took place in London. Their report had been made to the Council, to which he begged to refer Mr. Greenish, since he could only add that so far as he had observed, the only desire of every member of the Edinburgh Board was to test most fully and thoroughly the qualifications of the candidates. If more candidates passed in Edinburgh than in London, he could only suppose it was because they were better prepared. With regard to the Preliminary examinations, their conduct would soon be in the hands of another body, and the results of that change might be more satisfactory to those who had any doubt in the matter.

Mr. GREENISH said this was a question of great importance, and was continually being asked out of doors. It seemed to him that no one could avoid coming to the conclusion that students passed more easily in the north than in England, though he by no means wished to reflect in any way on the Edinburgh Board of Examiners; it was quite possible that the Examinations in London were too stringent.

The PRESIDENT thought the state of things which had been referred to might arise from the undoubtedly better state of general education in Scotland, especially amongst the middle and lower classes. Although Mr. Greenish's remarks did not apply, as he understood, so much to the Preliminary as to the Minor and Major examinations, still a man who possessed a good groundwork of primary education was much better qualified to apply his mind to the subjects in which he was afterwards examined.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

Green, George	Ryde.
Wyles, William	Market Deeping.

Chemists and Druggists.

Clemishaw, Joseph	Hounslow.
Greaves, Frederick W.	Ashbourne.
Ellis, Walter	Thornbury.
Morley, Edward	254, Upper Street, Islington.
O'Neill, James	Southbank.
Spill, Thomas	Bristol.
Waterhouse, Thomas	Uxbridge.

ASSOCIATE IN BUSINESS.

William Davie Ground having passed the Minor examination, and being in business on his own account, was elected an "Associate in Business" of the Society.

ASSOCIATES.

The following having passed the Minor examination were elected "Associates" of the Society:—

Galloway, James Barker	Liverpool.
Hooper, William	Yokohama.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Glanville, George	London.
Newling, Arthur John	Croydon.
Pritchard, Morris	Liverpool.
Sutton, George Curtis	Salisbury.

Two individuals were restored to their former status in the Society, upon payment of the current year's subscription and a fine.

FINANCE.

The minutes of this Committee were read and confirmed, and sundry accounts ordered to be paid.

REPORTS OF THE GOVERNMENT VISITORS ON THE SOCIETY'S EXAMINATIONS, 1874.

The SECRETARY read the following communication which had been forwarded to the Society from the Medical Department of the Privy Council:—

"Medical Department, Privy Council Office,
"21st August, 1875.

"Sir,—I am directed by the Lords of Her Majesty's Council to transmit to you, for the information of the Pharmaceutical Society, the accompanying copies of the Reports which have been made to their lordships by Dr. E. Headlam Greenhow and Dr. Maclagan respectively, upon the examinations conducted by the Pharmaceutical Society in London and Edinburgh during the year 1874.—I am, Sir,

"Your obedient Servant,
"EDWARD C. SEATON.

"The Registrar, Pharmaceutical Society,
"Bloomsbury Square, W.C."

[Copy.]

Report on the Examinations of the Pharmaceutical Society, held in London during the year 1874.

"The Board of Examiners of the Pharmaceutical Society held, during the year 1874, four meetings for the First, or Preliminary examination of candidates in Latin, English, and Arithmetic, and forty-two meetings for conducting the technical examinations.

"At the Preliminary examinations 1121 candidates presented themselves, of whom 536 passed, and 585, or about 52·18 per cent., failed. The proportion of failures, therefore, which in 1873 was larger than in any previous year, has undergone a further increase during the past year. In 1872 the proportion of failures was 38 per cent.; in 1873 it was 48 per cent.; and during last year, as I have said, it rose to upwards of 52 per cent. The increase in the proportion of failures at these examinations in 1874 was coincident with the changes, noticed in my last Report, in the regulations with respect to the minimum or passing number of marks in each of the separate subjects of the examination, and I believe that the increased number of rejections both in 1873 and also during the past year, has been mainly due to the effects of those changes on the passing of candidates; though, at the same time, it is not improbable that the desire to qualify themselves for undergoing the Minor examination before the new requirements, with respect to practical testing and the attainment of the age of 21 years, should come into force, may have induced a more than usual number of young and weak candidates to present themselves for the Preliminary examination during the past two years. The standard of this examination is certainly not higher than is absolutely necessary in order to secure a reasonable degree of competency in the candidates, more especially in reading prescriptions written in the Latin language; and, as it is manifestly essential to secure such competency in persons whose business will largely consist in compounding prescriptions, the standard could not properly be lowered with reference to this subject. On the contrary, the large increase that has taken place in the proportion of failures at these examinations, since the changes made in the system of marks with the view of securing a better knowledge of Latin, seems to me to be the fullest justification of the course adopted by the Examiners in this respect.

"Whilst writing this report I am informed that the Council of the Pharmaceutical Society have it in contemplation to depute the practical conduct of the Preliminary examination to the College of Preceptors, an arrangement which would, in my view, be an eminently satisfactory one.

"At the technical examinations 65 candidates presented themselves for the Major examination. Of this number 48 passed, and were registered as pharmaceutical chemists, and 17, or 26·15 per cent., were rejected.

"The Major examination must be regarded in the light of a voluntary honour examination, since the higher qualification obtained by passing it is not necessary for carrying on business as a chemist and druggist; and, in fact, hitherto only a comparatively small proportion of those who have passed the Minor or qualifying examination have subsequently presented themselves for the higher test of the Major examination. Small, however, as is the number of candidates for this examination, it is satisfactory to observe that an increasing proportion of those who offer themselves are successful in passing it.

"The largest proportion of failures was in the year 1872, when candidates for the Major examination were for the first time required to give proof of their practical knowledge of chemistry by correctly analysing a certain number of preparations placed before them, instead of only being required, as heretofore, to write answers to a series of questions. It is obvious that this practical work is a much better test of a candidate's qualification for the business of a chemist and druggist than any written examination can possibly be, for it implies in all the successful candidates a degree of practical knowledge and skill which can only have been acquired by considerable personal experience; whereas the theoretical knowledge sufficient for answering questions was no doubt frequently crammed from text-books for the occasion, and probably often forgotten again when it had served its purpose. The results of this change in the mode of conducting the Major examination seems also to show that candidates have found no material difficulty in preparing themselves for the more searching and practical examination they are now required to undergo; for although in 1872, the first year of the change, the proportion of failures was above 43 per cent., it fell in 1873 to 33 per cent., and in 1874 was scarcely above 26 per cent.; whereas in 1871, the year before the change, the proportion of failures was 30 per cent.

"For the Minor examination the very large number of 980 candidates presented themselves during the year 1874, but only 300 of that number were able to satisfy the examiners of their competency, and no less than 680 or 69·38 per cent. were rejected.

"The examinations were in all respects the same as in previous years, and I satisfied myself that nothing in the mode of conducting them contributed to the very large proportion of rejections. It had, however, been announced in December, 1872, that after October 1st, 1874, a certain amount of examination in practical chemistry, conducted in the laboratory, would be substituted for the previous *vivâ voce* examination, and that, after December 31st, 1874, no candidate would be admitted to the Minor examination who had not attained the full age of 21 years. The result of these announcements has been that a great many youths quite incompetent to pass have presented themselves for the Minor examination during the two last years, apparently in the hope of obtaining the qualification for registration as Chemists and Druggists before the new regulations should come into operation. During the spring and summer of 1874, especially, an extraordinary number of young and ignorant candidates came before the Examiners, with the necessary result that by far the larger proportion of them were rejected. During the month of July alone, no less than 303 candidates presented themselves for the Minor examination, of whom only 90 passed, and 213, or 70 per cent., failed.

"The number of candidates for the Modified examination—provided for such persons as should have produced to the Registrar of the Pharmaceutical Society, previous to December 31st, 1868, certificates showing that they were of full age and had been actually engaged for three years in dispensing and compounding prescriptions as assistants—continues to decrease considerably from year to year. Only 61 candidates presented themselves for this examination during the year 1874, and of these 33 passed and 28, or nearly 46 per cent. were rejected.

"This is also a somewhat larger proportion of failures than in previous years, but it was to be expected that the most competent candidates would be the first to avail themselves of the opportunity offered them, and that those who felt themselves weak in any of the subjects of the examination would be inclined to delay their trial as long as possible.

"It being manifestly most desirable that the examinations conducted by the Pharmaceutical Society in England and Scotland respectively should be as nearly as possible identical in character and requirements, Dr. Maclagan, the Government Visitor of the examinations in Edinburgh, was requested by the Medical Officer to the Privy Council to attend one of the London examinations, and I was in like manner requested to be present at one of the examinations in Edinburgh during last year.

"Dr. Maclagan made his visit in March, and was accompanied by two members of the Edinburgh Board of Examiners. Dr. Maclagan stated in his last year's Report that he and the two gentlemen who accompanied him were well satisfied with the result of their visit, and I am of opinion, from the conference I held with them on that occasion, that their visit was very desirable, and will tend to secure more complete uniformity in the mode of conducting the examinations in the two divisions of the United Kingdom.

"My visit to Edinburgh was made in the last week of July, when I was present at the examinations held on two successive days. I found that since the Conference in London, some alterations had already been made in the arrangements for conducting the examinations, and I was impressed with the belief that the Edinburgh Board of Examiners were most desirous to carry out the regulations of the Pharmaceutical Society, and to render their examinations as perfect as possible.

"The mode in which the Edinburgh examinations were conducted, as regards strictness, fairness, and consideration for candidates appears to me to merit the same approval which I have always felt bound to express with reference to the conduct of the examinations in London.

"(Signed) E. HEADLAM GREENHOW.

"14a, Manchester Square,
"March 31, 1875."

[Copy.]

Dr. Maclagan's Report on Examinations by the North British Branch of the Pharmaceutical Society of Great Britain.

"Edinburgh, 21st April, 1875.

"Since the date of my report of 5th May, 1874, I have visited the examinations on Thursday, 28th May, 1874; Tuesday, 28th July, 1874; Wednesday, 29th July, 1874; Monday, 7th December, 1874; Wednesday, 27th January, 1875. Dr. Greenhow was present at the examinations in July.

"Nothing which I have seen during the past year, has led me in any way to modify the opinion which I had the satisfaction of expressing last year, that the examiners continue to discharge their duties satisfactorily, and that their decisions upon the appearances made by candidates are properly proportioned to their merits.

Preliminary Examinations.

"The papers given in at these examinations are always placed at my command so that I can look them over at leisure. The total number of candidates was 118, of whom 67 passed, and 51 failed. This proportion of failures (43·2 per cent.) is almost the same as that of the last two years. Several of these candidates failed in more than one subject, but the following numbers show the proportion of failures in the three separate departments of examination:—

English 7	13·7 per cent.
Latin 11	21·5 "
Arithmetic 40	78·4 "

"Last year I had occasion to note the large proportion of candidates who failed to satisfy the examiners in the important department of arithmetic, and the small number of marks obtained in this department by successful candidates, as compared with those gained in Latin and English. I did not attempt to draw any conclusions from the facts then stated, believing that they possibly might be exceptional. The repetition of the occurrence this year seems to warrant the conclusion that candidates are not aware of the kind of examination in arithmetic which they are required to pass, and are not alive to its bearing on their professional studies. It is noteworthy that several candidates had got by English and Latin alone an aggregate of marks sufficient to have entitled them to pass, who were remitted for their great deficiency in arithmetic. It appears from the papers that it is especially in decimal fractions that arithmetical ignorance is most conspicuous. I have no intention of suggesting that the standard of questions in this subject should be made lower. Irrespective of general considerations the obvious bearing of a knowledge of decimals on chemistry would furnish a sufficient answer to such a proposal.

"As regards Latin and English the papers given to candidates certainly do not err in the way of severity. I would suggest that either at the preliminary trials or during the prescription reading at the technical examination, more attention should be paid to the pronunciation of Latin words, which, as I observed at the prescription reading, is often very bad, the candidate apparently having little or no idea of the difference between long and short vowels.

Technical Examinations.

"The total number of candidates who have appeared since the date of my last report is 159, of whom 75 passed and 84 failed. They were distributed as follows:—

Majors, 7; of whom passed 6, failed 1, =14·3 per cent.
Minors, 137; " " 58, " 79, =57·6 " "
Modified, 15; " " 11, " 4, =26·6 " "

"The number of candidates in the Major and Modified classes being small, the proportion of failures is best estimated by a reference to the Minors, and is seen to be considerably above that of last year, being 57·5, as against 43·9.

"A sufficient explanation of this is, I think, furnished by the results of the examinations in September, which I was unfortunately prevented from attending by having met with an accident. On this occasion 76 candidates appeared, of whom 28 passed and 48 failed. This was owing, no doubt, to many of these candidates deciding to come up before the new standard of merit (four-tenths of the total marks) should come into force. Many of these were probably conscious that they were not well prepared, but hoped that in some way or other they might scramble through, and a good many of them had, I believe, been once or oftener remitted by the London board. The result, though of course grievous to those remitted, is satisfactory to me as confirming the opinion, which observation had led me to form, that, in reality, there is no greater probability of an ill-prepared candidate passing in Edinburgh than in London.

"Some of the rejections were due to the candidates having failed to obtain the necessary aggregate of marks on the whole examination. The special failures on individual subjects are represented by the following numbers:—

Prescription Reading	2
Pharmacy	1
Materia Medica	1
Dispensing	1
Botany	22 = 27·8 per cent.
Chemistry	26 = 32·9 "

"These numbers speak for themselves; they show at a glance that the young men, during their occupation as assistants, acquire a fair knowledge of the practical part of their profession, but that this is empirical and does not rest on a proper scientific basis. It is self-evident that the standard of requirement in botany and chemistry, especially the latter, must, to say the least, be in no respect lowered, because the object of such examinations is not only to give security to the public that its chemists and druggists are duly acquainted with their business, but to elevate the profession of pharmacy by insisting on proper scientific requirements in those who practise it.

"The principal thing to be noted in regard to the examination in chemistry is the introduction of practical work in the laboratory; the candidates for the Major qualification being required to perform actual analyses, or to detect adulterations in samples presented to them.

"The selection of materials for this laboratory work has appeared to me to be judicious, and upon the whole the work of the candidates has been satisfactory. I would observe, however, that even where the constituents of a compound, or the adulterations present in a sample, have ultimately been arrived at correctly, there is often a want of methodicity in the application of tests, and a coarseness in the way of operating, especially in the using of needlessly large quantities of reagents, which show that there is room for improvement in the instruction of these young men in practical chemistry.

"I would suggest that, whilst correctness of result should in the main determine the estimate to be formed of a candidate's qualifications, additional marks should be given for neatness and expedition in obtaining correct results, and might thus help good candidates in obtaining honours.

"In the case of Minors, the substitution of the actual performance of testing for mere oral questioning is a decided improvement, and I hope to see it carried further than it has been during the past year.

"In my report of 5th May, 1874, I mentioned a suggestion of mine that the use of the microscope should be introduced into these examinations. It appears, however, that in some quarters this has been thought objectionable, and it has therefore not been used at all in Edinburgh since May, 1874.

"Of this course of action I quite approve, because it is important that there should in all respects be as much uniformity as possible in the methods of examining in London and Edinburgh. I remain, however, for reasons formerly expressed, unshaken in my opinion that the examinations, especially in the case of the Major, remain imperfect so long as the microscope is ignored. At a recent examination I was witness to an occurrence which, I think, illustrated this. A Major candidate was required to make the analytical examination of a sample where the adulterating material was starch. It was painful to witness his successive unavailing use of almost every conceivable reagent on the shelves, except that of a drop or two of tincture of iodine, which of course would at once have solved the mystery. I could not help feeling at the time how readily he would at once have been led to the use of the proper reagent, or rather would hardly have required any reagent at all, had his attention been directed to the idea that adulterations can be detected by optical as well as chemical experiment, and that the microscope, which was actually on a table near him, would have enabled him to discover in a few minutes what he failed to detect after a long and fruitless series of testings.

"(Signed) DOUGLAS MACLAGAN."

Mr. GREENISH said that he had been informed by Mr. Mackay that the spectroscope was not used in the examinations in Edinburgh, and that the use of the microscope was strictly confined to one being placed in the room for examination or practice by young men whilst waiting their turn, and this showed a difference between the examinations in Edinburgh and in London, where, as he had stated at the last Council meeting, the spectroscope had been introduced.

Mr. MACKAY said one portion of Dr. Maclagan's report might lead to the idea that the microscope had at one time been used in the examinations in Scotland, but that was not so except in the very limited manner which he had already stated on that and previous occasions.

Mr. WILLIAMS said it was highly important that young men coming up for examination and needing all their brain power, should not have their attention distracted by matters not strictly connected with the examination. Still he hoped the time would come when the use of the microscope would form an integral part of the Major examination.

Mr. HAMPSON and Mr. RIMMINGTON both concurred in this view.

Mr. MACKAY said the statement of Mr. Greenish that the spectroscope was used in the London examinations was very important: it took him quite by surprise, and if it were the fact, it would be necessary to introduce it in Edinburgh.

Mr. GREENISH said he knew as a fact that questions upon the spectroscope were put during the time devoted to the examinations.

The SECRETARY said he had been distinctly informed that the spectroscope had not been used in the examination.

Mr. MACKAY felt pretty sure that the London board would not have taken so serious a step as that involved in introducing a new instrument into the examinations without previously communicating with the Edinburgh board.

It was resolved that the reports of the Government Inspectors be entered on the minutes and published in the Journal.

SUBSCRIPTIONS NOT PAID IN TIME.

A discussion took place with regard to seven persons who had tendered their subscriptions after the date fixed by the bye-laws of the Society, but who had not paid the consequent fines. The Secretary was instructed to write to each of these persons, informing him that unless the fine were forwarded before the 15th inst. the amount tendered would be returned, and his name would not be restored to the Register of the Society.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 173.)

Tuesday, August 24 (*continued*).

The first paper read was—

Linimentum Terebinthinæ Aceticum.

BY W. SYMONS, F.C.S.

During the last meeting of the Pharmaceutical Conference, in a discussion on oleic acid, Professor Redwood is reported to have said, after speaking of the unsatisfactory character of liniments generally, "I have made several experiments with a view to get a more homogeneous liniment than liniment of turpentine with acetic acid, a preparation containing ingredients which separate immediately, and which cannot be kept united."—*Vide* 'Year-Book,' 1874, fol. 537.

On reading this, and remembering the fact which I had noticed, that any oil soluble in spirit vastly facilitates the mutual solution of turpentine and rectified spirit, I was induced to try the following mixture:—

Glacial Acetic Acid	1 part.
Spirit of Camphor	2 parts.
Castor Oil	1 part.
Turpentine	2 parts.

When mixed in this order, the above make a perfectly clear and stable solution.

The following will also do the same:—

Liniment Camphor	2 parts.
Castor Oil	2 parts.
Turpentine	2 parts.
Glacial Acetic Acid	1 part.

Probably in either case the proportions may be conveniently modified. Cajeput and other oils soluble in spirit may also be mixed or substituted for castor oil, but some oil soluble in rectified spirit seems essential as a blending medium, and the same principle may perhaps be applied to some other liniments, and thus fulfil the conditions wished for by Professor Redwood.

The PRESIDENT said papers like this were very interesting in this respect: they offered suggestions to the compilers of the next Pharmacopœia.

Professor REDWOOD said he had been afforded an opportunity of trying the formulæ suggested by Mr. Symons for making this previously unsatisfactory liniment—that is, unsatisfactory as ordered in the Pharmacopœia—and he considered the method proposed successful. Mr. Symons had very satisfactorily answered the question he undertook to investigate—viz., the best mode of blending the ingredients which are ordered in this formula. In so doing he had rendered an important service. One of the first duties of the pharmacist, and one which was comprised in the objects of the Conference, was to co-operate with the physician in devising the best means of applying remedies in certain cases, where the physician might be able to indicate what the active agent was that he desired to administer and apply, but where he lacked that practical experience that alone could enable him to indicate the best mode of applying it. He (Professor Redwood) was very glad that one of their members had undertaken the investigation of a subject which many, perhaps, might be disposed to eschew and consider an unimportant one. The mere question of the preparation of a liniment did not present to many very strong attractions; there was not room in it for the acquirement of any great credit in the way of discovery; but he considered, nevertheless, that it was possible to confer very great benefit upon medicine by giving attention to subjects of this description. Many of the diseases in which these external applications were used were of the most painful and distressing character, and the alleviation of suffering often depended in a high degree upon the manner in which certain remedies were put together and rendered suitable for application. A case came under his own observation many years ago in which a friend, a medical man, suffered intense torture from a skin disease, and after trying all the remedies suggested by the most eminent medical men, he at last derived the greatest relief from the application of a remedy supplied to him by an old woman. It was a secret in the hands of the individual who had recommended it; a portion of it was submitted to him for examination, and the best he could make of it was that it consisted of an old, and by some, perhaps, despised and rejected, remedy,—the old *ceratum saponis*, which had been rejected from the Pharmacopœia on account of the apparently unscientific character of the formula. The result satisfied him that for remedies of that description they were not always to look too strictly to the scientific correctness of the combinations resorted to. In cases of this description, what they, as pharmacists, had to consider was how they could produce an efficient and permanent combination of agents which the medical man wished to apply; they would then have done their duty, and must leave it to the medical authority to determine how far the result fulfilled his expectations. In this case the blending of the ingredients had been most successfully effected.

Professor ATTFIELD then gave a brief summary of the following—

Report on the Chemistry of the Aconite Alkaloids.

BY C. R. ALDER WRIGHT, D.SC. LOND.

The following materials for investigation were received from T. B. Groves, Esq. (Weymouth), prepared as described by him in former reports:—

A. Hydrochloride of new base believed by Mr. Groves to be identical with the "Atisine" of Broughton, obtained from *Aconitum napellus* ('Year-Book,' 1874, 507) by exhausting the roots with alcoholic hydrochloric acid, evaporating, treating with ammonia and ether, conversion of dissolved bases into nitrates by addition of nitric acid, and crystallization, and addition of ammonia and hydrochloric acid to the mother liquors and evaporation, whereby the crude hydrochloride separated at a certain state of concentration; this hydrochloride was then recrystallized several times from water.

B. Impure "aconitine" nitrate from *Aconitum napellus* (the mixed crystallized nitrates obtained as above).

C. Purified "aconitine" nitrate from *Aconitum napellus*; the crystalline nitrate prepared as above from another batch of roots, and purified by the mercuric iodide process (conversion into iodo-mercurate, decomposition by sulphuretted hydrogen whilst in alcoholic solution, filtration, removal of iodine by lead acetate, and extraction of alkaloid by ammonia and ether, after evaporation to small bulk).

D. "Pseudaconitine" from *Aconitum ferox?* (Nepaul aconite, 'Year-Book,' 1873, 500) obtained by exhausting the roots with alcoholic hydrochloric acid, evaporation, addition of ammonia and ether, and crystallization by spontaneous evaporation from the ethereal liquid to which alcohol had been added; the crystals were drained and squeezed in a screw-press, and then recrystallized twice from alcohol.

E. Purified "pseudaconitine;" a sample prepared (from a different batch of roots) as specimen D, and put through the mercuric iodide process.

F. "Amorphous pseudaconitine;" the non-crystalline mixture of bases obtained from the mother liquors of D by spontaneous evaporation of the alcoholic liquor acidified with nitric acid, whereby no crystals formed, precipitation by ammonia, and washing and pressing the amorphous precipitate.

Specimen A.—The substance received appeared homogeneous under the microscope and did not alter in composition by two recrystallizations from water; it did not produce any prickly sensation of the tongue after being cautiously tasted, but had a bitter taste. The following numbers were obtained :—

Sample (1) Air dry crystals as received.
,, (2) ,, ,, another sample.
,, (3) ,, ,, recrystallized from water, drained, and dried in the air.
,, (4) ,, ,, recrystallized twice from water, drained, and dried in the air.

Per cent.
Sample (1) 0·6190 gram lost at 100° 0·0295 gram = 4·77
,, (2) 0·4725 ,, ,, 0·0230 ,, = 4·87
,, (3) 0·5260 ,, ,, 0·0190 ,, = 3·61
,, (4) 0·9190 ,, ,, 0·0380 ,, = 4·13

Mean . . . . . . 4·34
Calculated for $C_{31}H_{45}NO_{10}$, HCl, $1\frac{1}{2}H_2O$ 4·13

Sample (1) 0·2680 gram of dry substance gave—
0·5755 CO_2 and 0·1850 H_2O
0·4490 ,, ,, 0·1000 AgCl
,, (4) 0·3520 ,, ,, 0·7555 CO_2 and 0·2400 H_2O
0·3320 ,, ,, 0·0750 AgCl
0·5050 ,, ,, 0·1110 ,,
0·4790 ,, ,, 0·0735 Pt

	Calculated.			Found.	
	$C_{30}H_{45}NO_{10}$, HCl	$C_{31}H_{45}NO_{10}$, HCl	$C_{30}H_{43}NO_{10}$, HCl	(1)	(4)
Carbon	58·49	59·25	58·68	58·56	58·53
Hydrogen	7·47	7·33	7·17	7·67	7·58
Chlorine	5·77	5·66	5·79	5·51	5·59 5·44
Nitrogen	2·27	2·23	2·28		2·18

These two samples were dissolved in water and converted into gold salts by addition of gold chloride ; in each case a flocculent amorphous precipitate was thus thrown down, which appeared to have a slight tendency to darken at the edges by exposure to light; the precipitates were, therefore, quickly filtered off, thoroughly washed, and dried over sulphuric acid in the dark. No apparent alteration was produced by heating the substances thus dried to 100°, but a slight loss in weight to the extent of a few tenths per cent. was thus occasioned, whence it is not impossible that a little decomposition was thus produced; after two or three hours at 100°, however, a perfectly constant weight was attained, whence it is more probable that the trifling loss was due to hygroscopic moisture energetically retained at the ordinary temperature.

Sample (1) 0·6790 grams dried at 100° till constant gave—
0·1430 Au = 21·06
,, (4) 1·1170 ,, ,, 0·2380 = 21·30
,, ,, 0·6995 ,, ,, 0·1475 = 21·09

Mean . . . . . 21·15

Per Cent.
Calculated for $C_{30}H_{45}NO_{10}$, HCl, $AuCl_3$ Au = 21·35
,, ,, $C_{31}H_{45}NO_{10}$, HCl, $AuCl_3$,, = 21·07
,, ,, $C_{30}H_{43}NO_{10}$, HCl, $AuCl_3$,, = 21·39

Attempts to form a platinum salt were not very successful, owing to the solubility of this salt in water, and especially in dilute alcohol; a specimen was obtained, of which—

0·3515 gram dried at 100° till constant gave—
0·0470 Pt = 13·37 per cent.
the lowest of the above formula—
$(C_{30}H_{43}NO_{10}, HCl)_2 PtCl_4$ = 12·55 ,,

Whilst the others require lower percentages still; probably, therefore, this specimen was not wholly freed from excess of $PtCl_4$, as but little washing could be given owing to its solubility.

When treated with ammonia and ether, the hydrochloride yielded a solution of free base which persistently refused to crystallize; nothing but varnishes could be obtained by spontaneous evaporation of the ethereal or alcoholic solutions, or of mixtures of the two; on bringing a drop of dilute nitric or hydrochloric acid in contact with the varnish, a well crystallized salt was instantly formed. The powdered varnish did not fuse at 100°, but long continued exposure to that temperature caused it to become slightly yellowish.

0·2460 gram dried at 100° till constant gave—
0·5675 CO_2 and 0·1745 H_2O.

	Calculated.			Found.
	$C_{30}H_{45}NO_{10}$	$C_{31}H_{45}NO_{10}$	$C_{30}H_{43}NO_{10}$	
Carbon	62·18	62·95	62·39	62·91
Hydrogen	7·77	7·61	7·45	7·88

From the above numbers it is evident that the formula $C_{31}H_{45}NO_{10}$ is the one which most nearly represents this new aconite base, although the formulæ $C_{31}H_{45}NO_{10}$ and $C_{30}H_{43}NO_{10}$ also closely agree with the numbers obtained. Manifestly, therefore, this instance is not identical with Broughton's "Atisine," which yielded numbers agreeing with the formula $C_{46}H_{74}N_2O_5$; moreover atisine (*Medical Press and Circular*, May 27, 1874) melted at 85, formed crystalline salts only with difficulty, and yielded a platinum salt pretty readily. According to the observations of Mr. Groves, this new base (referred to hereafter as "*base A*," no name being given to it until its history is more fully made out) is far less toxic than aconitine, producing no prickling of the tongue but having only a bitter taste and being almost inert. Comparative physiological experiments on the substance and the other aconite alkaloids are contemplated when sufficient amounts of undoubtedly pure materials are obtained.

Specimens B and C. The crystallized nitrate B (about 1½ ounces) was recrystallized three times from water, whereby its bulk was diminished to about one-third; the crystals finally obtained gave with ether and ammonia a solution which dried up to a varnish containing here and there a few crystalline points ; on thinning with alcohol or ether, however, no increase in size of these minute crystals took place, from whence it would seem that "aconitine" (which crystallizes readily from ether) could not have been present in any large quantity.

The mother liquors of these crystals were precipitated by sodium carbonate and the precipitate dissolved in ether and allowed to crystallize by spontaneous evaporation ; in this way, distinct crystals and a viscid non-crystalline mass separated. The whole was from time to time thinned with ether, and when no visible increase in the amount of crystals took place, the whole was filtered by the aid of a pump ; the crystals were slightly washed with ether and recrystallized from that menstruum. The same process was repeated, only small quantities of non-crystalline matters being thus separated by the second treatment and only traces by the third ; the ethereal solutions of the second and third treatment readily crystallized by spontaneous evaporation.

The mother liquors of these different crystallizations were united and evaporated to dryness ; the bases left were converted into hydrochlorides and crystallized. In this way a quantity of material was obtained, consisting, apparently almost wholly of the hydrochloride A mixed with a little of the hydrochloride of the crystalline base ("aconitine"), as it had a very bitter taste, but subsequently produced a sensation of prickling of the tongue to a small extent. The yield of recrystallized "aconitine" thus obtained was not much above 6 or 8 per cent. of the mixed nitrates used ; the crystals were anhydrous, and energetically produced the prickling of the tongue considered to be characteristic of "aconitine." The following numbers were obtained :—

(I.) 0·2970 gram of substance dried at 100° gave 0·6850 CO_2 and 0·1990 H_2O.

The amount of substance thus obtained in a pure state was not sufficient to enable a complete investigation to be made, and especially to see if any changes in composition were induced by treatment by the mercuric iodide process. The following numbers were, however, obtained with the crystallized base obtained from specimen C by agitating its solution with ammonia and ether, and spontaneous evaporation of the ethereal liquid.

(II.) 0·2270 gram gave 0·5235 CO_2 and 0·1480 H_2O.
(III.) 0·2975 gram gave 0·6845 CO_2 and 0·1955 H_2O.

	Calculated.			Found.		
	$C_{33}H_{45}NO_{11}$	$C_{32}H_{43}NO_{11}$	$C_{32}H_{43}NO_{10}$	I.	II.	III.
Carbon .	62·76 .	62·24 .	63·89	62·90	62·90	62·75
Hydrogen	7·13 .	6·97 .	7·16	7·45	7·24	7·30

These numbers apparently indicate that "aconitine" contains somewhat less hydrogen in proportion to the carbon than the new "base A": the numbers obtained with the gold salts from specimens B and C below, however, show that the molecular weight of "aconitine" is perceptibly higher than that of "base A."

The hydrochloride from specimen B was readily crystallizable, and apparently somewhat more soluble in water than that of "base A"; morover, it contains just twice as much water of crystallization ($3H_2O$, as against $1\frac{1}{2}H_2O$).

0·5140 gram of air-dry salt, lost at 100° 0·039 gram = 7·59 per cent.

Calculated for $C_{33}H_{45}NO_{11}$, HCl, $3H_2O$ = 7·48 per cent.

0·4750 gram of dry salt gave 0·0995 AgCl Cl = 5·18 per cent.

Calculated for $C_{33}H_{45}NO_{11}$, HCl Cl = 5·32 per cent.
$C_{32}H_{43}NO_{11}$, HCl Cl = 5·43 " "
$C_{32}H_{43}NO_{10}$, HCl Cl = 5·55 " "

0·7380 gram of gold salt from specimen B gave 0·1500 Au.
0·5795 gram of gold salt from specimen C gave 0·1200 Au.

	Calculated.			Found.	
	$C_{33}H_{45}NO_{11}$, HCl, $AuCl_3$	$C_{32}H_{43}NO_{11}$, HCl, $AuCl_3$	$C_{32}H_{43}NO_{10}$, HCl, $AuCl_3$	B.	C.
Gold .	20·21 .	20·50 .	20·85	20·32	20·71

From these numbers it seems that whilst the formula $C_{33}H_{45}NO_{11}$ most nearly represents the composition of the crystalline base from specimen B, that from specimen C has apparently a somewhat lower molecular weight, a formula intermediate between $C_{32}H_{43}NO_{11}$ and $C_{32}H_{43}NO_{10}$, representing the composition as deduced from the combustions of the free base and the determination of the gold in the gold salt; owing to the minute amount of substance received, however (less than 1 gram of nitrate), it was impossible to examine sample C more thoroughly, and it must therefore be at present left an open question as to whether the crystalline base known as "aconitine," isolated by the method above described, is really altered by being subjected to the mercuric iodide process or not; that such alteration may take place is rendered probable by the results obtained with pseudaconitine (*infra*) as well as by the above numbers. It may be here noticed that Duquesnel obtained from *Aconitum napellus* a crystalline alkaloid which he regarded as "aconitine, and which gave numbers agreeing with the formula $C_{27}H_{40}NO_{10}$ (*Comptes Rendus*, lxxiii., 207) after crystallization from ether, or a mixture of ether and petroleum spirit. Duquesnel's mode of extraction, however, was somewhat different from that of Groves, an alcoholic solution of tartaric acid being used in lieu of alcoholic hydrochloric acid, and the evaporation of the alcohol being conducted at a temperature not exceeding 60°; the question is thus introduced, does the mode of extraction adopted by Mr. Groves influence the result? This, and the numerous other questions arising as to the homogeneity and constitution of the crystalline products above described, can only be decided by further experiments with much larger quantities of material.

One thing is, however, clearly demonstrated—viz., that either through the natural presence in *Aconitum napellus* of more than one alkaloid forming well crystallized salts, or through changes produced in the alkaloid originally present by the methods of extraction adopted, the crystallized "aconitine nitrate" thence obtained is liable to consist of a mixture of at least two distinct salts, one of which, if not absolutely inert, is very much less active than the other. Whether these two substances pre-exist in the roots, are transformation products of some other substance, or are related so that one is produced by the decomposition of the other, etc., can only be decided by further research.

Specimens D and E. The crystals of "pseudaconitine," specimen D, received (already recrystallized twice from alcohol) were dissolved in a large bulk of a mixture of alcohol and ether, and set aside for slow crystallization; in this way two successive crops were obtained, which gave the following numbers:—

1st Crop. Under the microscope only one kind of crystal was discernible, but the great majority was only indistinctly crystalline.

0·3165 grams, dried at 100°, gave 0·7410 CO_2 and 0·2180 H_2O.

2nd Crop. Precisely resembled the first.

0·2925 gram gave 0·6805 CO_2 and 0·1970 H_2O.

Calculated.			Found.	
			1st Crop.	2nd Crop.
C_{36} . .	432 .	64·38	63·84	63·45
H_{49} .	49 .	7·30	7·65	7·48
N . .	14 .	2·09		
O_{11} . .	176 .	26·23		
$C_{36}H_{49}NO_{11}$	671	100·00		

The gold salts from these crystals much resembled those from "aconitine" and the new alkaloid.

1st Crop. 0·8090 gram, dried at 100° gave—
0·1575 Au = 19·46 per cent.
2nd " 1·3260 gram, dried at 100° gave—
0·2565 Au = 19·34 "

Mean . . . 19·40

Calculated for $C_{36}H_{49}NO_{11}$, HCl, $AuCl_3$ Au = 19·40 "

On dissolving these crystals in acids, salts were obtained which wholly refused to crystallize by spontaneous evaporation in the air, or over sulphuric acid.

These two crops of crystals were mixed and put through the mercuric iodide process; the ethereal solutions of base ultimately obtained, deposited crystals much resembling the original ones in appearance, and mostly appearing without any distinct shape under the microscope, forms however being well crystallized. Of these—

(I.) 0·3105 gram gave 0·7205 CO_2 and 0·2100 H_2O
0·7170 " of gold salt gave 0·1425 gram Au

The alcoholic mother liquors of the first and second crops of crystals were evaporated to dryness, and the residue put through the mercuric iodide process; the final product was an ethereal solution of base, which did not crystallize at all in well defined forms, but dried up to a crystalline crust.

(II.) 0·3200 gram gave 0·7300 CO_2 and 0·2160 H_2O.
0·6410 " of gold salt gave 0·1320 Au.

Specimen E weighed only about 0·6 gram, and was magnificently crystalline, differing wholly in appearance from all four of the products just described as obtained from specimen D, being made up of minute, well-defined rhombohedra. Unfortunately, this specimen was examined before the results just described were obtained, and was wholly used up in two combustions, wherefore no gold salt determination was made; from the results of these combustions it appeared probable at the time that this "pseudaconitine" and "aconitine" (specimen C) were isomeric, a conclusion by no means borne out by the results subsequently obtained as above described.

(III.) 0·3540 gram gave 0·8140 CO_2 and 0·2410 H_2O.
(IV.) 0·3195 " " 0·7365 CO_2 " 0·2200 H_2O.

	From Specimen D. by mercury iodide process.		Specimen E.	
	I.	II.	III.	IV.
Carbon . .	63·27	62·21	62·71	62·87
Hydrogen .	7·51	7·50	7·57	7·65
Gold in Au salt	19·87	20·59		

From the foregoing numbers it results that "pseudaconitine" has a composition different from that of either "aconitine" or "base A," being indicated by the formula $C_{36}H_{49}O_{11}$; apparently this substance is altered by the mercuric iodide process, its molecular weight thereby becoming lowered, and the percentage of carbon diminishing. With one sample of roots the product of the mercuric iodide process was magnificently crystalline (E); with another (D), the product thus obtained was no better crystallized than the original substance which for the most part only crystallized indistinctly.

As with "aconitine," further experiment is essential before it can be decided whether these different results are due to difference in the alkaloids contained in the roots, or to alterations in the base or bases originally present during the process of extraction.

No crystalline salts were obtainable from the different specimens obtained as above after employing the mercuric iodide process; this circumstance clearly shows that "pseudaconitine" differs considerably from both "aconitine" and base A, but whether it is a decomposition product of the same substance that yields the others, an alteration product or parent substance of the others, or is really in no way related to them, must be left to future experiment to decide, as must also the relations of these substances to napelline, acolyctine, lycoctonine, and the other more or less amorphous alkaloids examined by other chemists.

Duquesnel views "aconitine" as a glucoside. The amount of "aconitine" from specimens B and C was too small to allow of experiments being made on this point; but the following suggestive results were arrived at with the pseudaconitine product from the mercuric iodide process on specimen D marked (I) above. The base was dissolved in hydrochloric acid, precipitated by a scarcely perceptible excess of ammonia, filtered and washed, and then suspended in distilled water with a few per cents. of its weight of emulsin rubbed up with water to a paste (the activity of the emulsin being proved by leaving a little of it in contact with solution of pure cane-sugar, which in a day or two was converted into glucose); in a week an odour of sour beer began to develop, and a soluble salt of an alkaloid began to form; this action went on increasing for two or three weeks, at the end of which time a considerable proportion of the precipitate was dissolved. Ammonia gave a pretty copious precipitate with the filtered aqueous liquid, which also gave a decided reddish coloration to ferric chloride; no trace of glucose could, however, be detected in the liquid at any time during the whole course of the experiment by the copper test. It is hoped that the examination of a larger quantity of substance in this way may lead to some information as to the nature of the fermentative changes undergone by the aconite alkaloids. Attempts to obtain glucose from specimen F ("amorphous aconitine") by boiling for periods varying from half an hour to several days with dilute sulphuric acid proved equally unsuccessful.

The President said Dr. Wright had been working hard during the last twelve months in a field of inquiry in which nearly all seemed to be chaos. These alkaloids were so alterable by air and water that they changed rapidly under the eye whilst one was working with them. It seemed questionable whether it was worth while to pursue the matter further. But the Conference was greatly indebted to Dr. Wright for the labour he had bestowed upon the subject.

The next paper read was entitled

Pharmaceutical Experiments on the Bristol Rocks.

BY W. W. STODDART, F.C.S., F.G.S.

Many will probably remember that some time ago I published in the Journal a short account of the medicinal plants found in the vicinity of Bristol. On extending my observations to the inorganic substances of the Materia Medica, I found the results equally interesting, and with your permission will bring before your notice a few notes on the pharmacopœial metals which are to be found in our neighbourhood. We can furnish good specimens of fifteen out of the twenty-three metals mentioned in the B.P. For some time past I have made experiments on the natural ores, and from them have made several of our official preparations.

Most of our youths have no opportunity of being in a well appointed pharmaceutical laboratory, and of making themselves acquainted with that branch of practical pharmacy. It is therefore as a substitute for the laboratory that I have brought this subject forward, hoping that my young friends may find as much pleasure and instruction as I have in making the experiments. Although the study of pharmacy cannot be considered monotonous or tedious, yet a little deviation from the daily routine may probably be advantageous.

The inhabitants of Bristol are highly blessed with a neighbourhood surpassingly beautiful and rich in natural objects. The present subject is a case in point. The geological variety in the nature of the ground on which the city of Bristol is built is very conspicuous; a large proportion is of Palæozoic age, and it contains many of the rarest as well as the most common metals. Especially is it so with the upper rocks of the carboniferous limestone, which are rich in iron, lead and zinc. In the upper shales and triassic conglomerate we have immense stores of pure hæmatite. Our limestone has been worked for lead since the days of the Romans, and is now almost the only remaining source of zinc.

In the dolomite we have lead, copper, and magnesium.

Iron is always found as carbonate, or ferrous, or ferric oxide, but principally the latter.

The carbonate ($FeCO_3$) is obtained chiefly from the coal measures. It contains clay and calcic carbonate and yields from 22 to 40 per cent. of metallic iron. An average of 30 per cent. would be a tolerably good one.

The following is the analysis of two samples of iron stone collected at Kingswood:—

	Clay ore.	Black band.
Ferrous Carbonate	60·16	76·66
Ferric Oxide	·09	——
Manganic Oxide	·04	——
Magnesic Carbonate	2·63	3·92
Calcic Carbonate	16·28	14·54
Alumina	7·31	1·45
Silica	8·00	2·09
Sulphur	·33	·33
Moisture and Loss	5·16	1·01
	100·00	100·00
= Iron	29·10°/。	37°/。

Very pretty specimens of oxidized ferrous carbonate occur between the beds of limestone, near the south buttress of the suspension bridge. The crystals are small and lamelliform, interlacing with each other giving a soft velvetty appearance. They contain a considerable proportion of calcic carbonate and alumina, which have been derived from the rocks themselves. A sample from the surface of a limestone bed just below a clay parting gave—

Ferrous Carbonate	55·81
Ferric Acid	4·14
Calcic Carbonate	30·65
Clay	2·33
Fine Sand	1·01
Moisture, etc.	5 06
	100·00
Iron	= 30·32°/。

The iron ores that are more immediately connected with our present subject are the hæmatites or ferric oxide. Frequently we find this in the hydrated form ($Fe_4O_3H_2O$) and is then termed göthite. It is often embedded in large quartz crystals, forming beautiful objects for the cabinet. A sample taken from Sion Hill contained—

Ferric Oxide	85·22
Manganic Oxide	·73
Silica	3·91
Combined Water, etc.	10·14
	100·00
= Iron	59·64°/o

The ferric oxide (Fe_4O_3) is the most common, and is the one from which I have made my preparations. As the principal impurity is silica, it is easily separated by solution.

The bulk of the hæmatite is obtained from a bed of conglomerate resting on the upper limestone shales, where it occurs as a red earthy powder or crystalline nodules. The purest specimens are kidney shaded masses, or else specular lancet shaped crystals. As the name denotes a blood red colour is produced when the hæmatite is scratched, while the göthite gives a distinct yellowish brown colour. The Bristol hæmatite contains a large percentage of silica derived from its position in the upper shales. This greatly lowers its money value in the market, because it produces what is technically called "short iron."

It is difficult to arrive at a correct *average* value of the Bristol ore, because it varies so widely. Probably 48 per cent. would not be far from the truth.

The following analyses show the composition of several of the specimens :—

	Clifton.	Winford.	Ashton.
Ferric Oxide	75·19	72·00	85·00
Calcic Carbonate	3·54	2·16	1·01
Alumina	5·15	2·14	6·13
Silica	4·26	14·50	5·22
Manganese	trace	·21	·82
Phosphoric Acid	·01	·37	·25
Sulphur	·02	·03	trace
Moisture, etc.	11·83	8·59	1·57
	100·00	100·00	100·00
Iron	52·63	50·40	58·9

Picked specimen of reniform hæmatite—

Ferric Oxide	88·23
Silica	2·06
Moisture, etc.	9·71
	100·00
Iron =	61·76

The iron is easily dissolved out by strong hydrochloric acid. With this solution all the accompanying preparations have been made except the ammonio-citrate of iron. The usual dark colour of the scales cannot be produced without reducing the ferric into ferrous oxide and the formation of sulphate, afterwards following the pharmacopœia process.

The preparations made from the Clifton hæmatite are—

Ferri Peroxidum.
Liquor Ferri Perchloridi.
Tinct. Ferri Perchloridi.
Liquor Ferri Persulphatis.
Ferri et Ammoniæ Citras.
Ferri et Quinæ Citras.

Zinc is always found as calamine or carbonate. The pink colour of the officinal calamine is due to the presence of ferric oxide. It was formerly obtained plentifully in many parts of the Mendips, but is now nearly used up. The specimen on the table is from West Harptree. The discovery of new deposits is being anxiously waited for.

One of the samples of calamine gave—

Zincic Carbonate	94·98
Ferric Oxide	4·11
Silica and Insoluble Matter	·19
Calcic Carbonate	·72
	100·00

In some places the calamine is quite white and free from iron, to the presence of which it owes its much esteemed salmon colour. It is to be feared that much, if not most, of the calamine of the shops is such in name only. Many specimens have been tested that have not contained a particle of zinc.

Fine calamine is easily distinguished by the blowpipe on charcoal by the peculiar sublimate that changes from yellow to white on cooling.

I have from the Harptree calamine, specimens of—

Carbonate of Zinc.
Oxide of Zinc.
Sulphate of Zinc.

Magnesium.—In the neighbourhood of Bristol we have thick beds of dolomite, which is a mixture of the carbonates of lime and magnesium ($CaMg\,2\,CO_3$). At Clifton it occurs in a conglomerate, and as it contains from 3 to 6 per cent. of ferric oxide, it has usually a red colour. At Clevedon there is a very large deposit of this curious mineral. It has a delicate buff colour and a granular texture. In some of the beds are singularly shaped crystals of galena and malachite.

Its composition is at Clifton and Clevedon :—

	Clevedon.	Clifton.
Calcic Carbonate	51·59	48·26
Magnesic Carbonate	43·96	41·12
Ferric Oxide	·22	4·14
Insoluble Matter	·08	2·34
Moisture, etc.	4·15	4·14
	100·00	100·00

It is a remarkable circumstance that although the carbonates of lime and magnesium taken *separately* effervesce strongly on the addition of an acid, yet the dolomite, which is simply a mixture of the two in atomic proportion, gives hardly any reaction. Indeed should it show any marked effervescence when subjected to the action of dilute acid, it is a pretty sure indication of there being an excess of lime. I think this peculiarity was mentioned by Dr. Percy in a lecture some years ago.

The Epsoms on the table were made by adding to the powdered dolomite dilute sulphuric acid; both the carbonates are then changed into sulphates. The insoluble sulphate of lime is precipitated and the solution of sulphate of magnesium decanted off, evaporated and crystallized.

If the carbonate of magnesia be wanted, the solution of the sulphate is mixed with sodic carbonate as directed in the Pharmacopœia. Both these salts are here in a state of great purity.

Copper.—So far as I know this metal only occurs in the Clevedon dolomite as the hydrated dibasic carbonate ($CuO,H_2O.CuCO_3$), or as it is usually called Green Malachite. In the specimens on the table it appears as an incrustation of small green crystals. On charcoal before the blowpipe a metallic bead is easily obtained.

I have made from this source the black oxide and sulphate. They can easily be made by separating the copper from lime and magnesium by ammonia, before conversion into the oxide or sulphate.

Lead is very common throughout the district as galena or sulphide. As before mentioned the Mendip range has been celebrated for many years for the large quantity of lead found in the limestone. The galena almost always is found in cubes, but in the Clevedon dolomite the configuration is very curious. It somewhat reminds one of the geometrical puzzles of children, presenting the most eccentric figures resembling railings, stiles, etc., built up of cubes, octohedra, and their derivatives. All the galena in this district is argentiferous, containing about 0·02 per cent. of silver. From the galena I have litharge and carbonate of lead.

An ore of lead called mendipite is peculiar to the Mendip Hills, it is an oxychloride of lead ($2PbO,PbCl_2$). It is found in beautiful yellowish-white, semitransparent crystals, and is composed of

Plumbic Oxide	60·18
Plumbic Chloride	39·82
	100·00

It is readily soluble in nitric acid, and easily reduced on charcoal.

Manganese is frequently found as dioxide throughout the district, sometimes as a deposit, sometimes as fine crystals inclosed in quartz, and often mixed with hæmatite; when found as a black powdery deposit it is commonly called "Wad."

Silver has before been mentioned as accompanying lead, but I have just separated it from a rock in the carboniferous limestone: It is, I think, the first time that it has been found in that formation. It occurs with ferric oxide in the proportion of from 97 to 300 grains per ton. It is remarkable that there is no lead, quartz, or sulphur. It has been obtained by fluxing with litharge, soda ash, borax and argol, and then cupellation. A very successful method is to dissolve out the lime with hydrochloric acid, and treat the washed and dried residue with sodium amalgam.

Gold is found in minute quantities with the silver in the Walton limestone. It is procured by dissolving the silver bead with nitro-hydrochloric acid, diluting with distilled water, filtering off the chloride of silver, and evaporating to dryness. The small sample of perchloride of gold on the table was obtained from 50,000 grains of limestone.

The above are only a few experiments that could be made in the short time at my disposal, but are sufficient to prove that a study of metalliferous rocks is a most intensely interesting one to the pharmacist.

Whether the researches are carried on by the aid of pure chemistry, or by means of the microscope and spectroscope, the student has always at his command a source of profit, recreation and instruction.

The President said the occurrence of silver and gold was certainly very curious.

Mr. Siebold asked how the non-effervescence of the carbonates in dolomite on the addition of acid was to be accounted for; it seemed to be out of harmony with the laws of chemistry.

Mr. Stoddart said he could not explain it, but it was still a fact.

Professor Attfield said it was well known that the crystalline structure greatly affected the rate at which substances dissolved in acid. Magnesite, which was a pure carbonate of magnesium, required to be finely powdered before an acid would act upon it.

Mr. Stoddart said the observation was originally made by Dr. Percy in a lecture delivered in 1854. For himself he did not say effervescence could not be produced; if the substance was warmed and strong acid put to it, it was bound to effervesce; but if a lump were treated without powdering it, it certainly would not effervesce strongly.

The President said he supposed it resisted the action of acid because it was so hard; but when it was dissolved it gave off the gas.

Mr. Tichborne said the mystery of non-effervescence might be due to dissociation of carbonic acid in the first place, and the formation of acid salts.

An adjournment then took place for luncheon, which was provided by the Local Committee in the Hall of the Volunteers' Club, kindly lent for the purpose.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The President's Address.

(*Concluded from page* 179.)

Some of the best scientific works (prior to the nineteenth century) on engineering subjects we owe to Italian and French writers. The writings of Belidor, an officer of artillery in France in the seventeenth century, who did not, however, confine himself to military subjects, drew attention to engineering questions. Not long after their appearance, the Ponts et Chaussées* were established, which has maintained ever since a body of able men specially educated for, and devoted to, the prosecution of industrial works.

The impulse given to road-making in the early part of the last century soon extended to canals and means for facilitating locomotion and transport generally. Tramways were used in connection with mines at least as early as the middle of the seventeenth century, but the rails were, in those days, of wood. The first iron rails are said to have been laid in this country as early as 1738; after which time their use was gradually extended, until it became general in mining districts.

By the beginning of this century the great ports of England were connected by a system of canals; and new harbour works became necessary, and were provided to accommodate the increase of commerce and trade, which improved means of internal transport had rendered possible. It was in the construction of these works that our own Brindley and Smeaton, Telford and Rennie, and other engineers of their time, did so much.

But it was not until the steam-engine, improved and almost created by the illustrious Watt, became such a potent instrument, that engineering works to the extent they have since been carried out became possible or necessary. It gave mankind no new faculty, but it at once set his other faculties on an eminence, from which the extent of his future operations became almost unlimited.

Water-mills, wind-mills, and horse-machines were in most cases superseded. Deep mines, before only accessible by adits and water levels, could at once be reached with ease and economy. Lakes and fens which, but for the steam-engine, would have been left untouched, were drained and cultivated.

The slow and laborious toil of hands and fingers, bone and sinew, was turned to other employments, where, aided by ingenious mechanical contrivances, the produce of one pair of hands was multiplied a thousandfold, and their cunning extended until results marvellous, if you consider them, were attained. Since the time of Watt the steam-engine has exerted a power, made conquests, and increased and multiplied the material interests of this globe to an extent which is it scarcely possible to realize.

But while Watt has gained a world-wide, well-earned fame, the names of those men who have provided the machines to utilize the energies of the steam-engine are too often forgotten. Of their inventions the majority of mankind know little. They worked silently at home, in the mill, or in the factory, observed by few. Indeed in most cases these silent workers had no wish to expose their work to public gaze. Were it not so, the factory and the mill are not places where people go to take the air. How long in the silent night the inventors of these machines sat and pondered; how often they had to cast aside some long-sought mechanical movement and seek another and a better arrangement of parts, none but themselves could ever know. They were unseen workers, who succeeded by rare genius, long patience, and indomitable perseverance.

More ingenuity and creative mechanical genius is perhaps displayed in machines used for the manufacture of textile fabrics than by those used in any other industry.

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* Ponts et Chaussées, established 1720.

It was not until late in historical times that the manufacture of such fabrics became established on a large scale in Europe. Although in China man was clothed in silk long ago, and although Confucius, in a work written 2300 years ago, orders with the greatest minuteness the rules to be observed in the production and manufacture of silk, yet it was worth nearly its weight in gold in Europe in the time of Aurelian, whose empress had to forego the luxury of a silk gown on account of it cost.* Through Constantinople and Italy the manufacture passed slowly westwards, and was not established in France until the sixteenth century, and arrived at a still later period in this country. It is related that James V. had to borrow a pair of silk hose from the Earl of Mar, in order that he might not, as he expressed it, appear as a scrub before strangers.

So cotton, of which the manufacture in India dates from before historical times, had scarcely by the Christian era reached Persia and Egypt. Spain in the tenth and Italy in the fourteenth century manufactured it, but Manchester, which is now the great metropolis of the trade, not until the latter half of the seventeenth century.

Linen was worn by the old Egyptians, and some of their linen mummy cloths surpass in fineness any linen fabrics made in later days.† The Babylonians wore linen also and wool, and obtained a widespread fame for skill in workmanship and beauty in design.

In this country wool long formed the staple for clothing. Silk was the first rival, but its costliness placed it beyond the reach of the many. To introduce a new material or improved machine into this or other countries a century or more ago was no light undertaking. Inventors, and would-be benefactors alike, ran the risk of loss of life. Loud was the outcry made in the early part of the eighteenth century against the introduction of Indian cottons and Dutch calicoes.

Until 1738, in which year the improvements in spinning machinery were begun, each thread of worsted or cotton wool had been spun between the fingers in this and all other countries. Wyatt, in 1738, invented spinning by rollers instead of fingers, and his invention was further improved by Arkwright. In 1770, Hargreaves patented the spinning jenny, and Crompton the mule in 1775, a machine which combined the advantages of the frames of both Hargreaves and Arkwright. In less than a century after the first invention by Wyatt, double mules were working in Manchester, with over 2000 spindles. Improvements in machines for weaving were begun at an earlier date. In 1579, a ribbon loom is said to have been invented at Dantzic, by which from four to six pieces could be woven at one time, but the machine was destroyed and the inventor lost his life.‡ In 1800, Jacquards's most ingenious invention was brought into use, which, by a simple mechanical operation, determines the movements of the threads which form the pattern in weaving. But the greatest discovery in the art of weaving was wrought by Cartwright's discovery of the power loom, which led eventually to the substitution of steam for manual labour, and enabled a boy with a steam loom to do fifteen times the work of a man with a hand loom.

For complex ingenuity few machines will compare with those used in the manufacture of lace and bobbin net. Hammond, in 1768, attempted to adapt the stocking frame to this manufacture, which had hitherto been conducted by hand. It remained for John Heathcoat to complete the adaptation in 1809, and to revolutionize this branch of industry, reducing the cost of its produce to one-fortieth of what the cost had been before Heathcoat's improvements were effected.

Most of these ingenious machines were in use before Watt's genius gave the world a new motive power in the steam-engine; and, had the steam-engine never been perfected, they would still have enormously increased the productive power of mankind. Water power was applied to many of them; in the first silk-thread mill erected at Derby, in 1738, 318 million yards of silk-thread were spun daily with one water-wheel.

These are happier times for inventors; keen competition among manufacturers does not let a good invention lie idle now. That which was rejected by old machines as waste is now worked up into useful fabrics by new ones. From all parts of the world new products come—jute from India, flax from New Zealand, and many others which demand new adaptations of old machines or new and untried mechanical arrangements to utilize them. Time would fail me if I were to attempt to enumerate one tithe of these rare combinations of mechanical skill; and, indeed, no one will ever appreciate the labour and supreme mental effort required for their construction who has not himself seen them and their wondrous achievements.

Steamboats, the electric telegraph, and railways, are more within the cognizance of the world at large, and the progress that has been made in them in little more than one generation is better known and appreciated.

It is not more than forty years since one of our scientific men, and an able one too, declared at a meeting of this Association that no steamboat would ever cross the Atlantic; founding his statement on the impracticability, in his view, of a steamboat carrying sufficient coal, profitably, I presume, for the voyage. Yet, soon after this statement was made, the 'Sirius' steamed from Bristol to New York in seventeen days,* and was soon followed by the 'Great Western,' which made the homeward passage in thirteen-and-a-half days; and with these voyages the era of steamboats began. Like most important inventions, that of the steamboat was a long time in assuming a form capable of being profitably utilized; and even when it had assumed such a form, the objections of commercial and scientific men had still to be overcome.

Among the many names connected with the early progress in the construction of steamboats, perhaps none is more worthy of remembrance than that of Patrick Miller, who, with the assistance of Symington, an engineer, and Taylor, who was his children's tutor, constructed a small steamboat. Shortly afterwards Lord Dundas, who saw the value of the application of steam for the propulsion of boats, had the first really practicable steamboat constructed with a view to using it on the Forth and Clyde Canal. The proprietors, however, objected, and the boat lay idle. Again, another attempt to make practical use of the steamboat failed through the death of the Duke of Bridgewater, who, with his characteristic foresight, had seen the value of steam as a motive power for boats, and had determined to introduce steamboats on the canal which bears his name.

The increase in the number of steamboats since the time when the 'Sirius' first crossed the Atlantic has been very great. Whereas, in 1814 the United Kingdom only possessed two steam vessels, of together 456 tons burden, in 1872 there were on the register of the United Kingdom 3662 steam vessels, of which the registered tonnage amounted to over a million and a half of tons,† or to nearly half the whole steam tonnage of the world, which did not at that time greatly exceed three million tons.

As the number of steamboats has largely increased, so also gradually has their size increased until it culminated in the hands of Brunel in the 'Great Eastern.'

A triumph of engineering skill in ship-building, the 'Great Eastern' has not been commercially so successful. In this, as in many other engineering problems, the question is not how large a thing can be made, but how large, having regard to other circumstances, it is proper at the time to make it.

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* Manufacture of silk brought from China to Constantinople A.D. 522.

† Wilkinson's 'Ancient Egyptians;' Pliny, bk. xix., c. ii.

‡ Beckman's 'History of Inventions,' vol. ii., p. 528.

* First steamer crossed the Atlantic by steam alone in 1838.

† Board of Trade Return, 15th July, 1874, Table 8.

If, as regards the dimensions of steamboats, we have at present somewhat overstepped the limits in the 'Great Eastern,' much still remains to be done in perfecting the form of vessels, whether propelled by steam or driven by the force of the wind. A distinguished member of this Association, Mr. Froude, has now for some years devoted himself to investigations carried on with a view to ascertain the form of vessel which will offer the least resistance to the water through which it must pass. So many of us in these days are called upon to make journeys by sea as well as by land, that we can well appreciate the value of Mr. Froude's labours, so far as they tend to curtail the time which we must spend on our ocean journeys; and we should all feel grateful to him if from another branch of his investigations, which relates to the rolling of ships, it should result that the movement in passenger vessels could be reduced. A gallant attempt in this direction has lately been made by Mr. Bessemer; whether a successful one yet remains to be proved. In any event, he and those who have acted with him deserve our praise for an experiment which must add to our knowledge.

It is a question of vital importance to the steamboat that the consumption of fuel should be reduced to the smallest possible amount, inasmuch as each ton of fuel excludes a ton of cargo.

As improvements in the form of the hull are effected, less power—that is, less fuel—will be required to propel the vessel through the water for a given distance. Great as have been the improvements effected in marine engines to this end, much still remains to be done. Wolf's compound engine, so long overlooked, is, with some improvements, being at last applied. Whereas the consumption of fuel in such vessels as the 'Himalaya' used to be from 5 to 6 lbs. of fuel per effective horse-power, it has been reduced, by working steam more expansively in vessels of a later date, to 2 lbs. Yet, comparing this with the total amount of energy of 2 lbs. of coal, it will be found that not a tenth part of the power is obtained which that amount of coal would theoretically call into action.*

We live in an age when great discoveries are made, and when they are speedily taken advantage of if they are likely to be of service to mankind.

In former times, man's inventions were frequently in advance of the age, and they were laid aside to a await a happier era. There were in those earlier days too few persons who cared to, or who could, avail themselves of the profferred boon, and there was no sufficient accumulation of wealth to justify its being appropriated to schemes which are always in their early stage more or less speculative.

There is no more remarkable instance of the rapid utilization of what was in the first instance regarded by most men as a mere scientific idea, than the adoption and extension of the electric telegraph.

Those who read Odier's letter written in 1773, in which he made known his idea of a telegraph which would enable the inhabitants of Europe to converse with the Emperor of Mogul, little thought that in less than a century a conversation between persons at points so far distant would be possible. Still less did those who saw in the following year messages sent from one room to another by Lesage in the presence of Friedrich of Prussia, realize that they had before them the germ of one of the most extraordinary inventions among the many that will render this century famous.

I should weary you were I to follow the slow steps by which the electric telegraph of to day was brought to its present state of efficiency. In the present century few years have passed without new workers appearing in the field; some whose object was to utilize the new-found power for the benefit of mankind, others—and their work was not the least important in the end—whose object was to investigate magnetism and electrical phenomena as presenting scientific problems still unsolved. Galvani, Volta, Oersted, Arago, Sturgeon, and Faraday, by their labours helped to make known the elements which rendered it possible to construct the electric telegraph. With the battery, the electric coil, and the electro-magnet, the elements were complete, and it only remained for Sir Charles Wheatstone and others to combine them in a useful and practically valuable form. The inventions of Alexander, Steinheil, and those of similar nature to that of Sir Charles Wheatstone, were made known at a later date in the same year, which will ever be memorable in the annals of telegraphy.*

The first useful telegraph was constructed upon the Blackwall Railway in 1838, Messrs. Wheatstone's and Cooke's instruments being employed. From that time to this the progress of the electric telegraph has been so rapid, that at the present time, including land lines and submarine cables, there are in use in different parts of the world not less than 400,000 miles of telegraph.

Among the numerous inventions of late years, the automatic telegraph of Mr. Alexander Bain, of Dr. Werner Siemens, and of Sir Charles Wheatstone, are especially worthy of notice. Mr. Bain's machine is chiefly used in the United States, that of Dr. Werner Siemens in Germany. In this country the machine invented by Sir Charles Wheatstone, to whom telegraphy owes so much, is chiefly employed. By his machine, after the message has been punched out in a paper ribbon by one machine on a system analogous to the dot and dash of Morse, the sequence of the currents requisite to transmit the message along the wire is automatically determined in a second machine by this perforated ribbon. This second operation is analogous to that by which in Jacquard's loom the motions of the threads requisite to produce the pattern is determined by perforated cards. By Wheatstone's machine errors inseparable from manual labour are avoided; and what is of even more importance in a commercial point of view, the time during which the wire is occupied in the transmission of a message is considerably diminished.

By the application of these automatic systems to telegraphy, the speed of transmission has been wonderfully accelerated, being equal to 200 words a minute, that is, faster than a shorthand writer can transcribe; and, in fact, words can now be passed along the wires of land lines with a velocity greater than can be dealt with by the human agency at either end.

Owing partly to the retarding effects of induction and other causes, the speed of transmission by long submarine

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* Theoretical Energy of 1 lb. of coal:—

The proportions of heat expended in generating saturated steam at 212° Fahr., and at 14·7 lbs. pressure per square inch, from water at 212° are:

	Units of heat.	Mechanical equivalent in foot lbs.
I. In the formation of steam .	892·8	682,242
II. In resisting the incumbent pressure of 14·7 lbs. per square inch	72·3	55,815
	965·1	745,057

One pound of Welsh coal will theoretically evaporate 15 lbs. of water at 212° to steam at 212°. Therefore the full theoretical value of the combustion of 2 lbs. of Welsh coal is

$$2 \times 15 \times 745,957 \text{ foot pounds,}$$

or

$$\frac{2 \times 15 \times 745,057}{60 \times 33,000} \text{ horse-power, if consumed in 1 hour.}$$

$$= 11{\cdot}2 \text{ horse-power.}$$

As the consumption of coal per effective horse-power in a marine engine is 2 lbs., the power obtained is to the whole theoretical power as 1 11.

* Dates of patents: Wheatstone, March 1, 1837; Alexander, April 22, 1837; Steinheil, July 1, 1837; Morse, October, 1837.

cables is much smaller. With the cable of 1858 only 2½ words per minute were got through. The average with the Atlantic cable, Dr. C. W. Siemens informs me, is now 17 words, but 24 words per minute can be read.

One of the most striking phenomena in telegraphy is that known as the duplex system, which enables messages to be sent from each end of the same wire at the same time. This simultaneous transmission from both ends of a wire was proposed in the early days of telegraphy, but, owing to imperfect insulation, was not then found to be practicable; but since then telegraphic wires have been better insulated, and the system is now becoming of great utility, as it nearly doubles the capacity for work of every wire.

And yet within how short a period of time has all the wonderful progress in telegraphy been achieved! How incredulous the world a few years ago would have been if then told of the marvels which in so short a space of time were to be accomplished by its agency!

It is not long ago—1823—that Mr., now Sir Francis Ronald, one of the early pioneers in this field of science, published a description of an electric telegraph. He communicated his views to Lord Melville, and that nobleman was obliging enough to reply that the subject should be inquired into; but before the nature of Sir Francis Ronald's suggestions could be known, except to a few, that gentleman received a reply from Mr. Basrow, 'that telegraphs of any kind were then wholly unnecessary, and that no other than the one then in use would be adopted;' the one then in use being the old semaphore, which, crowning the tops of hills between London and Portsmouth, seemed perfection to the Admiralty of that day.

I am acquainted with some who, when the first Transatlantic cable was proposed, contributed towards that undertaking with the consciousness that it was only an experiment, and that subscribing to it was much the same thing as throwing their money into the sea. Much of this cable was lost in the first attempt to lay it; but its promotors, nothing daunted, made 900 miles more cable, and finally laid it successfully in the following year, 1858.

The telegraphic system of the world comprises almost a complete girdle round the earth; and it is probable that the missing link will be supplied by a cable between San Francisco in California and Yokohama in Japan.

How resolute and courageous those who engaged in submarine telegraphy have been will appear from the fact that, though we have now 50,000 miles of cable in use, to get at this result nearly 70,000 miles were constructed and laid. This large percentage of failure, in the opinion of Dr. C. W. Siemens (to whom I am much indebted for information on this subject), was partly due to the late introduction of testing a cable under water before it is laid, and to the use of too light iron sheathing.

Of immense importance in connection with the subsequent extension of submarine cables have been the discoveries of Ohm and Sir William Thomson, and the knowledge obtained that the resistance in wire of homogeneous metal is directly proportional to the length, so that the place of a fault in a cable of many thousand miles in length can be ascertained with so much precision as to enable you to go at once to repair it, although the damaged cable may lie in some thousands of fathoms of water.

Of railways the progress has been enormous; but I do not know that in a scientific point of view a railway is so marvellous in its character as the electric telegraph. The results, however, of the construction and use of railways are more extensive and widespread, and their utility and convenience brought home to a larger portion of mankind. It has come to pass, therefore, that the name of George Stephenson has been placed second to that of James Watt; and as men are and will be estimated by the advantages which their labours confer on mankind, he will remain in that niche, unless indeed some greater luminary should arise to outshine him. The merit of George Stephenson consisted, among other things, in this, that he saw more clearly than any other engineer of his time the sort of thing that the world wanted, and that he persevered in despite of learned objectors with the firm conviction that he was right and they were wrong, and that there was within himself the power to demonstrate the accuracy of his convictions.

Railways are a subject on which I may (I hope without tiring you) speak somewhat more at length. The British Association is peripatetic, and without railways its meetings, if held at all, would, I fear, be greatly reduced in numbers. Moreover, you have all an interest in them: you all demand to be carried safely, and you insist on being carried fast. Besides, everybody understands, or thinks he undertands, a railway, and therefore I shall be speaking on a subject common to all of us, and shall possibly only put before you ideas which others as well as myself have already entertained.

We who live in these days of roads and railways, and can move with a fair degree of comfort, speed, and safety almost where we will, can scarcely realize the state of England two centuries ago, when the years of opposition which preceded the era of coaches began; when, as in 1662, there were but six stages in all England, and John Crossdell, of the Charterhouse, thought there were six too many; when Sir Henry Herbert, a member of the House of Commons, could say, "If a man were to propose to carry us regularly to Edinburgh in coaches in seven days, and bring us back in seven more, should we not vote him to Bedlam?"

In spite of short-sighted opposition, coaches made their way; but it was not until a century later, in 1784 —and then I believe it was in this city of Bristol—that coaches were first established for the conveyance of mails. Those here who have experienced, as I have, what the discomforts were of long journeys inside the old coaches, will agree with me that they were very great; and I believe, if returns could be obtained of the accidents which happened to coaches, it would be found that many more people were injured and killed, in proportion to the number that travelled by that mode, than by the railways of to-day.

No sooner had our ancestors settled down with what comfort was possible in their coaches, well satisfied that twelve miles an hour was the maximum speed to be obtained or that was desirable, than they were told that steam conveyance on iron railways would supersede their "present pitiful" methods of conveyance. Such was the opinion of Thomas Gray, the first promoter of railways, who published his work on a general iron railway in 1819. Gray was looked on as little better than a madman. "When Gray first proposed his great scheme to the public," said Chevalier Wilson, in a letter to Sir Robert Peel in 1845, "people were disposed to treat it as an effusion of insanity." I shall not enter on a history of the struggles which preceded the opening of the first railway. They were brought to a successful issue by the determination of a few able and far-seeing men. The names of Thomas Gray and Thomes Sanders, of William James and Edward Pease, should always be remembered in connection with the early history of railways, for it was they who first made the nation familiar with the idea. There is no fear that the name of Stephenson will be forgotten, whose practical genius made the realization of the idea possible.

The Stockton and Darlington Railway was opened in 1825, the Liverpool and Manchester Railway in 1830, and in the short time which has since elapsed, railways have been extended to every quarter of the globe. No nation possessing wealth and population can afford to be without them; and though at present in different countries there is in the aggregate about 160,000 miles of railway, it is certain that in the course of a very few years this quantity, large as it is, will be very greatly exceeded.

Railways add enormously to the national wealth. More than twenty-five years ago it was proved to the satisfaction of a committee of the House of Commons, from facts and figures which I then adduced, that the Lancashire and Yorkshire Railway, of which I was the engineer, and which then formed the principal railway connection between the populous towns of Lancashire and Yorkshire, effected a saving to the public using the railway of more than the whole amount of the dividend which was received by the proprietors. These calculations were based solely on the amount of traffic carried by the railway, and on the difference between the railway rate of charge and the charges by the modes of conveyance anterior to railways. No credit whatever was taken for the saving of time, though in England pre-eminently time is money.

Considering that railway charges on many items have been considerably reduced since that day, it may be safely assumed that the railways in the British Islands now produce, or rather save to the nation, a much larger sum annually than the gross amount of all the dividends payable to the proprietors, without at all taking into account the benefit arising from the saving in time. The benefits under that head defy calculation, and cannot with any accuracy be put into money ; but it would not be at all over-estimating this question to say that in time and money the nation gains at least what is equivalent to 10 per cent. on all the capital expended on railways. I do not urge this on the part of railway proprietors, for they did not embark in these undertakings with a view to the national gain, but for the expected profit to themselves. Yet it is as well it should be noted, for railway proprietors appear sometimes by some people to be regarded in the light of public enemies.

It follows from these facts that whenever a railway can be made at a cost to yield the ordinary interest of money, it is in the national interest that it should be made. Further, that though its cost might be such as to leave a smaller dividend than that to its proprietors, the loss of wealth to so small a section of the community will be more than supplemented by the national gain, and therefore there may be cases where a government may wisely contribute in some form to undertakings which, without such aid, would fail to obtain the necessary support.

And so some countries, Russia for instance, to which improved means of transport are of vital importance, have wisely, in my opinion, caused lines to be made which, having regard to their own expenditure and receipts, would be unprofitable works, but in a national point of view are or speedily will be highly advantageous.

The empire of Brazil also, which I have lately visited, is arriving at the conclusion, which I think not an unwise one, that the State can afford and will be benefited in the end by guaranteeing 7 per cent. upon any railway that can of itself be shown to produce a net income of 4 per cent., on the assumption that the nation will be benefited at least to the extent of the difference.

A question more important probably in the eyes of many—safety of railway travelling—may not be inappropriate. At all events, it is well that the elements on which it depends should be clearly understood. It will be thought that longer experience in the management of railways should go to insure greater safety, but there are other elements of the question which go to counteract this in some degree.

The safety of railway travelling depends on the perfection of the machine in all its parts, including the whole railway, with its movable plant, in that term; it depends also on the nature and quantity of traffic, and lastly, on human care and attention.

With regard to what is human, it may be said that so many of these accidents as arise from the fallibility of men will never be eliminated until the race be improved.

The liability to accident will also increase with the speed, and might be reduced by slackening that speed. It increases with the extent and variety of the traffic on the same line. The public, I fear, will rather run the risk than consent to be carried at a slower rate. The increase in extent and variety of traffic is not likely to receive any diminution; on the contrary, it is certain to augment.

I should be sorry to say that human care may not do something, and I am not among those who object to appeals through the press, and otherwise to railway companies, though sometimes perhaps they may appear in an unreasonable form. I see no harm in men being urged in every way to do their utmost in a matter so vital to many.

A question may arise whether, if the railways were in the hands of the Government, they could not be worked with greater safety. Government would not pay their officers better, or perhaps so well as the companies do, and it is doubtful whether they would succeed in attracting to the service abler men. They might do the work with a smaller number of chief officers, for much of the time of the companies' managers is occupied in internecine disputes. They might handle the traffic more despotically, diminishing the number of trains, or the accommodation afforded by them, or in other ways, to insure more safety; but would the public bear any curtailment of convenience?

One thing they could, and perhaps would do. In cases where the traffic is varied, and could more safely be conducted with the aid of relief lines, which hold out no sufficient inducement to the companies to make, the Government, being content with a lower rate of interest, might undertake to make them, though, then comes the question whether, when the whole of this vast machine came to depend for supplies on annual votes of Parliament, money would be forthcoming in greater abundance than it is under the present system.

But the consideration of this subject involves other and more difficult questions.

Where are the labours of Government to stop? The cares of State which cannot be avoided are already heavy, and will grow heavier every year. Dockyard establishments are trifling to what the railway establishments, which already employ 250,000 men, would be. The assumption of all the railways would bring Government into conflict with every passenger, every trader, every merchant, and every manufacturer. With the railway companies there would be no difficulty; they would sell their undertakings to any one provided the price was ample.

Looking at the vast growth of railway traffic, one measure occurs to me as conducive to the safety of railway passengers, and likely to be demanded some day: it is to construct between important places railways which should carry passengers only or coals only, or to be set apart for some special separation of traffic; though there will be some difficulty in accomplishing this. Landowners, through whose properties such lines would pass, would probably wish to use such lines for general purposes. Nevertheless, it may have to be tried some day.

It would be instructive, were it practicable, to compare the relative proportion of accidents by railway and by the old stage coaches, but no records that I am aware of exist of the latter that would enable such a comparison to be made. It is practicable to make some sort of comparison between the accidents in the earlier days of our own railways and the accidents occurring at a later date.

The Board of Trade have unfortunately abandoned the custom, which they adopted from 1852 to 1859, of returning the passenger mileage, which is given in the German returns, and is the proper basis upon which to found the proportion of accidents, and not on the number of passengers without any regard to distance travelled, which has altered very much, the average journey per passenger being nearly half in 1873 what it was in 1846.

It would be erroneous to compare the proportions of accidents to passengers carried in various years, even if the correct number of passengers travelling were given. But a figure is always omitted from the Board of Trade return, which makes the proportion of accidents to passengers appear larger than it is; this is the number of journeys performed by season-ticket holders. Some estimate could be made of the journeys of season-ticket holders by dividing the receipts by an estimated average fare, or the companies could made an approximate estimate, and the passenger mileage could be readily obtained by the railway companies from the tickets. These additions would greatly add to the value of the railway returns as statistical documents, and render the deductions made from them correct.

Though it has been a work of labour, I have endeavoured to supply these deficiencies, and I believe the results arrived at may be taken as fairly accurate.*

From the figures so arrived at, it appears the passenger mileage has doubled between 1861 and 1873; and at the rate of increase between 1870 and 1873 it would become double what it was in 1873 in twelve years from that time, namely in 1885.

The number of passengers has doubled between 1864 and 1873, and at the rate of increase between 1870 and 1873 it would become double what it was in 1873 in eleven-and-a-half years, or in 1885.

It must, however, be remembered that the rate of increase since 1870, though very regular for 1871, 1872, and 1873, is greater than in previous years, being probably due to the rise of wages and the great development of third-class traffic, and it would not be safe to assume this rate of increase will continue.

Supposing no improvement had been effected in the working of railway traffic, by the interlocking of points, the block system, etc., the increase of accidents should have borne some proportion to the passenger mileage, multiplied by the proportion between the train mileage and the length of line open, as the number of trains passing over the same line of rails would tend to multiply accidents in an increasing proportion, especially where the trains run at different speeds.

The number of accidents varies considerably from year to year, but taking two averages of ten years each, it appears that the proportion of deaths of passengers from causes beyond their control to passenger miles travelled in the ten years ending December 31, 1873, was only two-thirds of the same proportion in the ten years ending December 31, 1861; the proportion of all accidents to passengers from causes beyond their own control was one-ninth more in the last ten years than in the earlier, whereas the frequency of trains had increased on the average one-fourth.

The limit, however, of considerable improvements in signalling, increased brake power, etc., will probably be reached before long, and the increase of accidents will depend on the increase of traffic, together with the increased frequency of trains..

The large growth of railway traffic, which we may assume will double in twenty years, will evidently greatly tax the resources of the railway companies; and unless the present companies increase the number of the lines of way, as some have commenced to do, or new railways are made, the system of expeditious and safe railway travelling will be imperilled. Up to the present time, however, the improvements in regulating the traffic appear to have kept pace with the increase of traffic and of speed, as the slight increase in the proportion of railway accidents to passenger miles is probably chiefly due to a larger number of trifling bruises being reported now than formerly.

I believe it was a former President of the Board of Trade who said to an alarmed deputation, who waited on him on the subject of railway travelling, that he thought he was safer in a railway-carriage than anywhere else.

If he gave any such opinion, he was not far wrong, as is sufficiently evident when it can be said that there is only one passenger injured in every four million miles travelled, or that, on an average, a person may travel

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* RAILWAY ACCIDENTS.—*Great Britain and Ireland.*

Year	Proportion of train mileage for year to total length of single line of way, excluding sidings	Number of accidents to passenger trains	Average journey of passengers of all classes, exclusive of periodical ticket-holders	Number of accidents to passengers from causes beyond their control			Number of miles travelled by passengers of all classes, including periodical ticket-holders	Proportion of passengers killed from causes beyond their control to passenger miles travelled	Proportion of passengers injured or killed from causes beyond their control to passenger miles travelled	Proportion of passengers killed from causes beyond their control to passenger journeys	Proportion of passengers injured or killed from causes beyond their control to passenger journeys
				Killed	Injured	Total					
I	II (*a*)	III No.	IV miles	V No.	VI. No.	VII No.	VIII (*b*) miles	IX. (*c*) miles	X (*d*) miles	XI (*e*) No.	XII (*f*) No.
1846		51	18·80	5	146	151	894,573,000	1 in 178,915,000	1 in 5,924,000	1 in 9,514,000	1 in 315,000
1849		33	18·21	5	84	89	1,162,806,000	1 in 232,561,000	1 in 13,065,000	1 in 12,768,000	1 in 717,000
1852		60	16·19	10	372	382	1,473,255,000	1 in 147,326,000	1 in 3,857,000	1 in 8,910,000	1 in 241,000
1855	5,134	75	15·34	10	311	321	1,864,175,000	1 in 186,418,000	1 in 5,807,000	1 in 12,316,000	1 in 384,000
1858	5,418	48	14·54	25	419	444	2,084,353,000	1 in 83,374,000	1 in 4,694,000	1 in 5,809,000	1 in 327,000
1861	5,921	55	14·21	46	780	826	2,547,653,000	1 in 55,384,000	1 in 3,084,000	1 in 3,947,000	1 in 220,000
1864	6,395	75	12·47	14	697	711	2,966,592,000	1 in 211,899, 00	1 in 4,172,000	1 in 17,141,000	1 in 338,000
1867	6,724	94	11·56	19	689	708	3,478,262,000	1 in 183,066,000	1 in 4,913,000	1 in 15,947,000	1 in 428,000
1870	7,253	123	10·74	65	1084	1149	3,801,734,000	1 in 58,488,000	1 in 3,309,000	1 in 5,465,000	1 in 309,000
1873	7,894		10·53	38	1504	1512	5,060,329,000	1 in 133,167,000	1 in 3,282,000	1 in 12,683,000	1 in 318,000
Aver.	1852—61	inclus.		20	425	445	2,018,485,000	1 in 100,924,000	1 in 4,536,000	1 in 6,850,000	1 in 308,000
Aver.	1864—73	inclus.		26	920	946	3,826,729,000	1 in 147,182,000	1 in 4,045,000	1 in 13,165,000	1 in 362,000

(*a*) The figures in this column are obtained by dividing the total train mileage by the aggregate length of single line of way, excluding sidings, and not by the actual length of the railway.

(*b*) The passenger mileage has been calculated, as it is not given in the Board of Trade returns, except partially between 1852 and 1859 (inclusive), and since 1859 no return under this head has been made.

(*c*) The figures in column No. IX. are obtained by dividing those in column VIII. by those in column V.

(*d*) The figures in column X. are obtained by dividing those in column VIII. by those in column VII.

(*e*) The figures in column XI. are obtained by dividing the total number of passengers carried in each year (including a calculated number of journyes made by season ticket holders) by the figures in column V.

(*f*) The figures in column XII. are obtained by dividing the total number of passengers carried in each year by the figures in column VII.

N.B.—The passenger mileage includes the miles estimated to have been travelled by season ticket holders. This estimate was obtained by calculating an average fare per mile for each class of passenger, and dividing the receipts from the season ticket holders by the average fare.

100,000 miles each year for forty years, and the chances be slightly in his favour of his not receiving the slightest injury.

A pressing subject of the present time is the economy of fuel. Members of the British Association have not neglected this momentous question.

At the meeting held at Newcastle-on-Tyne in 1863, Sir William Armstrong sounded an alarm as to the proximate exhaustion of our coal fields.

Mr. Bramwell, when presiding over the Mechanical Section at Brighton, drew attention to the waste of fuel.

Dr. Siemens, in an able lecture he delivered by request of the Association to the operative classes at the meeting at Bradford, pointed out the waste of fuel in special branches of the iron trade, to which he has devoted so much attention.

He showed on that occasion that, in the ordinary reheating furnace the coal consumed did not produce the twentieth part of its theoretical effect, and in melting steel in pots in the ordinary way not more than one-seventieth part; in melting one ton of steel in pots about $2\frac{1}{2}$ tons of coke being consumed. Dr. Siemens further stated that, in his regenerative gas furnace, one ton of steel was melted with 12 cwt. of small coal.

Mr. Lowthian Bell, who combines chemical knowledge with the practical experience of an ironmaster, in his presidential address to the members of the Iron and Steel Institute in 1873, stated that, with the perfect mode of withdrawing and utilizing the gases and the improvement in the furnaces adopted in the Cleveland district, the present make of pig iron in Cleveland is produced with $3\frac{1}{2}$ million tons of coal less then would have been needed fifteen years ago; this being equivalent to a saving of 45 per cent. of the quantity formerly used. He shows by figures, with which he has favoured me, that the calorific power of the waste gases from the furnaces is sufficient for raising all the steam and heating all the air the furnaces require.

It has already been stated that by working steam more expansively either in double or single engines, the consumption of fuel in improved modern engines compared with the older forms may be reduced to one-third.

All these reductions still fall far short of the theoretical effect of fuel which may be never reached. Mr. Lowthian Bell's figures go to show that in the interior of the blast furnace, as improved in Cleveland, there is not much more to be done in reducing the consumption of fuel; but much has already been done, and could the reductions now attainable and all the information already acquired be universally applied, the saving in fuel would be enormous.

How many open blast furnaces still belch forth flame and gas and smoke as uselessly, and with nearly as much mischief to the surrounding neighbourhood, as the fires of Etna or Vesuvius?

How many of the older and more extravagant forms of steam-engine still exist?

What is to be done with the intractable householder, with the domestic hearth, where, without going to German stoves, but by using Galton's grates and other improvements, everything necessary both for comfort and convenience could be as well attained with a much smaller consumption of coal?

If I have pointed out that we do not avail ourselves of more than a fractional part of the useful effects of fuel, it is not that I expect we shall all at once mend our ways in this respect.

Many cases of waste arise from the existence of old and obsolete machines, of bad forms of furnaces, of wasteful grates, existing in most dwelling houses; and these are not to be remedied at once, for not everyone can afford, however desirable it might be, to cast away the old and adopt the new.

In looking uneasily to the future supply and cost of fuel, it is, however, something to know what may be done even with the application of our present knowledge; and could we apply it universally to-day, all that is necessary for trade and comfort could probably be as well provided for by one-half the present consumption of fuel; and it behoves those who are beginning to build new mills, new furnaces, new steamboats, or new houses, to act as though the price of coal which obtained two years ago had been the normal and not the abnormal price.

There was in early years a battle of the gauges, and there is now a contest about guns; but your time will not permit me to say much on their manufacture.

Here again the progress made in a few years has been enormous; and in contributing to it, two men, Sir William Armstrong and Sir Joseph Whitworth, both civil engineers, in this country at all events, deservedly stand foremost. The iron coil construction of Sir William Armstrong has already produced remarkable and satisfactory results; in discussing further possible improvements, the question is embarrassed by attempting to draw sharp lines between what is called steel and iron.

There is nothing that I can see to limit the size of guns, except the tenacity and endurance of the metal, whatever we may choose to call it, of which they are to be made.

Sir Joseph Whitworth, who has already done more than any other man in his department to secure good workmanship, and whose ideal of perfection is ever expanding, has long been seeking, and not without success, by enormous compression, to increase those qualities in what he calls homogeneous metal. Make the metal good enough and call it iron if you will, and the size of a gun may be anything: the mere construction and handling of a gun of 100 tons, or of far greater weight, with suitable mechanical appliances, presents no difficulty.

Relying on the qualities of his compressed metal, Sir Joseph is now seeking by a singular experiment to limit the travel of the recoil, as far as practicable, to the elasticity of the metal. By attaching the muzzle of the gun to an outer casing, through which the force of the recoil is carried back to the trunnions, he proposes to avail himself of this elasticity to the extent of one-and-a-half times the length of the gun; whether its elasticity alone in so short a space will suffice without other aid is, perhaps, doubtful; but other aid may be applied, and the experiment, whether successful or not, will be interesting.

Docks and harbours I have no time to mention, for it is time this long and, I fear, tedious address, should close.

"Whence and whither," is an aphorism which leads us away from present and plainer objects to those which are more distant and obscure; whether we look backwards or forwards, our vision is speedily arrested by an impenetrable veil.

On the subjects I have chosen you will probably think I have travelled backwards far enough. I have dealt to some extent with the present.

The retrospect, however, may be useful to show what great works were done in former ages.

Some things have been better done than in those earlier times, but not all.

In what we choose to call the ideal we do not surpass the ancients. Poets and painters and sculptors were as great in former times as now; so, probably were the mathematicians.

In what depends on the accumulation of experience, we ought to excel our forerunners. Engineering depends largely on experience; nevertheless, in future times whenever difficulties shall arise or works have to be accomplished for which there is no precedent, he who has to perform the duty may step forth from any of the walks of life, as engineers have not unfrequently hitherto done.

The marvellous progress of the last two generations should make every one cautious of predicting the future. Of engineering works, however, it may be said that their practicability or impracticability is often determined by other elements than the inherent difficulty in the works themselves. Greater works than any yet achieved remain to be accomplished—not perhaps yet awhile. Society may not yet require them; the world could not at present afford to pay for them.

The progress of engineering works, if we consider it, and the expenditure upon them, has already in our time been prodigious. One hundred and sixty thousand miles of railway alone, put into figures at £20,000 a mile, amounts to 3200 million pounds sterling; add 400,000 miles of telegraph at £100 a mile, and 100 millions more for sea canals, docks, harbours, water and sanitary works constructed in the same period, and we get the enormous sum of 3340 millions sterling expended in one generation and a half on what may undoubtedly be called useful works.

The wealth of nations may be impaired by expenditure on luxuries and war; it cannot be diminished by expenditure on works like these.

As to the future, we know we cannot create a force; we can, and no doubt shall, greatly improve the application of those with which we are acquainted. What are called inventions can do no more than this, yet how much every day is being done by new machines and instruments.

The telescope extended our vision to distant worlds. The spectroscope has far outstripped that instrument by extending our powers of analysis to regions as remote.

Postal deliveries were and are great and able organizations, but what are they to the telegraph?

Need we try to extend our vision into futurity farther? Our present knowledge, compared to what is unknown even in physics, is infinitesimal. We may never discover a new force—yet, who can tell?

Parliamentary and Law Proceedings.

ADULTERATION OF LEMON JUICE.

At Westminster Police Court, on Wednesday, the 1st inst., Mr. George Purdon, an oilman, carrying on business at 20, King's Road, Chelsea, was summoned under the Adulteration of Food Act for selling lemon juice which was adulterated. Mr. W. Doveton Smyth, solicitor, appeared for the defendant. It appeared from the evidence of the food inspector that he purchased two bottles of lemon juice of the defendant, and told him he should submit them to the analyst, and that he could see it analysed; but the defendant declined to do so.

Dr. Andrew White Barclay, the food analyst of the parish of St. Luke, Chelsea, proved that he had received one of the bottles of lemon juice and analysed it. He found it to contain 20 grains of sulphuric acid in excess. Action had been taken in consequence of complaints that pure lemon juice could not be bought, and an analysis of a previous sample had shown that the defendant's article was adulterated. On the first bottle was a label, which stated that the fact of the lemon juice having passed the customs was a proof of its being genuine. There should be 29 grains of citric acid in a pint of lemon juice, and in this there were only 6. In answer to Mr. Arnold, the witness said that lemon juice was only used as a cooling summer drink, and was given to persons suffering from rheumatism. In the case of rheumatic patients sulphuric acid was very deleterious. Cross-examined.—Lemon juice was a compound and so was lime juice. The latter was a more expensive article, and he had not analysed any. In this lemon juice sulphuric acid was detected "free"—that is added, and not combined with potash. In a pint of lemon juice pure there should be five grains of sulphate of potash. By Mr. Arnold.—Persons purchased lemon juice at oil shops to use medicinally on account of it being much cheaper than if purchased at a chemist's.

Mr. Smyth said that for thirty years Mr. Purdon had carried on this business, and was a man of the highest respectability and position. This lemon juice was purchased wholesale from a firm in the Old Kent Road, and retailed by the defendant as he received it, and the new Act, which would soon come into law, would have operated in his favour. He sold the lemon juice as he received it, without breaking the bulk. The defendant and his family had used it for a cooling drink for some time, and liked it very much, and as there was no injury likely to arise from its use he hoped the magistrate would come to the conclusion that it was not a case contemplated by the statute.

Mr. Arnold said the question was, Did the defendant sell an article which was not what it professed to be, and according to the evidence of the medical gentleman who made the analysis the juice was adulterated with sulphuric acid? He was afraid he had no alternative but to convict, and fined the defendant 1*s.* and 2*s.* costs. Had he been present, he would not have inflicted the penalty, but ordered him to come up for judgment if called on.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

J. C. P.—Formulæ for Syrup of Iodide of Iron and Quinine were given in the *Pharm. Journ.*, May 3, 1873, p. 878.

X. Y. Z.—As plasters and proprietary articles have all failed, we should recommend you to go to the probable root of the evil and consult your bootmaker.

"*Fexop.*"—We fail to identify any practitioner from your description, and would recommend you to consult the Medical Register.

"*A Student.*"—The "New Judicature Act" does not affect the liability of registered chemists to serve on juries.

N. J. Lewis.—We cannot agree with you that to label and register the sale of poisons according to the terms of the Pharmacy Act is a farce, or that it is a safe practice to omit doing so. But it does not follow that for the "poison, wrappers, label and registration and all," no more than a penny should be charged.

A.P.S.—We agree with you as to the absurdity of the practice, but we do not think it worth while to give the gentleman mentioned the temporary fame the publication of your letter would involve.

A. P. S.—The Juries Bill was not brought forward during the last session of Parliament. At present chemists and druggists are not exempt from serving on juries unless they are also pharmaceutical chemists.

E. G. H. Thring.—We are afraid that any attempt to obtain three out of the four seats in Parliament, "now unallotted to any borough, county, or university," to be "allotted to three gentlemen to represent our highly important interests in the councils of the nation" would be futile. Indeed, we are not sure that pharmacists have interests so specially distinct from those of the rest of the nation as to require special representation.

W. Byron.—The "Hospital for Skin Diseases," 52, Stamford Street, Blackfriars; the "British Hospital for Skin Diseases," 56, Great Marlborough Street, W.

"*Alpha.*"—The answers to your questions would depend upon various circumstances. Such matters are best regulated by agreement between employer and employed.

P. B. B.—(1) A Latin Dictionary and Grammar. (2) Bentley and Redwood's 'Elements of Materia Medica' or Scoresby-Jackson's 'Note-Book of Materia Medica.'

G.—(1) *Poa annua;* (2) *Arrhenatherum elatius;* (3 and 4) *Agrostis vulgaris;* (5) *Brachypodium sylvaticum;* (6) *Bromus asper;* (7) *Phalaris arundinacea;* (8) *Phleum pratense;* (9) *Molinia cærulea;* (*a*) *Hieracium rigidum;* (*b*) *Crepis taraxacifolia;* (*c*) *Stachys lanata*—not British. The Curator of the Society's Museum would be glad to receive well preserved specimens of *b* and *c*; *b* should have mature fruit.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Allen, Mr. Wigner, Mr. J. C. Williams, Mr. G. L. Napier, Mr. C. Shapley, Mr. Thresh, "Embryo Pharmacist," "Disgusted," H. P.

⁂ We are compelled by want of room to defer answers to several correspondents until next week.

SOLUTIONS OF ALKALOIDS IN OIL.

BY J. B. BARNES.

The disagreeable odour of oleic acid must, I think, necessarily limit its use as a solvent for alkaloids and certain metallic bases when these substances are required for medicinal application.

I therefore beg leave to suggest the use of glacial acetic acid as a means of preparing solutions of alkaloids in oil when required for liniments.

It is well known that this acid mixes with fixed and essential oils in all proportions. I find that solutions of aconitia, atropia, morphia, and veratria, in glacial acetic acid, unite with almond oil and oil of turpentine, forming clear solutions, which after exposure in unclosed test tubes for several days remain clear and without change; quinia and cinchonia also unite with almond oil when dissolved in glacial acetic acid.

These solutions may be made of any desired strength, and do not lose their transparency when mixed with chloroform and camphor.

EMETINE.[*]

BY A. GLENARD.

In a note recently presented to the French Academy the author has described the first portion of an investigation of the alkaloid of ipecacuanha. The following is a *résumé* of the principal results :—

New Process for the Extraction of Emetine.—The author's process is based upon the combined use of lime and ether. It consists in treating with ether a suitably prepared powder, or an extract of ipecacuanha, and lime, or the precipitate formed upon adding an excess of lime to a solution obtained by treating ipecacuanha in the cold with water acidulated by sulphuric acid. Either of these mixtures, or the precipitate, when treated with ether, will yield all the alkaloid it contains.

The alkaloid may be obtained from the ethereal solution by distilling it to dryness and treating the residue with acidulated water, or by at once shaking the solution with acidulated water. A more or less acid aqueous liquid is thus obtained, which, upon the addition of ammonia, yields the emetine almost colourless, and much more pure than that produced by the processes ordinarily employed.

Preparation of Crystallized Hydrochlorate and Pure Emetine.—When water acidulated with hydrochloric acid is employed to remove the emetine from the ether, an acid solution is obtained, which, when sufficiently concentrated by evaporation, forms a nearly colourless, solid, crystalline mass. This mass is formed of extremely delicate needles, formed in bundles that radiate around a central point, and form small spheres with an embossed surface, resembling mulberries in appearance. Upon pressing these crystals in a cloth, the more or less coloured mother liquor runs off, and the crystals redissolved in water give a colourless solution, from which a fresh crystallization of perfectly pure hydrochlorate of emetine can readily be obtained.

The production of this crystallized hydrochlorate of emetine is worthy of notice, since it does not accord with what has been stated by previous authors, who have all considered emetine to be incapable of forming crystallizable salts. It is especially interesting in that it furnishes a convenient and certain method of obtaining perfectly pure emetine, for which it is only necessary to precipitate a solution of the hydrochlorate with an alkali. But it is important to observe that ammonia does not precipitate all the emetine of the hydrochlorate, and that the precipitate is less in proportion as the salt is more acid. It might appear from this that emetine is soluble in hydrochlorate of ammonia. But the author finds that it is the result of a decomposing action exercised by the emetine upon the hydrochlorate of ammonia, as is shown by the following two experiments. If a little dry powdered emetine be placed in a glass containing a solution of hydrochlorate of ammonia it may be observed to agglomerate and become transformed into a soft resinoid mass; at the same time the disengagement of ammonia may be recognized, and the resinoid mass gradually undergoes a kind of metamorphosis and becomes white and crystalline. Again, if emetine in powder be suspended in water and solution of hydrochlorate of ammonia be gradually added the emetine is dissolved, and upon evaporation of the solution crystals of a double hydrochlorate of emetine and ammonia are obtained.

The author believes the decomposition of hydrochlorate of ammonia by an organic alkali to have been hitherto unobserved. It does not appear, however, that emetine is alone in this action, as the author has observed that quinine, under similar conditions, behaves in the same manner.

Composition of Emetine and its Hydrochlorate.—These substances, dried at 110° C., gave upon analysis results corresponding with the following centesimal composition :—

	Emetine.	Hydrochlorate of Emetine.
Carbon	72·25 . . .	63·00
Hydrogen. . . .	8·61 . . .	8·15
Nitrogen	5·36 . . .	4·75
Oxygen	13·78 . . .	11·64
Chlorine	— . . .	12·46

From these figures the author has constructed the following formulæ :—

$$\underbrace{C_{30}H_{22}NO_4}_{\text{Emetine.}} \qquad \underbrace{C_{30}H_{22}NO_4 \cdot HCl}_{\text{Hydrochlorate of Emetine.}}$$

CONVERSION OF BRUCIA INTO STRYCHNIA.[*]

BY PROF. F. L. SONNENSCHEIN.

Brucia $C_{23}H_{26}N_2O_4$ and strychnia $C_{21}H_{22}N_2O_2$ differ, apparently, considerably in their composition; but the former may be easily converted into the latter. Referring to the formulas it will be seen that strychnia is produced by combining brucia with 4 O and eliminating $2\,H_2O$ and $2\,CO_2$. This is effected as follows :—Brucia is moderately heated with four to five times its weight of diluted nitric acid, when a red coloration will be produced and gases evolved, which cause in a mixture of barium chloride and ammonia a white precipitate of carbonate of barium. The red solution is concentrated in a water-bath, supersaturated with potassa and agitated with ether, which, on spontaneous evaporation, leaves a reddish mass containing a red colouring matter, a yellowish resin and an alkaloid, which is obtained pure by dissolving in an acid and crystallizing. This base has the intensely bitter taste and other properties of strychnia, gives the characteristic reactions with potassium chromate, cerium oxide, and sulphuric acid, and yields with chlorine the sparingly soluble compound. The muriate crystallizes in fine, silky needles, from which 9·20 per cent. chlorine was obtained. $C_{21}H_{22}N_2O_2HCl$ contains 9·58 per cent.

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[*] From the *Journal de Pharmacie et de Chimie* for September, p. 178.

[*] *American Journal of Pharmacy* for August; from *Pharmac. Centr. Halle*, 1875, No. 21.

The conversion of brucia into strychnia is not only highly interesting, but it is likewise of great importance in forensic analysis, proving again that in such cases the employment of oxidizing agents is admissible only with great caution. A student who had received for analysis a mixture containing, among other substances, brucia and nitrate of lead, employed the process of Stas and Otto for the separation of alkaloids, and found strychnia instead of brucia, which had been oxidized by the liberated nitric acid.

If strychnia is heated with a strong base, like potassa, soda, or baryta, for some time in a sealed glass tube placed in a water bath, a body is obtained which no longer shows the reactions of strychnia, but resembles brucia in its reactions. The experiments on this decomposition, which is likewise of importance in forensic analysis, are not yet concluded.

JAPANESE EDIBLES.*

A recent number of the *Gardeners' Chronicle* contains the following interesting information respecting some of the peculiarities of Japanese edibles, a large series of which was exhibited in the Japan court of the International Exhibition at South Kensington in 1873, and the vegetable portion was afterwards presented to the Kew Museum, where the specimens are now exhibited in their respective natural orders.

The collection is very varied, and numbers some 178 specimens. The Leguminosæ furnish a large proportion, the seeds of several varieties of *Phaseolus*—known as red, black, and white beans, according to their colour—forming a prominent and important article of food, for, besides being sold in their natural state, that is, simply dried like haricots, they are ground into a fine meal which is prepared in a variety of ways for table. Cakes prepared from this meal are in the collection, also a peculiar kind of preparation in long thin strips like isinglass. The cakes are about 2 inches square and half an inch thick; they have the appearance of having been compressed in moulds by heavy pressure and simply dried, perhaps without artificial heat. Both these cakes and the isinglass-like preparation are of a dull yellow ochre colour. Beans there are also preserved in sugar and others candied or crystallized; these are probably also species of *Phaseolus*, but their distinguishing characters are lost in their preparation. *Phaseolus Mungo* is a species or perhaps, more properly, a variety, which is largely cultivated in India and China for the sake of its small edible seeds, of which there is a green and a black variety. Several varieties are also cultivated of the Soy bean, Soja hispida or Glycine Soja, the produce of a hairy herbaceous plant with yellow or violet-coloured papilionaceous flowers and a small pod containing from two to five seeds, very similar in appearance to the common garden pea and varying as much in size. These seeds are largely used by the Japanese for making the sauce called by them Sooja and better known to us as Soy. Not much seems to be known about the preparation of this sauce, but it is said to be made by boiling the beans in water with an equal quantity of wheat or barley, and after leaving it to ferment for three months and adding salt and more water, to strain and bottle it, when it is ready for use. It is a favourite ingredient in many of the native Japanese and Chinese dishes, and its use is said to greatly help digestion. Besides their use in the preparation of the sauce, the beans are consumed in immense quantities as a vegetable, simply boiled or cooked in various ways.

Rice, of course, enters very largely into Japanese food products, specimens of which are shown, as also rice, starch, meal, etc., of different qualities; barley, wheat, and millet are also included, a specimen of the latter being shown simply cleaned of its husk, and exhibiting small white granules, very similar to, but much smaller than, the smallest tapioca. Buckwheat, the seeds of *Fagopyrum esculentum*, is too well known to need more than a passing mention to say that it is included by the Japanese as a food plant.

Amongst other fruits and seeds not to be classed with pulse or grain occurs the chestnut (*Castanea vulgaris*), the seeds of which are shown of three distinct sizes, the smallest about the size of a small kidney bean, and the largest about as big round as a penny. These are all devoid of their outer husk. In many parts of the world the acorns of the indigenous oaks form an article of food, one of the most remarkable being certainly the Chinese *Quercus cornea*, which is less astringent than most acorns, indeed it somewhat resembles the walnut in flavour. *Q. cuspidata* is one of the edible species of Japan. It is not unusual in continental Europe to see the fruits of the apricot dried and so preserved for use at a time when the fresh fruits are not obtainable; in Syria they are even rolled out, after the stones have been abstracted, into a thin pasty sheet, from which can be cut pieces of any size required. In Japan the fruits are simply dried, when they have a shrivelled appearance, somewhat like a French plum. An important fruit and one of which numerous varieties are known in India, China, and Japan, is the jujube (*Zizyphus jujuba*). These varieties are characterized chiefly by the shape, size, and colour of their fruits, the most common form of which somewhat resembles the Cornelian cherry (*Cornus mascula*). These fruits have an agreeable, sweetish flavour and are much esteemed for dessert purposes. Under the name of Japonicas the fruits of *Z. sinensis* are occasionally seen in Covent Garden Market, while in the countries bordering on the Mediterranean those of *Z. vulgaris* are commonly eaten both in a fresh and a dried state.

Turning to the Ebenaceæ we find one well-known fruit, the kaki of the Chinese—*Diospyros Kaki*. The tree is cultivated in India, China, and Japan, in each country the fruit being grown for the sake of its finely-flavoured pulp, which is not unlike that of a plum. It is of a reddish colour when ripe, and in size and shape is very much like those of an ordinary apple. The Japanese eat them freshly gathered, dried in the sun, or preserved in sugar; treated in this last way they are very nice, when freshly done, but apt to get tough or leathery by keeping.

The little order, Myricaceæ, which contains several economic plants of interest, such as those species of *Myrica* the small fruits of which yield such large quantities of wax as to be worth collecting for candlemaking in their native countries, furnish in Japan an edible fruit. This fruit, which is that of *Myrica Nagi*, has an agreeable sub-acid flavour, and is eaten both in its raw state and when cooked. The plant is cultivated entirely for the sake of its fruit.

Melons, ginger, and other products which ordinarily occur in tropical countries are, of course, included amongst those of Japan, but we will pass on to the consideration of those seeds which are of an oleaginous nature, and which are used chiefly for the sake of their oils. Foremost amongst these is the *Sesamum indicum*, two varieties of which, the black and the white, are included in the collection. This plant belongs to the order Pedaliaceaæ and is an annual herb, with a small quadrangular, oblong two-valved and two-celled capsular fruit, each cell containing a number of small flattened seeds. These seeds contain an immense quantity of oil of a superior quality, which is expressed and used not only in cookery but for a variety of other purposes, indeed it is said to be often substituted for and mixed with olive oil, as well as with oil of almonds. The seeds are, moreover, used as food, after the expression of the oil. The plant is very generally cultivated in most warm countries for the sake of the oil.

(*To be continued.*)

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* From the *Gardeners' Chronicle*, August 28, 1875.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 11, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PREPARING FOR EXAMINATION.

"THE chief cause of failure to pass examinations is a want of thoroughness." Such is the judgment of Professor FAWCETT, who speaks with the authority of one having experience as an examinee and examiner, besides no mean reputation as a statesman. The dictum is not at all new, but its importance to many of our younger readers, and the fact that it was uttered at a meeting presided over by a gentleman who has recently left his mark upon one of the examinations of the Pharmaceutical Society, induces us to call attention to some of the remarks by which it was accompanied and enforced.

The occasion was the distribution at Salisbury of the prizes and certificates awarded in connection with the late Oxford and Cambridge local examination. Doubtless therefore among Mr. FAWCETT'S auditors were many to whom an examiner's opinion as to the best way of preparing for an examination would have special interest. Of course Professor FAWCETT did not treat the question from the standpoint from which study is looked upon as a means to pass an examination. On the contrary, the legitimate influence of the examination on education was limited to its acting as an incentive to study, and inducing a habit of careful expression and accurate thought.

Professor FAWCETT says that nothing produces so unfavourable an impression upon an examiner as a question answered in a loose and shambling style, and of this there can be little doubt. But when he goes on to say that there cannot be a greater mistake than for a teacher or a pupil to suppose that going over a wide range of subjects in a cursory and shallow manner will produce as good a result in an examination as obtaining a more complete mastery over a much smaller number of subjects, the statement unfortunately requires some qualification. Undoubtedly excellence in a few subjects ought to be regarded as a much greater distinction, and is certain to prove permanently far more beneficial, than mediocrity or showy superficiality in several subjects. But when it comes to a question of marks,—which teacher and pupil usually regard, improperly, of course, as an important result in an examination, — Professor FAWCETT himself confesses that a man possessing a moderate knowledge of one subject and a superficial acquaintance with two others would be likely to fare better than a man who possesses a profound knowledge of one subject. In fact the influence of examinations upon education is, to say the least, a very mixed one, and one to which it is seldom safe to appeal. But the Professor gets back upon safe ground again, when he says that two or three subjects, carefully thought out and thoroughly mastered, will give a strength and solidity to the mind and a soundness to the judgment, which will prove invaluable in after life, but cannot be looked for from a mental training less thorough and complete.

Professor FAWCETT has no sympathy with the outcry about the injury done to the body and mind through overwork in preparing for examination. On the contrary after having had during thirty years abundant opportunities for watching those who have passed examinations where competition is most severe, he has come to the conclusion that where one has suffered any mental or bodily injury through overwork, twenty have brought upon themselves far more lasting and serious harm by leading a purposeless and indolent life.

Professor FAWCETT believes that only a certain number of hours can be profitably spent in reading each day, and this is an important consideration for those who contemplate leaving the work of preparing for examination to be crowded into a few weeks. When the mind is jaded the work that is done leaves no good results behind, and six hours' reading a day will often produce a better result than ten hours'. This lesson was enforced by quoting the words of his tutor at Cambridge, who used to say "I will never ask you to read more than five hours a day, if you will only work while you are at it as hard as you can." Few pharmaceutical students can command more or even as many hours daily for study; we cannot do better therefore than press home upon them this wise advise to work hard while they are at it, and above all, to be thorough.

UNUSUAL DOSES.

WE are glad to notice that the reference made in the Address of the President of the Pharmaceutical Conference to the important subject of some guarantee being given for the correctness of extreme doses, enforced as it was by the apposite experience of Mr. BOORNE, has been commented on by some of our medical contemporaries. The *Lancet* considers "it is but due to dispensers to make such prescriptions clear and not leave them in anxious doubt." The *British Medical Journal* says that some indication that any extreme dose which it may be desirable to order is intentionally and advisedly prescribed, "would be useful in many cases in saving anxiety and possible injury to the patient, the dispenser, and the prescriber." But it considers Mr. GROVES' remark that it may become necessary to urge this point upon the attention of the Government rather a strong suggestion, and one of which "possibly constituents might think two or three times before acting on." Whatever this may mean, it appears scarcely to come with good grace from the organ of a Society that has a standing committee whose express duty it is to try to impress the Society's views upon legislation.

IPECACUANHA CULTIVATION.

In his report on the Royal Gardens at Kew, for 1874, the Director, Dr. Joseph D. Hooker, referring to the attempts made to acclimatize various plants in other than their native countries, says that the prospects of ipecacuanha cultivation are far less encouraging than those of the cinchona cultivation. This arises not so much from want of success in establishing and increasing the plant as from the apparently extremely slow growth of the underground root stock from which the drug is obtained and the small yield of even a fully grown plant. Nevertheless, he considers the cultivation should be persevered in.

LEAD IN COSMETICS.

In a communication to the *Medical Times and Gazette*, for August 28, Dr. George Johnson, F.R.S., mentions two cases that have come under his notice where chronic lead poisoning has resulted from the use of a face powder. In both cases the sufferers were ballet-dancers, and the "flake-white," used for the purposes of their calling consisted mainly of carbonate of lead with a minute quantity of chalk.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.

On Tuesday last the American Pharmaceutical Association was to have commenced its meeting in Boston, concluding with a steamboat excursion in Boston harbour on Friday. A numerously attended meeting was expected, and considerable interest appears to have been excited with respect to the nomination of the next President, who will have to preside over the great "centenneial" meeting of pharmacists to be held in Philadelphia in 1876.

THE POSTMASTER-GENERAL AND THE POSTAGE OF SAMPLES FOR ANALYSIS.

It will be remembered that by the 16th section of the Sale of Food and Drugs Act, 1875, provision is made that when the analyst does not reside within two miles of the residence of the person requiring an article to be analysed, such article may be forwarded to the analyst through the post-office as a registered letter, subject to any regulations which the Postmaster-General may make in reference to the carrying and delivery of such articles. In anticipation, therefore, of the Act coming into operation on the first day of next month the Postmaster-General has just issued notice that these regulations will be as follows:—

"1. Each packet must be addressed according to the official designation of the analyst, as 'Public Analyst,' or otherwise, and the nature of its contents must be stated on the front of the packet.

"2. Any postmaster at whose office a packet for a public analyst shall be tendered for registration may refuse to accept it for this purpose, unless it be packed in so secure a manner as to render it at least unlikely that its contents will escape and injure the correspondence.

"3. Liquids for analysis shall be contained in stout bottles or bladders, which shall be enclosed in strong wooden boxes with rounded edges, the boxes being covered by stout wrappers of paper or cloth, and no such packet shall exceed eight inches in length, four inches in width, or three inches in depth.

"4. No packet whatever addressed to a public analyst shall exceed the dimensions of eighteen inches in length, nine inches in width, or six inches in depth. The postage and registration fee on each packet must, of course, be prepaid."

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 193.)

Tuesday, August 24 (*continued*).

On reassembling after luncheon the first paper read was on—

The Microscopy of Natal Arrowroot.

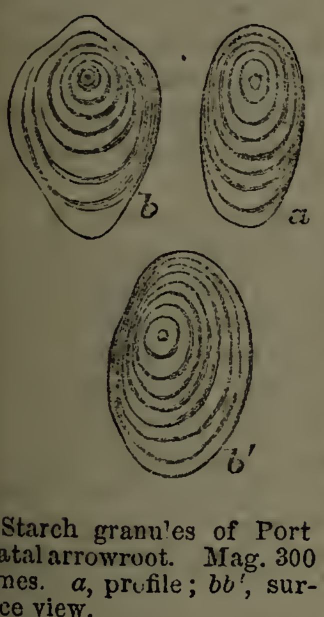
BY THOMAS GREENISH, F.C.S.

Whilst engaged in 1871 and 1872 in a prolonged microscopical examination of the starch grains generally found in commerce, and more especially those commercially and popularly known as arrowroots, I observed some distinctive characters in that imported from Natal which enabled me with little difficulty to identify the product of that colony, since the same characters do not apply in an equal degree, if at all, to the produce of the maranta obtained from any other source. There were placed at my disposal samples of maranta from every British Colony that yielded it, and probably every country from whence commercially it was an article of export; but in none of them did I find those special differences which apply to that of Natal. I felt inclined to doubt what has generally been accepted as a fact that the Natal arrowroot is the produce of a maranta. I therefore forwarded a sample of it to the late Mr. Daniel Hanbury, at the same time asking him if he had any knowledge as regarded the plant yielding Natal arrowroot. He replied that he had no reason to believe otherwise than it was a maranta, at the same time thanking me for bringing under his notice those points of difference which had suggested my inquiry. I had not at that time any special object in pursuing the subject further, and simply recorded the fact in my notes on this particular starch.

Increased interest in the determination of the starch granules has been observable since the introduction of the Adulteration Act, and some mistakes which occurred and which became public induced me to turn my attention again to this subject, for I observed that Natal arrowroot had been the source of some difficulty. Two cases are recorded in the *Pharm. Journ.*, Feb. 21, 1874, p. 685, and July 25, 1874, p. 75, one occurred at Greenock, the other at Uttoxeter, in each of which the arrowroot in question was the produce of Natal. I may also add that one of several samples of arrowroot lately sent to me for examination I pronounced to be a Natal maranta. I was afterwards informed that this arrowroot had been purchased and invoiced as Natal arrowroot, but one sample of it having been sent to a public analyst, who had named it tous-les-mois, and a second to an analytical chemist who said that it was potato starch; the purchaser consequently felt himself in a difficulty.

In the scientific or historical literature of the starches, published in this country, I had not met with any notice of the difference under the microscope between the starch from the maranta grown in Natal and that grown in any other country, and I felt some hesitation in publishing my own unsupported observations on this subject. Quite recently, however, I have found that the difference has been noticed on the Continent. An able microscopist, Dr. Julius Wiesner in a work published by him, 'Microscopische Untersuchungen,' devotes one chapter to the "Morphological relations of some new or little known starch grains," and among others he mentions Natal arrowroot in the following paragraph :—

"Arrowroot from Port Natal has appeared in German commerce, but of the origin or botanical source of it nothing is known. This starch is found to agree with no other arrowroot of commerce, neither with any of the known kinds of starches. It consists of single grains which are circular or oval to a rounded or trigonal contour, and are somewhat flattened. The length of the grains ranges between 0·008 to 0·069 m.m., mostly between 0·031 and 0·045 m.m. The hilum, a round solid body, appears especially clear both under water and glycerine. The eccentricity of the granules ranges between $\frac{1}{1{,}5}$ and $\frac{1}{3}$; the very numerous laminæ appear under water with especial clearness." Wiesner also adds that in scientific literature he has only found one notice of it, and that by Flückiger,* who states that the botanical source of Natal arrowroot is unknown to him, that the grains are very irregular, elliptic or globular, and even trigonal; and that often the grains have the appearance of potato starch, but in size they do not exceed 0·070 m.m. Potato ranges between 0·060 and 0·100 m.m.



Starch granu'es of Port Natal arrowroot. Mag. 300 times. *a*, profile; *bb'*, surface view.

Wiesner gives in his work the annexed drawings of Natal starch. The mussel-shaped granule very well illustrates one, and probably the most common form of granule of which the Natal arrowroot is composed; and his description of the laminæ very fairly represents my own view of the subject.

Vogl,† author of the 'Commentary on the Austrian Pharmacopœia,' also mentions the Natal arrowroot and refers its origin to the *Canna edulis*, the plant yielding tous-le-mois.

Nägeli in his great and exhaustive work‡ on the starch grains, makes no mention of Natal arrowroot by name; but after describing a sample of Jamaica arrowroot from *Maranta Arundinacea*, he says that "he has had sent to him from England a sample of starch, as a variety of potato starch, but he finds that it is a kind of Jamaica arrowroot," and then he goes on to give a description of it. "The grains are from oval to round, frequently trigonal, seldom having a transverse fracture for hilum; the eccentricity is $\frac{1}{3}$." This description differs from one that he had just previously given of Jamaica arrowroot, and does not apply to potato, but corresponds with Wiesner's description of the Natal, and it seems probable that the starch sent to him from England as a variety of potato starch was really a Natal starch. In support of this opinion I may add that Dr. John Squiers, of Demerara, who conducted a most careful investigation into all the tropical starch producing plants, in his report published in 1847, states that "arrowroot from Africa had been sent to the West India Islands in the ships with the liberated Africans and thence re-exported to England." There is, therefore, I think, great probability that the arrowroot in question was originally from the coast of Africa.

It must now be evident that I am not alone in my observation of Natal arrowroot differing in its appearance under the microscope from the produce of any other maranta known in commerce.

It would be difficult to state from the appearance of any single granule under the microscope, that it was even a maranta, and it would be still more difficult to say that it was a maranta from Natal. But when seen in number on the field of the microscope, the peculiarities to which I have referred could not, I think, escape the most casual observer, much less the eye educated to the microscopical analysis of starch granules. Wiesner's description is very characteristic, the laminæ are seen with singular clearness. He refers also to the *eccentricity of the starch*. In the microscopy of starch the word concentric is often misplaced, and the term eccentric is rarely used in this country. Take as an illustration, one of the three starches, wheat, barley, or rye, having the form of a circular disc, the hilum in the centre is centric and the laminæ around it are concentric. If, again, another form be taken, represented by curcuma, canna, maranta, potato and others of similar shape the hilum is out of the mathematical middle point or centre, it is eccentric, and although the first ring may be concentric with regard to the hilum, the remainder are eccentric; the curcuma is an instance of excessive eccentricity. Compare the distance of the hilum from the upper part of the grain with its distance from the lower part and it gives the eccentricity. The eccentricity of grains of the same kind of starch is tolerably constant. Now if this plan of measurement be applied to the granules of the Natal maranta, it will be found that they average an eccentricity of $\frac{1}{1{,}5}$ to $\frac{1}{3}$. This is an important feature in Natal starch; other marantas as well as potato starch average $\frac{1}{6}$ eccentricity.

I have used the word "hilum," because it is a commonly accepted term, but it is also a misplaced one. Properly it should be called the "nucleus." Let the early history of a starch granule be considered. Our first knowledge of it is a cell filled with a homogeneous substance; there is neither hilum nor the appearance of lamination. In process of growth a differentiation takes place; there is a nucleus formed, and a separation of the remainder into layers, alternating in density. One layer has been termed anhydrous, but incorrectly; the German words signifying "water-rich" and "water-poor" layers more truly express their true conditions. They are optically different, depending upon the relative refractive powers of the layers in different states of density. The nucleus in the living starch grain is the softest part; it contains matter of the most recent formation, and is the most delicate part of the granule. It is on this point that the cracks in the drying of the starch grains occur, and being filled with air, show as dark lines under the microscope, and to these in their different forms the term hilum is given. Starch grains fresh from the plant contain 40 per cent. of water. Many starches have what may be termed a special fracture; this in granules of the same kind is often very characteristic of the particular starch, as in rye starch. But too much reliance should not be placed on these accidental markings. The starch granule when first formed has no such mark, but either from pressure in the cells, or too rapid an alteration in density, they do occasionally occur even in fresh starch just obtained from a living plant. The singular clearness of the laminæ is, I believe, the reason why Natal starch has been so frequently mistaken for that of potato. The starch of the maranta differs from that of the potato, in being on the average only two-thirds the size, the laminæ are less distinct, also there is generally a transverse fracture as a hilum, and as a rule the nucleus of the potato starch is at the smaller end of the granule. If measurement be resorted to, it will be found that potato ranges from 0 060 to 0·100 m.m., while a maranta ranges from 0·022 to 0·068 m.m. These points together with the shape of the granule are distinctions broad enough to separate potato from maranta at least, if not from any other starch of commerce.

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* Nahrungs und Genussmittel.

† Lehrbuch der Pharmacognosie.

‡ 'Die Stärkekörner,' Zurich, 1858.

The question now arises—What is the botanical source of Natal arrowroot? I did hope through the kind assistance of some friends to have shewn you here to-day a specimen of the *Maranta arundinacea* direct from Natal, and from which there can, I think, be little doubt that the arrowroot is obtained, but I have been unsuccessful and even disappointed. The literature of this subject is very scanty. In the *Pharmaceutical Journal** is a note to this effect. "Prof. Bentley exhibited a plant which had grown from one of the rhizomes sent over with African arrowroot, a specimen of which was exhibited at a previous meeting of the Society. It had been cultivated at the Royal Botanic Society's Gardens, Regent's Park, and found to be *Maranta arundinacea*."

There is no mention here of Natal, and although arrowroots are produced in the Canary Isles, Liberia, Lagos, and Sierra Leone, they are not in sufficient quantity for export. In a history of the Colony of Natal, by the Rev. W. Holden (1855), is printed the second annual report of the Agricultural and Horticultural Society (1851), and it contains some valuable information bearing directly on this part of the subject. Mr. McKen, the secretary, states that "from a single plant of the arrowroot (*Maranta arundinacea*) which he had procured with other valuable plants from the Royal Gardens at Kew, he had then sufficient to plant at least the third of an acre, and from the abundant produce and easy cultivation he had no doubt it would soon become an important article of export." In 1856, Natal exported 818 cwts., in 1870 the quantity it had increased to 3,320 cwts.

In the absence of a specimen of the identical plant, this is the most satisfactory evidence that I can furnish that the arrowroot imported from Natal is the produce of *Maranta arundinacea.*

Lippman† has recorded in a tabular form under three heads the results of a series of experiments on the temperature at which the different starch grains "swell," "burst," and "lose all shape." I have done the same for comparison with each of the three starches—Bermuda, St. Vincent, and Natal. I mixed 1 drachm of the starch with 6 oz. of cold water, and gradually, with constant stirring, raised the temperature.

Natal Starch.

50° C. No perceptible change.
55° C. A few grains swollen with stellate markings.
60° C. Many have lost all form, but small ones little affected.
65° C. Greater part a shapeless mass.

Bermuda.

50° C. No perceptible change.
55° C. No perceptible change.
60° C. Grains slightly swollen.
65° C. Some have lost all form, small grains little affected.

St. Vincent.

50° C. No change.
55° C. No change.
60° C. Very little change, only a few swollen.
65° C. Very slight general swelling, and one here and there a shapeless mass.

It results from these experiments that Natal at 55° C. seems equally affected with Bermuda at 60° C., and St. Vincent at 65° C. I made an examination of each under the microscope at every rise of 5°. I must, however, add that there is great difficulty in determining the exact bursting point of starch granules. Any table can only be considered, therefore, as a relative approximation.

It is a curious fact that at a temperature which bursts the larger grains the smaller ones are scarcely acted upon. Nägeli states that the swelling of starch grains as a rule begins at 55° C. for large grains, and 65° for small; the small ones, requiring 10° higher temperature than the average of larger ones to produce the same result. I carried my experiments further to determine whether the same difference existed in the temperature required to make a starch jelly. For this purpose I used—

ʒj starch.
℥ss cold water.
ʒiss boiling water.

I mixed the starch with the ℥ss cold water, and then added the boiling water and gradually with constant stirring raised the temperature until complete gelatinization took place. I found that Natal required 65° C., Bermuda 70° C., and St. Vincent 75° C. The St. Vincent jelly was the most transparent, the others were somewhat translucent.

As a practical result, a very important yet difficult question may be asked—Have these experiments any bearing on the relative dietetic value of Natal as compared with other starches? Nägeli, to whose work on the starches I must again refer, says that the structure of the starch granule is a system of laminæ from the nucleus to the outer envelope; that these laminæ and the whole contents of the grain consist of a very intimate mixture of granulose and cellulose throughout in different relative proportions; that if the granulose be extracted, the cell structure remains as a skeleton of cellulose; that granulose is very digestible and cellulose much less so; also that wheat starch contains more granulose than potato starch. It seems, therefore, probable that the dietetic value of the different starches may be in some measure due to the relative proportions of these two bodies; the dense laminæ containing relatively more cellulose than those that are less dense. These facts, taken in connection with the experiments, point to the probability that Natal starch may be more valuable in a dietetic point of view than some others which are found in commerce.

Raspail, in 1825, described a starch grain as consisting of an outer envelope or integument containing a gum soluble in water.

Fritzsche, in 1834, proved Raspail's views to be incorrect, and was the first to publish the lamellated structure of the starch grain. His views have since been more fully elaborated by Nägeli, and are now generally accepted: that the starch granule is made up of different layers partitioned by a cellular membrane, the nucleus being less dense than the cell wall. But the more recently published views of Hartig * on the structure of the starch granule, accompanied by some very careful experiments and drawings in illustration, require, I think, that the very generally accepted theory on this subject be somewhat modified.

In a very interesting paper on the edible starches of commerce by Mr. P. L. Simmonds, read at the Society of Arts, March 28, 1873,† he states that "in Bermuda the production of arrowroot has been declining and has now given way to other and more profitable crops." Bermuda exported in 1851 arrowroot to the value of £10,320, in 1861, £4,291. Imported into the United Kingdom, 1868, 60 cwt.; 1869, 90 cwt.; 1870, none.

As it seems probable therefore, that at no very distant period Bermuda arrowroot may exist only in name, the relative dietetic value of importations from other colonies may profitably engage our attention.

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* *Pharm. Journ.*, 1st series, vol. x., p. 272.

† Jahresbericht für Chemie, von Liebig und Kopp, 1861, p. 745.

* Ueber den Bau des Stärkemehls, v. Prof. Dr. Th. Hartig.

† *Pharm. Journ.* [3], vol. iii., p. 833 and 853.

That the peculiarities in the starch to which I have referred exist, there is abundant evidence; that they have been a source of error in diagnosis, there can be no doubt. But why there should be this difference in the starch of a maranta grown in Natal, distinguishing it from the produce of the same plant grown in any other locality, forms an interesting subject for further investigation, and we must be content to wait until the life history of a starch granule is better understood and can be fairly written.

The **President** said no doubt the members all felt, as he did, thankful to Mr. Greenish for having had the patience to conduct all these experiments, and he thanked him heartily in their name. He had not been aware that there was any doubt as to the source of Natal arrowroot, but he thought Mr. Greenish had now made it pretty plain what that source was. He wished to ask whether the condition of the granules as to dryness did not affect the behaviour of starch, and whether the experiments had been made with starch dried at a uniform temperature.

Mr. **Greenish** said the starches used had been kept in different situations, whether they were equally dried he did not know.

The **President** remarked that it was singular to hear that Bermuda arrowroot was not now imported, for an article called by that name was on sale in the shops, and was being sold in his own shop at that time. The paper was exceedingly valuable in its elucidation of the structure of the grains.

Mr. **Stoddart** said he had been much interested in the paper, but he could not quite agree with the author. He was one of the parties to the Uttoxeter case, and he was surprised that any one should have mistaken the arrowroot for potato-starch, the hilum and the rugæ were not in the same position as in potato-starch, and no microscopist could look at the sample and not be struck with the extraordinary distinctness of the lines; there was no other starch in commerce at all like it. When he saw it, he supposed it had been dried at different temperatures, the distinction was so very marked. What was wanted was to be able to see the starch granules as opaque objects. The refractive power of the light in the microscope was so great that it disturbed the vision, but if the granules could be seen as a solid marble, there would be a vast difference. Take wheat starch for example. A question arises as to whether it is adulterated with starch from some leguminous plant, the granules of which assume a kidney shape. There was no rule as to shape to go by; but the positions of the hilum and the rugæ were so strongly marked in Natal arrowroot that no man who was accustomed to look through a microscope could mistake them. He saw the sample at Uttoxeter which the analyst had mistaken for potato starch; but any one who compared the two would see that there was as much difference between the rugæ in the Natal arrowroot and in the potato starch as there was between that starch and turmeric. It did not matter whether you looked at them in fluids or in the dried state. He had heard a number of persons say that when the granule was in fluids they could not see the hilum, nor when it had been dried. He himself used a mixture of spirit, water, and glycerine, he could hardly tell the exact proportions, but with this mixture he found the rugæ and the hilum of the granules of starch very distinct indeed. The subject was a most interesting one and well worthy of discussion.

Mr. **Mackay** said reference had been made to some arrowroot which had been condemned in the West of Scotland. It was arrowroot which was not imported by himself, but which was purchased from a first-class house in London, and sent in original cases as it was received—not, however, before it was examined—and forwarded in the belief that it was genuine Natal arrowroot. The customer wrote to him asking for a written guarantee. He declined to give one, but stated his opinion that it was genuine Port Natal arrowroot. The next act in the drama was that a note came from the purchaser enclosing a certificate from two analysts which stated the arrowroot to be adulterated with from ten to twenty per cent. of what the firm of public analysts called torrefied arrowroot or some other flour. Samples of this condemned Natal arrowroot were therefore sent to four gentlemen, namely, Professors Redwood, Maclagan, Attfield and Archer, and the curious result was, that all these gentlemen declared there was no adulteration whatever and no torrefaction, but that the arrowroot was pure starch obtained from a maranta. The Greenock analysts then withdrew the assertion as to adulteration. In a letter published at the time, Professor Maclagan stated that he had passed many thousands of grains of this maranta under the microscope and he discovered six granules which he said were split. He was glad the subject had been brought forward, for this discussion might lead to further investigation. What Mr. Greenish had said afforded some reason for desiring the more general use of the microscope, which did not at present enter into the pharmaceutical examinations at all. He said this on the special authority of Professor Maclagan, of whose views on this point some public notice might probably soon be taken; more especially as he was fortified in these views by the fact that at one of the recent Major examinations at Edinburgh, had the microscope been used, one gentleman would not have been rejected. As it was he failed to detect some adulteration which the microscope would have made plain.

Mr. **Brady** said that he had noticed that the term "life-history" of starch had been employed. He thought the idea of a "life-history" in any physiological sense had been exploded, and that the researches of Mr. Rainey, published several years ago, had demonstrated the fallacy of the supposition that starch had anything in common, structurally speaking, with the vegetable cell. It appeared to be on the contrary, an example of spherical coalesence, to be accounted for on a purely physical theory. With these views he had some objections to both the terms "nucleus" and "hilum," as applied to the dark focal spot of the starch granule. He did not for a moment contest the value of the external physical characters revealed by the microscope as a means of identifying the starches of different plants, only they should not be invested with the sort of importance which there seemed some disposition to assign to them. Mr. Rainey's researches had scarcely met with the attention they deserved even in this country, much less in Germany.

Professor **Redwood** said it might be expected that he could throw some light on the subject, but the particular case alluded to was scarcely sufficiently fresh in his recollection. He remembered that he took a great deal of pains to get what he was assured was an authentic sample of Natal arrowroot with which to compare the sample that was sent to him; and he came to the conclusion that the sample sent from Edinburgh consisted of Natal arrowroot and of nothing else. As far as he could make out, what the analyst in Scotland had referred to as the effect of torrefaction was what Mr. Greenish had alluded to as characteristic of the starch of the maranta, that was a slight crack at one of the ends; and this he found on that occasion and on several occasions since was observable more frequently in the Natal arrowroot than in any other kind of arrowroot which had come under his notice. In other instances in which arrowroot had been suspected to have been adulterated with potato starch he had come to the conclusion that the samples were those of Natal arrowroot. The question was often asked in respect of particular samples "Is this genuine arrowroot?" He should like to know distinctly what the term arrowroot specifically signified. Was it to be taken to signify the starch of a maranta? There were samples of starch which were perhaps in a dietetic sense equal to arrowroot, starches which were distinguished by specific names, arrowroot being used as a generic name. There were Portland arrowroot, Tahiti arrowroot, and others; and it was very desirable that it should be distinctly and publicly indicated what it was that the name of arrowroot was to be restricted to, especially now that articles were being offered for sale to which certain persons considered the term did not properly apply. Was arrowroot to be considered the starch of a maranta; if so, were all maranta starches and no others to be included under the name? While Portland arrowroot and other specific terms were in use there would be difficulty with regard to the term arrowroot. No doubt the arrowroot which the President was selling was identical in its physical and chemical characteristics with the starch of the maranta, even although it might not be prepared in Bermuda. Speaking generally there ought to be more discrimination in the application of specific names to such an article as arrowroot.

Mr. **Thresh** said he had examined some samples of arrowroot and found that 10 per cent. of the granules had fractures extending from the circumference to the hilum, but not over the hilum. He sent one to Mr. Siebold who reported that it was not a genuine arrowroot; a corresponding sample was sent to an analyst in Manchester who reported that it was. He drew the attention of the latter analyst to the dip in the starch granules, and to the shape of many of them; and the analyst then said there were some granules which might mislead, but still he felt confident they were the starch of maranta. It was probably the cracks from the hilum to the circumference and not the cracks across the hilum that caused one analyst to say that the starch was altered by torrefaction.

Mr. **Greenish** said Mr. Mackay sent him some arrowroot from Greenock, and there was no question about its being Natal maranta. It had fragments of maranta root mixed up with it, and that determined the point beyond a doubt. As to the use of the term arrowroot, he adopted it as a commercial and popular term; but he would prefer to use the word starch in a scientific paper. A public analyst had stated that pepper was sometimes mixed with arrowroot and starch, but that seemed to him to be unscientific. Allusion had been made to what gave students a little trouble with regard to starch grains. He would remind them that in the starch of cereals such as wheat, barley and rye, the large granules were round; but besides these there were compound granules, which were compounds of smaller granules, and hence the apparent variation in the shape.

The next paper read was entitled—

FURTHER RESEARCHES ON THE CRYSTALLINE CONSTITUENTS OF BARBADOES AND SOCOTRINE ALOES.

BY WILLIAM A. TILDEN D.SC. LOND., F.C.S.

The names employed in the following pages to designate the crystalline principles obtained from the several varieties of aloes are to be understood as follows:—

Barbaloin.—From Barbadoes aloes. Discovered by Smith and Co. of Edinburgh, and analysed by Stenhouse, 1851.

Socaloin.—Isolated from Socotrine aloes in 1856, by T. B. Groves.

Nataloin.—Discovered by Flückiger, 1871.

Zanaloin.—Prepared by Histed, from a variety of socotrine aloes imported by way of Zanzibar. Analysed by Flückiger, 1871.

Before proceeding to the comparison of the properties of these bodies, and the discussion of their chemical constitution, I propose to describe briefly some additional experiments lately conducted in my laboratory upon the aloin from Zanzibar aloes. All the new analyses included in the following account were made for me by Mr. W. A. Shenstone, to whose care and patience I take this opportunity of expressing my obligations.

Zanaloin.—I am indebted to Messrs. Hanbury, of Plough Court, for liberal supplies of very fine Zanzibar aloes, from which the specimens of aloin now produced were prepared. Without such aid, in fact, the experiments must have come to an end prematurely, as I found it impossible to obtain appreciable quantities of the crystalline constituent from commercial samples of the drug produced from other sources. The process employed for its isolation was devised by Mr. Histed, and, although rather troublesome and not very productive, I have not succeeded in improving upon it. It consists in macerating the coarsely powdered aloes with a sufficient quantity of proof spirit to make a paste, and afterwards gradually expressing the liquid from the mass. The yellow cake which remains is purified by crystallization from water, and then from rectified spirit.

The aloin obtained in this way has already been described by Dr. Flückiger ('Year-Book of Pharmacy,' 1871), and in the main my observations agree with his. I have found that when dried by exposure to air at the ordinary summer temperature the quantity of water it contains varies perceptibly from day to day, and it is difficult to get it into such a condition as to retain a constant weight. By exposure in a vacuum over sulphuric acid it loses weight rapidly, and two determinations made in this way gave 14·06 and 13·9 per cent. respectively. The loss of weight experienced upon exposure to a temperature of 115° to 120° C. was somewhat greater than this—14·46 and 15·95 per cent. in two recorded instances—but this greater loss is in all probability due to partial decomposition, the aloin fusing and becoming darker in colour.

Two determinations of carbon and hydrogen made upon the air-dried substance gave these results:—

	I. Twice Crystallized.	II. Crystallized Three Times.	Mean.
C	52·70	52·87	52·78
H	6·42	6·39	6·40

No great importance, however, attaches to these numbers in consequence of the uncertainty regarding the hygroscopic condition of the substance.

After drying in a vacuum over sulphuric acid three combustions were made with the results indicated below. In all these and subsequent analyses the substance was burnt with a mixture of lead and potassium chromates, all the usual precautions being observed:—

I. ·2926 gram of anhydrous zanaloin gave ·6379 of CO_2 and ·1528 of H_2O.

II. ·2650 gram gave ·5792 CO_2 and ·1370 H_2O.

III. ·2606 gram gave ·5678 CO_2 and ·1380 H_2O.

	I.	II.	III.	Mean Percentages.
C	59·45	59·60	59·42	59·49
H	5·80	5·74	5·87	5·80

Dr. Flückiger gives 59·20 and 5·94 as the percentages of carbon and hydrogen in zanaloin dried over sulphuric acid, but the slight discrepancy may be accounted for by the more complete dryness of the substance operated upon by us.

Bromozanaloin.—The aloin upon which I have been operating was prepared from aloes, taken, I am informed, from the same sample upon which Flückiger made his experiments. I have also been careful to prove by repeated application of the test, that my zanaloin gives the same reactions with nitric acid and other oxidizing agents as the zanaloin examined in the laboratory at Bern. We have been more fortunate than Professor Flückiger in the production of definite brominated and chlorinated derivatives from this body. By dissolving zanaloin in water and adding an excess of bromine water to the solution a yellow precipitate was obtained, which, after two crystallizations from spirit of wine and drying *in vacuo*, gave the following analytical results:—

I. ·3537 gram gave ·4485 of CO_2, and ·0942 of H_2O.

II. ·3412 gram gave, by heating in a sealed tube with nitric acid and nitrate of silver, ·3405 of AgBr.

Percentages.

	I.	II.
C	34·57	—
H	2·95	—
Br	—	42·09

Another specimen made by reversing the operation, pouring the solution of aloin into excess of bromine water, and allowing the mixture to stand some hours before collecting the precipitate, gave results which differ slightly from the foregoing. The proportion of bromine found in this case being somewhat greater, and of carbon and hydrogen somewhat less than before.

The air-dried substance lost in this case 9·22 per cent. of its weight by exposure in a vacuum:—

I. ·2769 gram of bromozanaloin dried *in vacuo* gave ·3458 of CO_2, and ·0670 gram of H_2O.

II. ·5970 gave by ignition with lime ·6043 of bromide of silver.

Percentages.

	I.	II.
C	34·05	—
H	2·65	—
Br	—	43·06

Chlorozanaloin.—This body was obtained by the action of hydrochloric acid and chlorate of potassium. The crystals are bright yellow and lustrous, and closely resemble those of chlorobarbaloin. They gave off 13·65 and 14·47 per cent. of water when exposed to a temperature of 110° to 115° C.

I. ·3608 gram dried at 110° gave ·3644 gram of chloride of silver.

II. ·6393 gave ·6496 of AgCl.

Percentages.

	I.	II.	Mean.
Cl	24·97	25·12	25·04

Acetyl-zanaloin.—Dry zanaloin was boiled for nearly half-an-hour with about three times its weight of acetic anhydride. The solution diluted with a little alcohol and poured into water gave a pale yellow precipitate which could not be made to crystallize from either alcohol or ether. After drying in the air it gave off mere traces of water *in vacuo*.

I. ·2196 gram gave ·4755 of CO_2, and ·1063 of water.

II. ·2732 gram gave ·5874 of CO_2, and ·1328 H_2O.

Percentages.

	I.	II.	Mean.
C	59·05	58·63	58·84.
H	5·37	5·39	5·38.

Acetyl-barbaloin—Prepared in the same way is a yellowish white curdy substance, the analysis of which gave the following numbers:—

I. ·2774 gram gave ·5976 of CO_2, and ·1334 of H_2O.

II. ·2150 gram gave ·4630 of CO_2, and ·1064 of H_2O.

Percentages.

	I.	II.	Mean.
C	58·55	58·73	58·63.
H	5·34	5·49	5·41.

Leaving out of consideration the question of the formula deducible from these figures, I propose now to compare them with the results which have been obtained by different experimenters in operating upon the aloin of Barbadoes aloes.

	Barbaloin. *(dried in vacuo.)* Stenhouse (average).	*Zanaloin.* *(dried in vacuo.)* Tilden (average).	Flückiger.
C	59·31 per cent.	59·49	59·2
H	5·88 ,,	5·80	5·9

	Bromobarbaloin. Stenhouse (average).	Tilden.*	*Bromozanaloin.* Tilden.*	Tilden.
C	35·48	34·66	34·57	34·05
H	2·78	3·04	2·95	2·65
Br	41·97	41·96	42·09	43·06

	Chlorobarbaloin. Tilden (1872).	*Chlorozanaloin.* Tilden (1875).
C	45·17	—
H	3·70	—
Cl	25·13	25·04

	Acetyl-barbaloin. (average.)	*Acetyl-zanaloin.* (average).
C	58·63	58·84
H	5·41	5·38

A review of these numbers is sufficient in my opinion to convince anyone that it is impossible to distinguish by quantitative analysis the aloin of Barbadoes from that of Socotrine or Zanzibar aloes.

The only difficulty encountered in this table of results occurs in Stenhouse's analysis of the brominated derivatives.

On referring to his paper, however, I found that this compound had been prepared by adding the bromine water to the solution of the aloin. Now the experiments I have described in a preceding paragraph indicate, I think conclusively, that the substance obtained in this way is not pure, that it is in fact contaminated with aloin, from which it differs so slightly as regards its solubility in spirit of wine that the two substances cannot be completely separated by re-crystallization from that solvent. The only way of avoiding this contamination is to bring the aloin at once into contact with an excess of bromine, and this is best effected by reversing the process of precipitation by pouring the solution of aloin into the bromine water.

The conclusion then to which these experiments lead us is that these two crystalline bodies which I have called barbaloin and zanaloin are isomeric when in the anhydrous state. This conclusion is supported by all that we know of their botanical origin and physical characteristics, as well as their chemical properties. The two bodies resemble each other in appearance and in taste, and though zanaloin is slightly paler in colour and a little more soluble, there is no marked difference in these respects. It may be observed, however, that zanaloin and its derivatives contain a larger amount of water of crystallization than barbaloin. As to qualitative tests there is but one in the action of which any difference can be perceived in operating on the two bodies, and that is nitric acid. With barbaloin, nitric acid gives an instant coloration which fades quickly to orange red. Zanaloin, on the contrary, moistened with the same liquid, gives no immediate coloration, but on the application of heat an intense orange red is developed. They both give chrysammic acid under the prolonged action of nitric acid and both yield crystallizable chloro- and bromo- substitution derivatives which resemble each other very closely.

Socaloin is believed, and with great probability, to be identical with zanaloin. Zanzibar aloes is but a variety of socotrine, and the qualitative reactions of the two agree in every respect. But as yet no quantitative analyses of socaloin have been published.

Nataloin is evidently widely separated from the rest of these crystalline principles by its inferior solubility and especially by the circumstance that it yields no chrysammic acid nor definite chloro- or bromo- substitution derivatives.

Taking all these circumstances into consideration I am unable to adopt the suggestion of Rochleder that these bodies constitute three successive terms of a homologous series. On the contrary the analytical results obtained by different experiments indicate that barbaloin and zanaloin have the same composition. They must therefore be represented by the same formula. I propose for them both in the anhydrous state the symbols $C_{16}H_{18}O_7$ which, as will be seen by the annexed statement of percentages, agrees satisfactorily with all the analytical numbers. This, which is simpler than the formula hitherto received, is also conformable with the statement of Graebe and Liebermann that aloin yields anthracene or some closely allied hydrocarbon, perhaps methylanthracene, when heated with zinc.

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* Both prepared at the same time and in the same way, by pouring bromine water into solution of the aloin.

$C_{16}H_{20}O_7$	$C_{16}H_{18}O_7$	$C_{16}H_{16}O_7$
requires	requires	requires
C 50·25	C 59·62	C 60 00
H 6·17	H 5·59	H 5·00

Bromo-derivative

$C_{16}H_{15}Br_3O_7$
requires
C 34·34
H 2·68
Br 42·93

Chloro-derivative

$C_{16}H_{15}Cl_3O_7$
requires
C 45·12
H 3·52
Cl 25·03

Acetyl-derivative

$C_{16}H_{15}(C_2H_3O)_3O_7$
requires
C 58·92
H 5·35

This formula, $C_{16}H_{18}O_7$, has been proposed by Rochleder for nataloin and it agrees closely with the results of my analyses of that substance, but the discussion of this part of the question must be deferred till further experimental results have been accumulated.

Dr. A. TILDEN also placed on the table a number of specimens of products obtained from the different aloins, by nitric acid and other reagents. Most of them he said were coloured and had a beautiful lustre.

The PRESIDENT said any chemist who had ever engaged in experiments of this kind must be aware that Dr. Tilden had expended a vast amount of labour and time in preparing the paper. He wished the Conference had more of such papers. When Flückiger made his discovery of nataloin, Mr. Hanbury asked him to repeat the experiment. It took him by surprise and every one else. Every one had supposed there was but one kind of aloin, and when he (the President) got socaloin he had no idea but that he had got the same thing from another source. How the aloins differed it was impossible to say, but they appeared to yield the same numbers on combustion. There seemed to be as many varieties of aloin as there were of tannin.

Mr. SCHACHT said he should like to ask one question. Dr. Tilden was good enough to show him, a few weeks previously, some of these reactions, amongst them that with bichromate of potash. It struck them both that it was like that obtained when the same reagent was applied to strychnine. Had that experiment been repeated?

Dr. TILDEN said that on repeating the experiments several times under a variety of conditions, he had come to the conclusion that no practical analyst could mistake the reaction for the strychnine reaction, although at first sight it seemed to resemble it. The colour produced was not a purple, such as the splendid purple strychnine gives, which fades to a red, but a greenish purple which fades to a yellow. He admitted that at first sight there was a resemblance. As he could not apply the results of these experiments, he did not bring them forward.

The PRESIDENT said, when Mr. Hanbury sent him the crystals as above mentioned, he asked him to perform an experiment and to use the vapour of nitric acid, the aloin being first moistened with sulphuric acid. It was not a red colour which was produced, but a green.

Mr. MACKAY asked whether there had been an opportunity of ascertaining from medical men the relative strengths of the different kinds of aloin so as to determine their commercial value; or whether they differed in value.

Dr. TILDEN said so far as he knew he was the possessor of the only specimen of zanaloin in existence; and he could not say how much he should like to take per ounce for it. If he might judge from the labour it had cost to produce it it would be rather a costly article. He had hoped he should have been able to bring forward the results of experiments with regard to its physiological action. He had induced Mr. Dobson to undertake experiments at the Bristol Infirmary; but unfortunately Mr. Dobson took a holiday in the midst of his researches, and the results were not concluded in time to bring them forward this year. He hoped towards the end of the present year to have them completed and to publish them.

The PRESIDENT said he supposed the aloin of commerce was the produce of the Barbadoes aloes.

Dr. TILDEN said there was no doubt of that; the others were so difficult to obtain.

A paper was then read on—

SOME POSSIBLE APPLICATIONS OF SALICYLIC ACID IN PHARMACY.

BY F. BADEN BENGER, F.C.S.

The fact pointed out by Professor Kolbe and others some few months since that salicylic acid possesses remarkable antiseptic properties, that it is non-poisonous, odourless, and almost tasteless, must have set many pharmacists thinking what applications might be made of such a substance in practical pharmacy; and probably many other members of this Conference have instituted experiments somewhat similar to those I wish to lay before you to-day, with the view of testing the value of such applications. I shall be very glad to find that there are gentlemen present in a position to check my results, as time has not as yet permitted me to repeat many of my experiments.

It has already been shown by Kolbe* that salicylic acid is capable of arresting and preventing alcoholic and lactic fermentation, that it prevents the action of emulsin on amygdalin, and also the production of essential oil of mustard when the powdered seeds are moistened with a very dilute solution of the acid. A series of experiments made by Dr. Godeffroy in the Vienna Pharmaceutical School† prove that many syrups may be preserved by the addition of small quantities.

I have placed on the table a number of pharmaceutical preparations, all more or less subject to spontaneous decomposition. Each is labelled with name, date, and proportion of salicylic acid which has been added. It will be seen that many of these are from two to four months old, some of which are scarcely distinguishable from those prepared yesterday.

No. 1 is Infusum Rhei, prepared April 25, and containing ½ grain of salicylic acid to the fluid-ounce.
„ 2 Infusum Sennæ Co. April 25. Acid salicylic. ½ grain to fluid-ounce.
„ 3 Decoctum Cetrariæ. May 17. ½ grain to fluid-ounce.
„ 4 „ „ 1 grain to fluid-ounce.
„ 5 Infusum Gentianæ Co. June 19. ¼ grain to fluid-ounce.
„ 6 „ „ ½ grain to fluid-ounce.
„ 7 Infusum Rhei. June 5. ½ grain to fluid-ounce.
„ 8 Infus. Aurantii. June 19. ¼ grain to fluid-ounce.
„ 9 „ „ „ ½ grain to fluid-ounce.
„ 10 Infus. Cuspariæ. „ ¼ grain to fluid-ounce.
„ 11 „ „ „ ½ grain to fluid-ounce.
„ 12 Infus. Senegæ. „ ¼ grain to fluid-ounce.
„ 13 „ „ „ ½ grain to fluid-ounce.

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* *Pharm. Journ.*, Nov. 28, 1874, p. 421.

† *Pharm. Journ.*, May 1, 1875, p. 865.

No. 14 Infus. Buchu. Aug. 9. ¼ grain to fluid-ounce.
„ 15 „ „ „ ½ grain to fluid-ounce.
„ 16 Infus. Aurant. Co. „ ¼ grain to fluid-ounce.
„ 17 „ „ „ ½ grain to fluid-ounce.
„ 18 Suc. Limonis. Expressed May 17. ½ grain to fluid-ounce.
„ 19 „ „ „ „ 1 grain to fluid-ounce.
„ 20 Mist. Acaciæ. June 10. ½ grain to fluid-ounce.
„ 21 „ „ „ 1 grain to fluid-ounce.
„ 22 Paste—composed of 1 dram wheat-flour, 7 drams water, 1 grain salicylic acid. Prepared June 7.

In experimenting on these preparations five specimens of each were in most cases set aside, one in its ordinary unfortified condition, and the other four with the addition of ⅛ gr., ¼ gr., ½ gr., and one grain of salicylic acid to the fluid ounce. It was not until the proportion of ¼ grain and in some cases ½ grain to the fluid ounce was reached, that the result was entirely satisfactory. The whole of the specimens have been tested under very trying conditions. They have been kept through the hottest part of the year, at a temperature of 65° to 75° F., in uncorked bottles only loosely covered with paper. A slight sediment took place in some, from which they were decanted a week ago, and since then spots of mould have appeared on the surface of one or two of the infusions containing ¼ grain of salicylic acid to the fluid ounce, and on the infusion of senna prepared April 25, containing ½ grain to the fluid ounce. At the time the specimens of lemon juice were transferred to other bottles they had been expressed more than three months; the juice had lost most of its odour, but had acquired no other. A few weeks before a slight flocculent precipitate began to fall in both, and this evidence of decomposition continues. It will be found that the aroma of most of the aromatic infusions is scarcely inferior to that of fresh preparations; the mucilage is perfectly fresh; the lemon juice free from mouldy or stale flavour; and the paste shows no symptom of decomposition.

So far, these experiments appear successful, but I now come to the record of disappointment and failure.

To specimens of freshly expressed juice of conium, hyoscyamus, and taraxacum, salicylic acid was added in proportions varying from ¼ grain to 1 grain to the fluid ounce. The juices in their natural condition and after coagulation and filtration were so treated, but all became bad within a few weeks,—some mouldy on the surface, others gradually lost their characteristic odour and taste without much alteration in appearance. Other specimens, to which half the Pharmacopœia quantity of spirit and 1 grain of salicylic acid to the fluid-ounce had been added, appear good after ten weeks' keeping; some improvement in the official method of preserving juices may therefore possibly be made in that direction, but I am not yet content to give up the hope that the costly and in many cases objectionable addition of alcohol may be altogether superseded.

The case of fresh infusions *versus* concentrated ditto has been many times before a pharmaceutical tribunal; and in almost every instance where the verdict has been in favour of concentrated preparations it has turned on the point that a good concentrated infusion is better than a bad "fresh" one or the inconvenient alternative of keeping a patient waiting an hour or two for his medicine.

The above experiments seem to justify the conclusion that most of the Pharmacopœia infusions, mucilage of acacia, and lemon juice, may be preserved almost unimpaired for several months by the addition of ½ a grain of salicylic acid to each fluid ounce. Infusion of senna seems to be an exception, for although the specimen on the table has been prepared four months, and was good until a few days ago, several other specimens treated with the same proportion of salicylic acid were bad in a few weeks. That such a small quantity of the acid produces no injurious effect on the system appears certain from the fact that 15 or 20 grains have been taken during the day without interfering with any of the functions of the body. That salicylic acid does not prevent, and only slightly retards, the action of pepsine I have proved by experiment.

A mixture consisting of 100 grains hard boiled white of egg, 2 grains Bullock and Reynolds' pepsine, 5 minims hydrochloric acid, and 1 fl. oz. of water was prepared. To similar mixtures were added ¼ grain, ½ grain, and 1 grain of salicylic acid, and the vessels marked No. 1, 2, 3, and 4. The whole were then maintained at a temperature of 98° F. for about six hours; at the end of this time the whole of the albumen had disappeared in No. 1, one grain remained undissolved in No. 2, two grains in No. 3, and five grains in No. 4.

Professor Salkowsky states (*Pharmaceutische Zeitung*, June 30th) that benzoic acid possesses greater antiseptic powers than salicylic acid. I have prepared a few infusions—buchu, orange, and gentian—with ⅛ gr., ¼ gr., ½ gr., and 1 gr. of this substance to the fluid ounce. Those containing ⅛ gr. to the ounce had all spoiled in seven days. The others remain good at the present time, having been prepared a month. They are as bright and aromatic as the day they were prepared. I have placed specimens on the table for examination. Added to white of egg and pepsine in the same proportions as in the salicylic acid experiments described above, benzoic acid seemed to retard the digestive process slightly longer.

Since the above was written and in the hands of the printer, Mr. Thresh has published in the *Pharmaceutical Journal* of Saturday last the results of some experiments he has been making to test the conservative power of salicylic acid when added to infusions, etc. Mr. Thresh's experiments only extend over a few weeks, but they help to show that less than half-a-grain of salicylic acid to the fluid ounce cannot be depended on.

Some of my infusions with one quarter of a grain to the ounce have kept much longer than those prepared by Mr. Thresh. The only difference in our *modus operandi* appears to be that he dissolved the acid in the water previous to making the infusion, and I dissolved it in the warm infusion after straining; my preparation would therefore probably contain a little more of the antiseptic than his.

The President said this paper was one of a practical nature; it came home to every pharmacist. Every one was interested in it whether he had any knowledge of the science of chemistry or not. The Conference would allow him to thank Mr. Benger for the trouble he had taken. He had not heard previously that benzoic acid was a preventive of fermentation; it seemed to have more effect than salicylic acid.

Mr. Williams said he should like to have more information; and it is important the subject should be brought before the association generally. It had been asserted that salicylic acid would keep leeches alive or rather prevent them dying so rapidly. Was it true? Of course leeches were not now so important as they used to be; still some were kept by most pharmacists.

Mr. Thresh said he had added salicylic acid to the water in which leeches were kept for about two months. About 100 leeches were kept in a half-gallon stone jar tied over with linen. This was washed out weekly and generally one or two leeches were dead. Since adding a little aqueous solution of salicylic acid to the leech water not one leech had died, and the water had been always free from the odour it had gradually acquired without the acid. As an experiment the water had not been changed for three or four weeks, and it was as clear as it used to be at the end of one week without the acid. He thought salicylic acid would be more useful for making concentrated infusions than simple infusions.

Mr. Gerrard said he had made experiments similar to those made by Mr. Benger, and had not found that salicylic acid had had the preservative effect he had mentioned. There was also a fatal objection to its use when perchloride of iron was prescribed; it became purple immediately. That would not do, so that in dispensing such prescriptions it could not be used and they would have to fall back upon a simple infusion without acid. With reference to leeches, at the time he saw the note in the Journal there was a great mortality among the leeches in the institution where he was engaged, and he thought he would apply the suggestion. The weather was warm and the water was being changed daily. He added a small quantity of acid in the proportion mentioned in the Journal and repeated it from day to day, but the mortality went on; and so he therefore discontinued the use of the acid.

Mr. **Walter Hills** said he could corroborate what Mr. Gerrard had said. A friend of his had tried the addition of salicylic acid in the proportion mentioned in the Journal, but it seemed to kill the leeches rather faster.

The **President** said it might depend upon the proportion used.

Mr. **Gerrard** said he used the proportion mentioned in the Journal. It was very small. He did not dissolve it in glycerine. The purity of the acid might have had something to do with the result.

The **President** asked whether Mr. Gerrard had tried the effect of benzoic acid.

Mr. **Gerrard** said he had not. He did not know what effect the acid might have had if the leeches had been in an unhealthy state and dying off rapidly.

The **President** said it might have kept them healthy without curing them when ill.

Mr. **Siebold** said it had been pointed out that the acid does not interfere with the action of pepsine; but it was nevertheless probable that the acid might interfere with the process of digestion. If it were true that it prevented the action of diastase in the formation of sugar, he thought it would also interfere with the action of pancreatin.

Mr. **Schacht** said as other substances having an antiseptic power had been named he would ask whether any gentleman had any experience in the use of boracic acid. It had been recommended to be used in surgery, and one gentleman had reported very favourably of the results when so used. It naturally occurred in a discussion like this to suggest that it might be useful in such experiments as Mr. Benger had described.

Professor **Attfield** said it had been more than once stated that boracic acid was used at the preservation of milk. He had once found it present in a sample of milk. It would be interesting to know whether analysts generally had found it.

Mr. **Savage** said he knew it had been extensively and successfully used by milkmen at Brighton, who found they could then keep milk for several days when otherwise they could not keep it as many hours.

Mr. **Siebold** said boracic acid had been used extensively on the continent for the preservation of milk and meat. The same acid was the principal constituent of a preparation called "aseptin," which was largely sold in Germany. The antiseptic action of boracic acid was much weaker than that of salicylic or benzoic acid. He wished to draw attention to the value of benzoic acid for the preservation of meat. If the meat were cut up in small pieces and placed in a weak solution of benzoic acid, it would keep for a very long time. Some had been kept in that way for three months; the meat remained perfectly good, and the liquid quite clear, and there was not the slightest indication of putridity or bad odour. He thought that this property of benzoic acid might be utilized for giving some degree of stability to one of the most important preparations of food used in pharmacy, viz., Liebig's cold made infusion of beef, a preparation which was of inestimable value in the case of delicate children rejecting other kinds of food, and which had saved many a life. This preparation, however, was liable to spoil within twenty-four hours, and required to be made from fresh beef, which could not always be had the moment it was needed. By the addition of a small quantity of benzoic acid (about half a grain per ounce) this infusion kept very well for a week; whether it would keep even longer he had not yet tried. The experiment was well worth repeating, for if such a valuable preparation could be made to keep by the addition of so small a quantity of a harmless substance, it would indeed be a great boon.

Mr. **Ekin** said milk dealers were much indebted to chemistry; but the mention of this substance might have a prejudicial effect. [A Member: It is known all through the country.] The dealers in milk on a large scale already looked upon the public analysts, he thought rightly, as their very best friends. The analysts had set up an arbitrary standard for milk, and the milk dealers on a large scale availed themselves of it, there was hardly an instance in which the milk was not toned down to the analysts' standard and a large profit thereby made.

Mr. **Bickerdike** said the only substance to which salicylic acid could be compared was carbolic acid; and he should like to know whether the proportion of half a grain to the ounce was in all cases sufficient for the purposes of preservation. With carbolic acid, for most organic substances at all events, 1 in 500 would keep them sweet and unchanged.

The **President** said that a patent already existed for the preservation of meat by boracic acid accompanied by pressure. His brother when botanizing in the Abruzzi, getting tired of hard boiled eggs, determined to take some meat with him preserved by this method. It got mildewed at the top, but the rest remained good and wholesome.

Mr. **Benger** said he had not tried carbolic acid; but salicylic acid in the proportion of half a grain to the ounce perfectly preserved infusions from three to four months, and several were kept with a quarter of a grain to the ounce.

Mr. **Young** said that for many months Professor Lister had used boracic lint; when salicylic acid was first spoken of he had given it a fair trial; but he certainly gave the preference to boracic lint. It was found exceedingly useful in certain cases, and the sale of it had materially increased during the last eight or nine months. In answer to a question whether Mr. Lister used boracic acid in combination with carbolic, Mr. Young replied, No; alone.

Mr. **Martindale** said boracic acid was of special use in cases of burns; it was much milder in its action as an antiseptic agent than carbolic acid.

Mr. **Gerrard** said he thought the specimen of paste exhibited a faint odour of carbolic acid.

The next paper read was a:—

REPORT ON THE PURITY OF THE MAGNESIUM CARBONATES OF COMMERCE.

BY J. C. THRESH.

The list of subjects for investigation issued by the Conference includes one on the "Purity of the Ponderous, Semi-Ponderous, and Light Carbonates of Magnesia." The semi-ponderous variety appears to be very little known, for I have not been able to procure a single sample. One parcel I did receive from a chemist in Lincolnshire labelled "semi-ponderous," but I found it was the ordinary ponderous carbonate. My report, therefore, deals no further with it, but is confined to the seventy samples of light and heavy magnesium carbonates which I have obtained in various ways from wholesale and retail chemists, in England, Scotland, and Wales. By obtaining samples from such a diversity of sources, I have endeavoured to make them as representative as possible.

Before stating the results of my investigations, I may say that I was at first sorely puzzled as to the best method of detecting traces of calcium carbonate in presence of the magnesia. The method given in the P.B., of super-saturating an acid solution of the salt with ammonium hydrate and adding ammonium oxalate, is certainly not reliable as a qualitative test, since under certain circumstances unknown to me even dilute solutions of magnesia after standing a time deposit a crystalline compound of ammonium and magnesium oxalate. As a quantitative test it is to say the least tedious, since the precipitate must be dissolved and re-precipitated twice to free it completely from magnesia. In my experiments I adopted the following process for ascertaining the presence of lime and estimating the quantity. After igniting from 2 to 3 grams to determine the loss on ignition, I placed the resulting oxide in cold water and after letting it stand a little while (say half an hour) the addition of oxalate of ammonium to the clear filtered solution gave a precipitate if the magnesium carbonate contained 1 per cent. of the calcium salt. I found also that by treating the oxide with water until the filtrate no longer gave a precipitate with oxalate of ammonium I could extract 98 per cent. of the calcium carbonate. In these experiments, when I added ground calc-spar, instead of the precipitated $CaCO_3$, to the pure magnesium salt, and heated the sample over the gas lamp, the residue when treated with water and filtered contained scarcely a trace of lime.

Of the seventy samples of carbonate examined, twenty-seven were the ponderous variety. None of these contained a trace of lead, but in six iron was detected in minute quantities. Several gave slight traces of aluminia and fourteen traces of lime.

The calcium carbonate was estimated in four cases, and ranged from ·3 to ·7 per cent. Most of the samples contained traces of soluble salts, and eleven of them when boiled in water yielded an alkaline solution.

With four exceptions the loss on ignition was as near as possible 58 per cent., proving them to have the composition given by the Pharmacopœia. The exceptions named lost 53·5, 55, 56, and 55·6 per cent. respectively, but the three latter had evidently been dried at too high a temperature, whereby a portion of the water of hydration had been lost. This was proved by the amount of CO_2 they contained and by the difficulty with which they dissolved in dilute acid. Also when moistened with water and carefully redried, they increased in weight.

The one carbonate which yielded 46·5 per cent. of magnesium oxide, dissolved readily and completely in dilute acids and when moistened and redried did not increase in weight. Upon analysis I obtained the following results :—

MgO	46·5
CO_2	33·14
H_2O	20·36
	100·

This would seem to indicate that the salt had the composition expressed by the formula $(MgCO_3)_2MgH_2O_2$ $2H_2O$, since the calculated percentages

MgO	45·9
CO_2	33·5
H_2O	20·6
	100·

closely correspond with the proportions found.

Some of the samples of heavy carbonate were examined for silica, but I failed to detect it.

I have still another specimen to remark upon which is not included in the previous ones, although it came to me marked mag. carb. pond. I received it from a chemist who informed me that he made most of his own chemicals, mag. carb. included, and who wished me to send him the results of my analysis. On receiving it, I was struck by its granular appearance and great density. It was twice as dense as the ordinary heavy carbonate, and when ignited lost only 38 per cent. of its weight. Its analysis gave—

MgO	42·5
H_2O & CO_2	38·
(Soluble salts) $MgSO_4$ & Na_2SO_4	19·5
	100·0

This explains its being so dense and granular, and at the same time shows how very carefully it had been prepared.

Leaving this exceptional sample of "home made chemicals" out of the question, we may conclude that the condition of the heavy magnesium carbonates of commerce is satisfactory, inasmuch as they are free from all but the slightest trace of impurity, and correspond in composition with the official formula.

Of the light carbonate of magnesia I examined 43 samples, and I am sorry to say I cannot report so favourably upon them, as I have of the heavy variety. None of these however contained a trace of lead, but only one was free from iron. The amount of this latter metal present, varied from a minute trace to ·35 per cent. (calculated as ferrous carbonate). I estimated the iron in several samples by titrating with permanganate of potash an acid solution of the carbonate which had previously been treated with pure zinc in a current of CO_2. In four samples the iron calculated as carbonate was ·104, ·20, ·30, and ·35 per cent. respectively. The alumina found in most of the samples varied in amount from the merest trace, to ·14 per cent., which was the most I obtained from the samples I quantitatively examined.

Calcium carbonate is the principal impurity in the light magnesium carbonate, only six being free from it, the remainder containing it in rather considerable proportions. Thus, in one sample I found 3·4 and in another 3·6 per cent, but the average of the others in which it was estimated was 1·005 per cent.

Much larger proportions of soluble salts were found in the light than in the heavy carbonates. The aqueous solution generally giving copious precipitates with either silver nitrate or barium chloride, and with ammonium phosphate and ammonia. Only in three cases was the reaction alkaline. One sample yielded 1·09 per cent. of sodium and magnesium sulphates, but it was an exception. The percentage of magnesium oxide obtained by calcination was in most cases 42 per cent., but several yielded a larger proportion owing to their having been dried at too high a temperature.

I have now only to remark upon one or two samples purchased as carbonate, but labelled "calcined" magnesia. They contained nearly 70 per cent. of MgO, and dissolved with difficulty in dilute acid. The amounts of loss on ignition was greater than possibly have been the case with calcined magnesia however long exposed, and I concluded they were mixtures in about equal proportions of "calcined" and "carbonate." On making inquiries on the subject, I was informed by a chemist that it was a common practice to mix the two, since the former, when put up in packets ready for sale, cakes together or becomes lumpy, unless it has previously been mixed with the carbonate.

I tried the experiment, and found that the admixture of a considerable proportion of carbonate did obviate the tendency of the calcined to "cake." I am assured this practice is not followed for the sake of obtaining an increased profit, but as it is an adulteration, it would be difficult to convince a magistrate that pecuniary motives were entirely absent, when the one is so much cheaper than the other.

The PRESIDENT said, this was a paper furnished in response to a question contained in the list of subjects for investigation; and the list had rarely produced better results than in this case. He thanked Mr. Thresh heartily for undertaking this investigation. The home-made samples were not quite so pure as they ought to have been; the percentage of impurity was in some cases very large.

Mr. Brady said he did not understand the difficulty in obtaining semi-ponderous magnesia. It was an article largely manufactured at Washington and he would be glad to send Mr. Thresh a specimen of it.

Mr. Thresh said he applied to several of the principal London houses; they all said that the heavy and light carbonate of magnesia were the only two kinds they kept in stock. He would like to ask Mr. Brady whether he thought it possible to make the carbonate of magnesia on a large scale, without its containing traces of lime.

Mr. Brady said that no two samples of magnesian limestone would yield precisely the same result by the same treatment, but that he believed the commercial product, whether light or heavy, as turned out by the leading manufacturers, was an almost chemically pure product. He could speak of the care exercised in the north country manufactory, and was certain that any batch containing an appreciable percentage of carbonate of lime would be sent back into the works. The heavy carbonate, as was well known, was now almost a monopoly; but the light carbonate and light calcined were made on a very large scale, being used, especially the calcined, for many purposes in the arts as well as in medicine, for instance, in the manufacture of some varieties of indiarubber.

Mr. Williams said that olive oil was largely treated with it.

Mr. Tait stated that a case came under his own observation in Edinburgh, in which a lady complained of the difficulty of getting Gregory's powder as supplied by his firm to mix with water, and at the same time supplying him with a specimen of that powder, as prepared by a chemist in London. He found that the lady was quite right; but, on adding some diluted hydrochloric acid, he ascertained that the London powder was partly, if not wholly, made with the heavy carbonate of magnesia, instead of the calcined according to Dr. Gregory's formula, which he understood to correspond with the pulvis rhei comp. of the British Pharmacopœia.

The next paper was on—

Citrate of Lithium.

BY C. UMNEY.

Citrate of Lithium of trade is either in a crystalline or pulverulent form.

Its composition when crystalline is exceedingly uniform, but when in powder, as commonly met with in pharmacy, it varies considerably, and is dissimilar to the citrate of lithium of the British Pharmacopœia.

In order to test the suitability of the official proportions of citric acid and lithium carbonate for the production of neutral anhydrous lithium citrate, and to determine whether the *characters and tests* given in the Pharmacopœia were strictly accurate, and in addition to ascertain by the examination of trade specimens how far the requirements of the Pharmacopœia were complied with, the experiments upon which this communication is based were made.

The official process directs that to 100 parts of carbonate of lithium, 180 parts of citric acid should be used, but Squire ('Companion to the Pharmacopœia,' p. 180) takes exception to this, and gives for 100 of carbonate, 200 parts of citric acid, which latter proportions have been accepted, for in the United States' Pharmacopœia, 1874, this ratio has been adopted.

Now neither by calculation nor in actual practice are either of these proportions correct.

Accepting the formula:—

$$3\ (L_2CO_3) + 2\ (H_3C_6H_5O_7H_2O) = 2\ (L_3C_6H_5O_7),$$

then 100 parts of carbonate of lithium will be required to neutralize 189·2 parts of citric acid, the product of anhydrous lithium citrate being identical with the amount of citric acid originally employed.

If commercial carbonate of lithium of fine quality contain 98·5 per cent. of real carbonate, then the proportions would be 100 parts of carbonate and 186·5 parts of citric acid.

Lithium citrate when prepared from these proportions and dried until anhydrous was neutral to test paper, while a specimen made in accordance with the British Pharmacopœia was distinctly alkaline, and one by the United States' formula strongly acid, and much discoloured.

A solution of specific gravity 1·230 when set aside, produced* crystalline citrate of lithium, more generally used in pharmacy some fifteen or twenty years ago than at the present time.

The definition of "deliquescent," applied by the British and United States' Pharmacopœias to citrate of lithium, is (as remarked by Squire) inaccurate, and this can doubtless be confirmed by those accustomed to handle the salt.

Incineration, as a means of quantitative estimation, is given in both the Pharmacopœias referred to, the acid salt of the one, and the alkaline salt of the other, being both stated to yield the theoretical quantity of 53 per cent. of carbonate by ignition.

It is apparent that if different proportions of carbonate be used for the production of two citrates, as these Pharmacopœias direct, then the weight of the residues upon incineration cannot be identical as stated, but must be in proportion to the weight of the original carbonate employed.

The theoretical quantity of carbonate cannot easily be obtained by incineration of lithium citrate, inasmuch as carbonate of lithium loses a portion of its carbonic acid at high temperatures and becomes caustic.

In order to obtain approximate results it is advisable to subject the citrate to the minimum amount of heat, and to conduct the incineration rapidly.

The examination of trade specimens of lithium citrate indicates that not only do manufacturers regard the anhydrous salt as required by the Pharmacopœia as an unnecessary refinement, but they simply decline to attempt its production, for in no instance have I been able to procure specimens that contained more than 84 per cent. while those most generally met with do not exceed 74 per cent. of anhydrous citrate.

Lithium Citrate of Pharmacy.

Specimen.	Quantity Taken.	Dried at 100°.	Dried at 115° (240° Fahr. B. P.) to produce the official citrate.
1	1 grm.	·852 grm.	·838 grm.
2	,,	·862	·821
3	,,	·808	·745
4	,,	·765	·747
5	,,	·773	·741
6	,,	·850	·828
7	,,	·757	·739
8	,,	·822	·803
9	,,	·770	·733
10	,,	·765	·729

It would seem from the above that the difference between citrate dried at 100° and 115° is about 5 per cent. corresponding to about one molecule of water, or in other words, if the formula for crystalline citrate of lithium be $L_3C_6H_5O_7\ 4H_2O$, then the salt dried at 100° will lose three of these four molecules of water.

It is possible that the compilers of the 1864 British Pharmacopœia, in which citrate of lithium was first official, adopted the anhydrous citrate to lessen the objections to the salt on account of its supposed deliquescent character, and that in the 1867 edition the same was accepted as correct.

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* Mr. Sandford has kindly favoured me with crystals made twenty years since, from proportions almost identical with those I have given. These crystals contain about 73 per cent. of anhydrous citrate of lithium, and correspond in all probability to the formula $L_3C_6H_5O_7 + 4H_2O$.

I cannot see why the crystals, which are thoroughly definite and reliable, should not be used in preference to anhydrous citrate, and if it be thought desirable to retain a salt containing less water than the crystals, then one dried at the temperature of a water bath would in my opinion be sufficient for all practical purposes.

The chief advantage likely to result from the adoption of the crystalline as the official form of citrate of lithium would be that its appearance would guarantee its uniformity, while the chief argument in favour of drying the citrate at the temperature of a water bath *only*, is that such a salt is more easy of manipulation, and can be prepared and retained under all circumstances of greater uniformity than one absolutely anhydrous.

The PRESIDENT said this was one of a series of valuable papers on articles in the Pharmacopœia which Mr. Umney had contributed. Citrate of lithium was greatly used, and it appeared to be unsatisfactory in its composition, varying sometimes to the extent of 10 or 20 per cent. He agreed with Mr. Umney that, provided his assertion were correct that the crystalline salt was not deliquescent, it would be better to use the salt in that form rather than in an amorphous condition. He should like to ask whether benzoate of lithium had been tried; he had seen it strongly recommended in a continental journal.

Mr. WILLIAMS said benzoate of lithium was being extensively employed. He thought it was in America where it was principally used. It seemed to be an elegant and beautiful salt, and it was largely prepared for the foreign market. Having been a maker of citrate of lithium for many years, he should like to say that he considered the reasons why crystals were given up was that it was found very difficult to produce them with uniformity and elegance. Manufacturers know better now; but ten or fifteen years ago it was a difficult task, for the manufacture of good crystals had died out. He did not think the anhydrous salt of the Pharmacopœia was practically so useful as a salt containing one atom of water would be.

The PRESIDENT asked whether the crystals were deliquescent.

Mr. WILLIAMS said no; not when they are properly prepared. In fact, they were rather efflorescent.

Professor REDWOOD said he had been happy to hear it stated by two manufacturers that they now advocated the adoption of the crystalline form of this salt. When the Pharmacopœia of 1867 was under revision the difficulty in the way of adopting the crystalline article originated with manufacturers; it was they who really stood in the way, and Mr. Williams had virtually admitted as much. There was one advocate of the crystalline form at that time, and that was Mr. Sandford, who had prepared it and showed it could be prepared. Nevertheless, the manufacturers who were consulted objected to its being ordered in that form; and that was the reason why this and some other salts were left as they are ordered in the amorphous condition. He was glad manufacturers had altered their opinion and were willing to admit that such articles should be ordered in a crystalline condition.

The next paper read was a—

NOTE ON THE CULTIVATION OF SAFFRON IN THE ABRUZZI.

BY HENRY GROVES.

In this my third year's botanizing in the rugged Abruzzi, where hospitality retains its old and hearty form, and where the wealthiest landowners compete for the pleasure of entertaining strangers, without inquiring how much they have in Consols, or caring to what exact stratum of society they may appertain, I have been led to pass through the Saffron district, and now lay the result of my inquiries before my pharmaceutical brethren.

The Abruzzi, seen from a height, present the appearance of a vast sea of mountains, for here the Apennines present their grandest chain, with outlying ranges of an altitude varying from 7,000 to 10,000 feet, and it is on the lower spurs of these mountains, at a height of from 2000 to 3000 feet, that the cultivation of saffron has been carried on for many generations. The mountains are calcareous and, except to the botanist who has roamed them, present a very barren aspect, only relieved by the beech thickets which straggle up their flanks as far as the tree limit. These woods are frequently broken by the immense "Ravari," or rubbles slopes, which form conspicuous objects even at a distance and, with precipices which crown the higher mountains, combine to give the idea of a very land of stones, although pasture enough is found to feed all the numerous flocks of the Puglie during the summer months. Such is the picture of these mountains that overlook the saffron districts.

The cultivated ground commences below the beech thickets, and is but a little less stony than the ground above; however, corn and potatoes thrive well, and a little lower down the saffron plots are established. Here the stones are removed as much as is possible in a soil that consists of little else, and the ground is well trenched to a depth of half a metre and prepared in August with animal manure, preferably that of sheep, so as to be ready for the planting of the bulbs in the following October. The bulbs are planted in ridges with intervening furrows, which, for economy of soil, are sown with corn, as this crop is gathered before the saffron flowers appear, and the furrows remain free as pathways for the gatherers; besides which they are so disposed as to drain the plot. Each ridge is about half a metre in width, and is planted with four or five rows of bulbs which are placed so as to touch each other longitudinally, and are planted at a depth of 10 centimetres, so that they are but just covered with earth. Nothing now remains but to keep the ground well weeded, and in the latter part of October and the whole of November the crop is gathered. For one season the bulbs will give out flowers when placed in a moist place even without earth. The gathering is done in the early morning, chiefly by women, who have wicker baskets on their arms and pass along the furrows plucking the whole flower, which is carried home, and the stigmata removed at leisure. These baskets are renewed yearly, a local fair being held for that purpose, and after the gathering they are condemned to serve general household purposes. Several flowers usually grow from one bulb, in some instances as many as 10 or 12. Once planted, the saffron plots remain good for two years, at the end of which time they are dug up, and in the third year are planted with corn, after which they may be used again for saffron, although they seek to keep the plots shifting as much as possible. When the old ground is dug up the bulbs first planted are already wasted, and only the reticulated tunics remain, by the side of which are found the new bulbs. These are taken home and selected, the larger ones for replanting, and the smaller ones, with the remains of the old ones, are given to the cows as fodder, to which they are very partial. Nor are the cows the only lovers of saffron bulbs, for the field mice would commit great havoc were they not looked after by the peasants, who keep small guns and traps constantly in the fields. The trap employed is the usual spring trap which catches the mouse by the neck, but instead of four or six holes, they have 10. The market price of good bulbs is about five lire or francs the "salma," which equals three "tomoli" or 167 litres. Although saffron grounds are to be found here and there throughout the Abruzzi, the chief centres are towards the valley of the Acerno in the neighbourhood of Barisciano, San Demetrio, San Pio delle Camare, Collepretro, Navelli, Caporciano, San Nicandro, San Mito, and Castel del Monte, where the cultivation is carried on in a grand scale, many of the wealthy landowners owing their position to saffron dealing, which in reality is speculation, as the price per kilo ranges from one-hundred to three hundred lire. The poorer cultivators sell at the price of the year, but the richer dealers set aside their saffron in tins if the price does not suit them. Some seasons have yielded such profits that one years' harvest has surpassed the value of the land under cultivation; at others the cultivation would have ceased were not the beds of two years' duration, and consequently no expense is entailed to wait the result of a second season.

The adulteration of saffron is carried out in various ways, the chief one being by mixing with it shredded beef, of which a suitable piece is boiled and then shredded into small fibres which are stained with saffron water and then dried. The filaments of the stamens are also dyed in the same manner and also intermixed. To make the saffron water, about 15 grams of the stigmata are tied up in a cloth, and soaked with a little water or wine, which after a time is pressed out, and the process repeated as long as any colouring-matter remains. The exhausted saffron is used by the country people in their polenta, to which it imparts some slight flavour. Another adulterant is an almost impalpable yellow earth found here and there in the mountains; and finally, before taking the product to market, it is damped with wine or water. Dealers accustomed to buying saffron avoid these adulterated specimens so that the Aquilan or Abruzzi quality rules higher than any other kind, not excepting that of Spain.

After the thanks of the Conference had been awarded to Mr. H. Groves,

Mr. **Williams** said it would be interesting to know whether the colour of saffron was effected by rain. It was believed that the feathers of certain birds lost their colour unless the feathers were kept well oiled; and that if the bird were prevented oiling its feathers, the rain would wash out brilliant and delicate colours. He should like Mr. Groves to be asked whether the rain washed the colour out of the stigmas of the growing plant.

Adulterated Musk.

Mr. **Blanchard** said he had had sent to him half-a-dozen samples of musk; and in that expensive article two pods were discovered to be adulterated.

Mr. **Umney** said the musk brokers placed musk before the wholesale dealers in four distinct piles; the lowest of which was sold at about 14*s.* an ounce and the finest at 40*s.*, and upwards. He should like to know from which pile the samples were taken. That from pile No. 4 could not be expected to equal that from pile No. 1., when these numbers were oringally placed as being indicative of quantity.

Mr. **Blanchard** said it was offered to him by a first-rate broker as excellent musk; he thought the price moderate and bought some of it.

The Conference then adjourned until the Wednesday.

(*To be continued.*)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Chemical Section.

The Chemical Section of the British Association commenced its sittings on Thursday, August 26, with the following—

Presidential Address.

BY PROFESSOR A. G. VERNON HARCOURT, M.A. F.R.S.,

President of the Section.

To the privilege of presiding over this Section custom has added the duty of offering some preliminary remarks upon the branch of science for whose advancement we are met.

In discharge of this duty some of my predecessors have reviewed the progress of chemistry during the previous year; and until a few years ago there was no more needful service that your President could render, though the task of selection and abstraction was one of ever-increasing difficulty. But a few years ago the wisdom and energy of Dr. Williamson transformed the *Journal of the Chemical Society* into a complete record of chemical research, and this Association materially promoted the advancement of science when it helped the Chemical Society in an undertaking which seemed at one time hopelessly beyond its means. The excellent abstracts contributed to the Journal err, if at all, on the side of brevity, and yet the yearly volume seems to defy the bookbinder's press. I shall not venture to attempt further abstraction, nor to put before you in any way so vast and miscellaneous an aggregate of facts as the yearly increment of chemistry has become. The advancement of our science—to borrow again the well-chosen language of the founders of this Association—is of two kinds. The first consists in the discovery and co-ordination of new facts; the second in the diffusion of existing knowledge, and the creation of an interest in the objects and methods and results of scientific research. For the advance of science is not to be measured only by the annual growth of a scientific library, but by the living interest it excites and the number and ardour of its votaries. The remarks I have to offer you relate to the advancement of chemistry in both aspects.

One fact has been brought into unpleasant prominence by the *Journal of the Chemical Society* in its present form, namely, the small proportion of original work in chemistry which is done in Great Britain. All who are ambitious that our country should bear a prominent part in contributing to the common stock of knowledge, and all who know the effect upon individual character and happiness of the habit and occupation of scientific inquiry, must regret our backwardness in this respect. The immediate cause is easily found. It is not that English workers are less inventive or industrious than their fellows across the Channel, but that their number is exceedingly small. How comes it that, in a country which abounds in rich and leisurely men and women—for neither the reason of the case, nor the jealousy of the dominant sex, nor partial legislation, excludes women from sharing this pursuit with men—there are so few who seek the excitement and delights of chemical inquiry? Moralists tell us that the reason why some men are content with the pleasures of eating and drinking and the like is, that they have never had experience of the greater pleasure which the exercise of the intelligence affords. I am not about to represent it as the moral duty of those who have means and leisure, to cultivate chemistry or any branch of science; but no taste for a pursuit can be developed in the absence of any knowledge of its nature. A taste for chemistry is often spoken of as a peculiar bias with which certain men are born. No doubt there are differences in natural aptitudes and tastes, but the chief reason why it is so rare for men of leisure to addict themselves to scientific pursuits is, that so few boys and young men have had experience of the pleasure which they bring. Much has been done during the last twenty years, both at the universities and at the public schools, to provide for the teaching of science. To speak of what I know best, the University of Oxford has made liberal provision for the teaching of science, and for its recognition among the studies requisite for a degree; nor have the several colleges been backward in allotting scholarships and fellowships as soon as and whenever they had reason to believe that those elected for proficiency in science would be men equal in intellectual calibre to those elected for proficiency in classics or mathematics. But the result is somewhat disappointing, and under a free-trade system science has failed to attract more than a small percentage of University students. Excellent lectures are delivered by the Professors to scanty audiences, and the great bulk of those educated at the University receive no more tincture of science than their predecessors did twenty years ago.

The recognition of science among the subjects of University examinations is by no means an unmixed advantage to those concerned. Examinations have played and will continue to play a useful part in directing and stimulating study, and in securing the distribution of rewards according to merit; but they produce in the student, as has often been pointed out, a habit of looking to success in examination as the end of his studies. This habit of mind is peculiarly alien to the true spirit of scientific work. Only such knowledge is valued as is likely to be producible at the appointed time. Whether a theory is consistent or true is immaterial, provided it is *probable*, that is to say, advanced by some author whose authority an examiner would recognize. All incidental observations and experimental inquiry lying outside the regular laboratory course, which are the natural beginnings of original work, must be eschewed as trespassing on the time needed for preparation. The examination comes; the University career is at an end; and the student departs, perhaps with a considerable knowledge of scientific facts and theories, but without having experienced the pleasure, still so easily gained in our young science of chemistry, of adding one new fact to the pile of knowledge, and, it may be, with little more inclination to engage in such pursuit than have most of his contemporaries to continue the study of Aristotle or Livy.

However, examinations have their strong side, to which I have referred, as well as their weak side; and, although it is the natural desire of a teacher to see his more promising pupils contributing to the science with whose principles and method they have laboured to become acquainted, the younger, like the elder branches of knowledge, must be content to serve as instruments for developing men's minds. Chemistry can only claim a place in general education if its study serves, not to make men chemists, but to help in making them intelligent and well informed. If it is found to serve this purpose well, the number of chemical students ought to increase; and if the number increases, no rigour of the examination system will prevent one or two, perhaps, in every year adopting chemistry as the pursuit of their lives. But the Universities have little power to determine what number of students shall follow any particular line of study. With certain reserves in favour of classics and mathematics, their system is that of free trade. Young men of eighteen or nineteen have tastes already formed, some for the studies which were put before them at school, in which, perhaps, they are already proficient and have been already successful, some for games and good fellowship. It is from the nature of the case with the masters of schools that the responsibility rests of fixing the position of science in education. During the last ten years provision has been made at most of the larger schools for the teaching of some branches of science; and those who recall the conservatism of schoolboys, and their consequent prejudice in favour of the older studies, will understand a part of the difficulties which have had to be encountered. The main and insurmountable difficulty is what I may call the impenetrability of studies. A new subject cannot be brought in without displacing in part those to which the school-hours have been allotted. It is the same difficulty which occurs again and again in human life. There are so many things which it would be well to know and well to follow; but life, like school time, is too short for all. From the educational phase of this difficulty the natural differences of tastes and aptitudes provide in some degree a way of escape. I think that, wherever a school can afford appliances for the teaching of chemistry, all the boys should pass through the hands of the teacher of this subject. Two or three hours a week during one school-year would be sufficient to enable the teacher to judge what pupils were most promising. There may be instances to the contrary, but I do not think it likely that any boy who attended chemical lectures for a year without becoming interested in the subject would ever pursue it afterwards with success. Suppose that, out of one hundred boys who have gone through this course, five are selected as having shown more intelligence or interest than the rest; they should be permitted to give a considerable part of their time, while still at school, to studying science without suffering loss of position in the school, or forfeiting the chance of scholarship or prizes. If any such system is possible, and were generally adopted, each school sending annually to the Universities, or other institutions for the education of young men, its small contribution of scientific students, the Professors' lecture-rooms and laboratories would be filled with young men who had already learnt the rudiments of science. Laboratories of research as well as of elementary instruction would find a place at the English Universities, and the reproach of barrenness would be rolled away.

Some of the defects or difficulties to which I have adverted are perhaps peculiar to our older schools and universities. The introduction of the study of natural science has borne earlier fruit in schools whose celebrity is of more recent date, such as the excellent College in this neighbourhood. Oxford and Cambridge ought to possess, but are far from possessing, such laboratories as have lately been built at the Owens College, Manchester. It is proposed to constitute in this city a College of Science and Literature, similar to Owens College and in connection with two of the Oxford Colleges. The scheme set forth by its promoters appears thoroughly wise and well considered, and all who are interested in scientific education must wish it success.

I have placed first among the modes in which science—and in particular chemical science—may be advanced the assignment to it of a more prominent and honoured place in education; but owing, as I do, my scientific calling and opportunities of work to a bequest made to Christ Church by Dr. Matthew Lee more than one hundred years ago, I cannot forget or disbelieve in the influence of endowments.

I have spoken of the leisurely class in this country as that to which scientific chemistry must look for its votaries. In our social conditions, and in the absence of endowments, it is hard to see where else they can be found. Men who have their livelihood to make cannot afford to spend money, and still less to bestow their time and energy on the luxury of scientific inquiry. Even if they have the opportunity of earning their livelihood by scientific teaching no leisure may remain to them for original work, and the impulse to such work (often, it must be admitted, of a feeble constitution) is starved in the midst of plenty. The application of endowments to the promotion of original research is a difficult question. I am inclined to think that posts, constituted chiefly with this object, should be attached in every case to some educational body, and should have light educational duties assigned to them. The multiplication of such posts in connection with the many colleges and schools in this country, where there is some small demand for chemical teaching, with the provision in each case of a sufficient laboratory and means of work, would probably do more than any centralized scheme for the promotion of chemical research.

To the advancement of chemistry by the formation of public opinion on the questions of scientific education and the endowment of original research, the Chemical Section of the British Association may reasonably hope to contribute. But doubts have been expressed as to the serviceableness of this or any such organization for the direct advancement of our science itself. No doubt we cannot accomplish much. Chemical inquirers at the present time may be compared to a party of children picking wild flowers in a large field; at first all were near together, but as they advanced they separated, till now they are widely scattered, singly, or in groups, each busy upon some little spot, while for every flower that is gathered ten thousand others remain untouched.

That the science of chemistry would advance more rapidly if it were possible to organize chemists into working parties, having each a definite region to explore, cannot, I think, be doubted. Is such organization in any degree possible?

The experiments of which Bacon has left a record, though curious historically, have no scientific value.

But in one respect his 'Physiological Remains,' furnish an example which we might follow with profit. "Furthermore," he writes, "we propose *wishes* of such things as are hitherto only desired and not had, together with those things which border on them, for the exciting the industry of man's mind." I will quote further, as an example, a part of one of his wishes, which has very recently been fulfilled. "Upon glass four things would be put in proof. The first means to make the glass more crystalline. The second, to make it more strong for falls and for fire, though it come not to the degree to be malleable."

I do not know that the industry of M. de la Bastie's mind was excited by Bacon's enumeration of glass more strong for falls and for fire among things hitherto only desired and not had; but the conception of such an enumeration seems to me worthy of its author. Much fruitless and discouraging labour might be saved, a stimulus might be given to experimental inquiry, and chemical research might become more systematic, and thus more productive, if Bacon's example were followed by the leaders of chemistry at the present day.

The Council of the Pharmaceutical Conference, whose meeting has just preceded our own, has published a list of subjects for research which they commend to the attention of chemists. Where one of these subjects has been undertaken by any chemist his name is appended to it. Might not the representatives of scientific chemistry issue a similar list?

Perhaps two or three of the distinguished English chemists who are members of this Association, might be willing to serve on a committee, which should put itself into communication with the leaders of chemical inquiry abroad, and should make and obtain and publish suggestions of subjects for research. Such a list so got together, would, I think, find a welcome place in all scientific journals, and would thus be widely known and easily accessible to every student.

That which chiefly makes the organization of chemical inquiry desirable is the boundless extent of the field upon which we have entered. Not every fact, however laboriously attained and rigorously proved, is an important fact in chemistry any more than in other branches of knowledge. Our aim is to discover the laws which govern the transformations of matter, and we are occupied in amassing a vast collection of receipts for the preparation of different substances and facts, as to their composition and properties, which may be of no more service to the generalizations of the science, whenever our Newton arises, than were, I conceive, the bulk of the stars to the conception of gravitation.

It may, however, be urged that the growth of chemical theory keeps pace with the accumulation of chemical facts. It is so, if the elaboration of constitutional formulæ is leading us up to such a theory. But at present, however useful and ingenious this mode of summarizing chemical facts may be, it does not amount to a theory of chemistry.

Two objections to regarding such formulæ as anything more than a chemical shorthand, as it has been termed, seem worth recalling. The first is mentioned at the outset in most text-books in which these formulæ are employed, but sometimes, I venture to think, lost sight of afterwards. The arrangement of the atoms of a molecule in one plane is equally convenient in diagrams, and improbable as a natural fact. But is not this arrangement used as though it were a natural fact when the possible number of isomeric bodies is inferred from the number of different groupings of the atoms which can be effected on a plane surface? The conceptions of plane geometry are much simpler than those of solid geometry (which is another recommendation of the present system of formulæ); but so far as I am able to follow the similar theories which have recently been propounded independently by MM. De Bel and Van't Hoff, the consideration of the possible immersions of *solid* molecules leads to new conclusions. Wislicenus has found that paralactic acid undergoes the same transformations as ordinary lactic acid when heated and when oxidized. The two acids differ in their action on polarized light. His conclusion is that paralactic acid does not differ in its atomic structure from the lactic acid of fermentation, and that the kind of isomerism which exists between the two acids is not connected with the difference in the reciprocal arrangement of the atoms, but rather with a difference in the geometric structure of the molecule. To this difference he gives the name of "geometric isomerism." The authors named above agree in supposing that the action of substances in solution on polarized light results from an unsymmetrical arrangement of atoms and radicles in three dimensions around a nucleus atom of carbon.

The second objection relates to the statical character of the account which "developed" formulæ give of the differences between different kinds of matter. The modern theory of heat supposes not only that the molecules which constitute any portion of matter are in constant rapid motion, but that the atoms which constitute each molecule are similarly moving to and fro. Such movement might be an oscillation about the position assigned to the several atoms in the constitutional formulæ of the molecule. Since, however, the modes of formation and decomposition of substances are the only facts upon which the formulæ are based, it is to be considered whether these facts may not depend altogether upon the nature or average nature of the motion impressed upon the atoms—that is, upon dynamical and not upon statical differences.

Many substances are known whose existence is contrary to the theory of valency and saturation, such as nitric oxide and carbonic oxide; others, which transgress the theory of isomerism, such as chloride of dichlordibromethane ($C_2Cl_2Br_2, Cl_2$) and bromide of tetrachlorethane (C_2Cl_4, Br_2), which should be identical, but are isomeric; yet these theories are simply an expression of the statement that certain substances can exist or can differ, while others cannot. It is true that in the vast majority of cases the theoretical limitation appears to exist. But just as the absence of any fossil remains of the connecting links between species is only significant if the geologic search has been sufficiently thorough, so it is with chemical theories depending upon the non-existence of certain classes of bodies. Indeed, in our case, where investigation is guided by theory, and, as a rule, only those things which are looked for are found, the limitation may be partly of our own making. A chemist who should depart from the general course, and set himself to prepare substances whose existence is not indicated by theory, would perhaps obtain results of more than the usual interest.

Among chemical inquiries, if ever such a list as I have ventured to suggest should be drawn out, I hope that many would be included relating to the most peculiar substances and the simplest cases of chemical change. The thorough study of a few reactions might perhaps bring in more knowledge of the laws of chemistry than the preparation of many new substances.

I believe that if any chemist not content with a process giving a good yield of some product examines minutely the nature of the reaction, observing its course as well as its final result, he will find much more room for study than the chemical equation represents. He will probably also find that the reaction and its conditions are of a formidable complexity, and will be driven back towards the beginnings of chemistry for cases sufficiently simple for profitable study.

In concluding my remarks, I desire briefly to refer to another branch of chemical science to the advancement of which this Association seeks to contribute—I mean applied or technical chemistry. One of the principal differences between the papers read before this section, as a class, and those which the Chemical Society receives, is the larger proportion in our list of papers on technical subjects. Whatever chemists may hold, there can be no doubt that the estimation of our science by the outside world rests largely on the well-founded belief that chemistry is useful. Indeed, though scientific chemists are justly eager to vindicate the value of investigations remote from any application to the arts, they cannot but feel a livelier sense of triumph when the successful synthesis of a vegetable principle yields also a product of great technical value in the arts, as in the case of the production of artificial alizarin.

By visiting in turn the principal centres of British industry, this Association brings together men engaged on pure and on applied chemistry. We who come as visitors may hope that our papers and discussions here may bring fresh interest in the science, if not actual hints for practice, to those whose art or manufacture is based on chemistry. In return, the most interesting communications the section has received have not unfrequently been the descriptions of local industries; and there is no part of our hospitable reception more welcome and more instructive to us than the opportunities which are provided of seeing chemical transformations on a large scale, and effected by processes which observation and inventiveness have gradually brought to perfection, and with the surprising familiarity and skill which are engendered by daily use.

The following is a complete list of the papers brought before the Chemical Section:—

Report of the Committee for the purpose of Determining the Specific Volumes of Liquids. By T. E Thorpe.

Report of the Committee for the purpose of Investigating the Methods of Making Gold Assays, and stating the results thereof. By W. Chandler Roberts.

Some account of the Manufacture and Refining of Sugar in Bristol, 1875. By Henry T. Chamberlain.

The Tobacco Trade of Bristol. By Thomas Davey.

A Simple Method of Determining the Proportion of Carbonic Acid in Air. By A. S. Davies.

On an Apparatus for Estimating Carbon Bisulphide in Coal-Gas. By A. Vernon Harcourt, F.R.S.

Report of the Committee for the purpose of superintending the publication by the Chemical Society of the Monthly Reports on the Progress of Chemistry. By Professor A. W. Williamson, F.R.S.

On Tanning. By P. S. Evans.

On Muntz and Rampacker's Apparatus for the Estimation of Tannic Acid. By Dr. J. Watts.

Researches on the Crystalline Constituents of Aloes. By Dr. W. A. Tilden.

On Japanese Camphor from Peppermint. By G. H. Beckett and Dr. C. R. A. Wright.

On the Alkaloids of the Aconites. By G. H. Beckett and Dr. C. R. A Wright.

On the Action of Ethyl-Bromobutyrate on Ethyl-Acetosodacetate. By F. Clowes, B.Sc.

On Noctilucine. By Dr. T. L. Phipson.

Report on Isomeric Cresols, and on the Law which governs Substitution in the Phenol Series. By Dr. H. E. Armstrong.

On the Analytical Forms called Trees, with applications to the Theory of Chemical Combinations. By Professor Cayley.

Some further Experiments on Crystallization of Metals by Electricity. By P. Braham.

On Nitrate of Silver. By J. W. Gatehouse.

On New Solvents for Gold, Silver, Platinum, etc., with Explanation of so-called Catalytic Action of these Metals and their Salts on Hydrogen Dioxide. By T. Fairley, F.R.S.E.

On the Use of Potassium Dichromate in Grove's and Bunsen's Batteries to insure constancy. By T. Fairley, F.R.S.E.

Report of the Committee for the purpose of Examining and Reporting upon the Methods employed in the Estimation of Potash and Phosphoric Acid in Commercial Products and on the mode of stating the results. By A. H. Allen.

Report of the Sewage Committee. By Professor Corfield, M.D.

Treatment of Sewage. By J. C. Melliss.

On the Oxidation of Essential Oils. By C. T. Kingzett.

Some remarks on Oxyuvitic Acid. By Professor A. Oppenheim.

Derivatives of Mercaptan. By L. Jackson and A. Oppenheim.

On the Nature of Berthelot's Vinylic Alcohol. By Dr. H. E. Armstrong.

On a New Gaseous Compound of Fluorine and Phosphorus. By Professor T. E. Thorpe.

On a New Process for the Separation of Lead, Silver, and Mercury (Mercurous) Salts. By T. Fairley, F.R.S.E.

On a Process for the Preparation of Periodates with their Application as a Test for Iodine and Sodium. By T. Fairley, F.R.S.E.

The Relation of the Arrangement of the Acids and Bases in a Mixture of Salts to the Original Manner of Combination. By Dr. J. H. Gladstone.

Notes on the Copper-Zinc Couple. By Dr. J. H. Gladstone and Alfred Tribe.

On the Augmentation of the Chemical Activity of Aluminium by Contact with more Negative Metals. By Dr. J. H. Gladstone and Alfred Tribe.

On the Chemical Theory of Gunpowder. By Dr. Debus.

A Method of Effecting the Solution of Difficultly Soluble Substances. By A. H. Allen.

Observations on Apparatus and Modes of Examining for the Source of Polluted Air. By W. Thomson.

Parliamentary and Law Proceedings.

POISONING BY ARSENIC.

An inquest has been held at Hatcham by Mr. William Carter, relative to the death of Susan Wincott, aged 13, who died through eating some poisonous compound found in the street, and alleged to have been mistaken by the children for "black man's cocoa-nut."—Mr. Wildey Wright watched the case on behalf of Dr. Horace Cory and Co., of the Manor Works, Hatcham, and Inspector Foden represented the police authorities.

Harriet Blackshaw, aged 9, deposed that on Thursday, August 26th she was "playing shop," with a girl named Stonor and other children. Louisa Stonor was shopkeeper and gave a piece of white stuff to each of the children. It was sour to the palate, but tasted like milk. Witness sucked it, but did not swallow any.

Louisa Stonor deposed that she got a piece of the white compound from the kitchen dresser at home, but could not tell how it came there. She gave some of it to a number of children, but none to the deceased. They sucked it but did not swallow any. They were all ill afterwards, and her brother was also very sick after partaking a bit of it.

Blackshaw being recalled, said that on the previous night (Wednesday the 25th) her sister gave some sweets or something to deceased, but she could not exactly say what.

James Stonor, a labourer, living in Britannia Terrace, the father of the previous witness, said that he had no knowledge how the stuff came to be upon the dresser, but his wife said she saw it there. He believed that the children must have picked it up in the street.

A number of children were next examined, with the view of ascertaining where deceased obtained the compound, but without success. Mr. Wincott, however, said that deceased told him that Lizzie Blackshaw had given it to her. It was stated by the children that the deceased did not "play at shop" with them.

Eliza Elizabeth Blackshaw said that she and a number of other children were playing together when Louisa Stonor came up with a large lump of white stuff in her hand. She broke it with a stone, gave some to the children, and a piece to witness, and later on deceased asked for a piece, which witness gave her, and she ate it all. Witness ate a piece, and it made her very sick and ill. Her father took the remainder from her and destroyed it. She had found it on the dresser.

Dr. F. Smith said death had resulted from an irritant poison.

Mr. Wright: Have you seen any of the compound.

Witness: Yes, the mother gave me this piece (produced) and I find it is pure arsenic. She said it was some of this that deceased had eaten. The jury returned a verdict: "That the deceased died from inflammation of the intestines, caused by an irritant poison taken accidentally."—*Standard.*

Poisoning by Strychnine.

On Wednesday, an inquiry into an alleged case of poisoning by strychnine was resumed and brought to a termination before Mr. W. Carter, the coroner for East Surrey, at Norwood. From the evidence taken on this and previous occasions it appeared that three persons, a labourer named Thomas Taylor and two women named respectively Hannah Taylor and Mary Ann Hudson, went into the Hope beer-house at Norwood, and met there an accountant named Hunt, in whose company they became intoxicated. On his offering them something "to set them right," they all three drank from the bottle he offered, the result being that one (Mary Ann Hudson) died, while the others were violently ill, suffering apparently from the effects of strychnine. William Abbee, a fishmonger, said that on the 12th of last month he saw the man Hunt in the Gipsy Queen tavern, and Hunt asked him where there was a chemist's shop, to which witness replied by referring to the house next door. Hunt said he had been there, and asked for another, and, being told of one, said he had also been there. He was told of a third, and he replied that he had also been to that one. The witness further stated that the man remarked to him, as if in explanation of the reason why he wanted a chemist's shop, that he had been a heavy drinker, and was in the habit of taking strychnine, which he found took away the effects of the drinking. Hunt afterwards spoke to him again, recurring to the previous conversation, and saying that he had enough strychnine about him to take away the lives of fifty people. This was said loud enough for other people to hear if there had been persons there, but there were not. On the same day, and subsequently to this, witness saw the prisoner and the man and woman Taylor in the Hope beer-house, which is opposite to the Gipsy Queen tavern, and Hunt and they went into the taproom. Other evidence showed that the deceased woman subsequently joined the society of the other three, and that they were intoxicated together. Dr. Muter, analytical chemist, was called, and produced a six-ounce bottle, said to have been taken from the prisoner by the police. This bottle contained, he deposed, a solution of strychnine, of the usual strength sold by chemists, the *maximum* dose of which would be ten drops. A teaspoonful would be sufficient to destroy life. He deposed also that the vomit of the deceased contained strychnine, and that that poison had also been detected in the intestines. In answer to the coroner, the witness said he had not seen the poison in the working of its effects on the human frame, but he knew what those effects were from his studies, and he supported the views of Mr. Harris, who saw the deceased—namely, that she died from the effects of strychnine. Of this, he said, he had not the slightest doubt. The jury then recalled the officers, and commenced to examine them with respect to rumours about the neighbourhood in reference to the deceased woman, and the man Hunt and the Taylors. The coroner urged them to confine their attention to the evidence, and to attach no credence to unsupported rumours, but one or two of the jury still persisted that it was their duty to find out if Hunt had any motive in causing the death of the woman, and that it should be ascertained where the poison had been obtained. The officers said no evidence had been obtained as to this, and it was suggested that it had been got through a wholesale house. The coroner urged the jury to confine their attention to the evidence, the points of which he again placed before them; and, after some short deliberation, they returned a verdict of "Manslaughter" against Hunt. The witnesses were bound over to appear against the prisoner at the Central Criminal Court.

Correspondence.

J. R. Moore.—Perhaps *Œnothera biennis.* It is impossible to name a plant from a single leaf.

A. Mitchell.—*Euphorbia Peplus.*

L. E. Bore.—(1) We named this plant for you last year. See vol. v., p. 230, No. 4; (2) Impossible to say, the flowers are all gone; (3, 6, and 7) Exotic species of *Campanula*—see an article in the *Garden* for Aug. 28; (4) *Holcus lanatus;* (5) *Poa annua;* (8) *Lolium italicum;* (9) *Phleum pratense.*

G. E. J.—(1) *Stellaria media;* (2) *Sinapis arvensis;* (3) *Trifolium arvense;* (4) *Matricaria inodora;* (5) *Medicago lupulina;* (6) *Papaver Rhœas;* (7) *Polygonum aviculare;* (8) *Atriplex deltoidea;* (9) *Chenopodium album;* (*a*) *Atriplex hastata;* (*b*) *Chenopodium album.*

A. L. F. B.—(1) *Phragmites communis;* (2) *Cynosurus cristatus;* (3) Send a better specimen; (4) *Ononis arvensis;* (5) *Rumex conglomeratus.*

G. C. Druce.—(*a*) *Aira flexuosa;* (2) *Cerastium arvense;* (*c*) *Agrostis vulgaris;* (*d*) *Sagine apetala;* (*e*) *Avena pubescens;* (*f*) *Mentha rotundifolia;* (*h*) *Carex binervis;* (*i*) *Agrostis alba.* Many thanks for the *Eriocaulon septangulare.*

C. F. Johnson.—(1) *Pulicaria dysenterica;* (2) *Odontites rubra;* (3) *Achillea Ptarmica.*

J. Gray.—(1) *Euphorbia Helioscopia;* (2) *Sonchus asper;* (3) Probably *Antirrhinum majus*—no flowers sent; (4) *Capsella Bursa-pastoris; Centaurea nigra;* (6) *Achillea millefolium;* (7) *Hieracium murorum;* (8) *Ranunculus repens;* (9) No flower sent; (10) *Campanula rotundifolia;* (11) *Linaria vulgaris;* (12) *Chenopodium rubrum;* (13) *Teucrium Scorodonia;* (14) *Polystichum angulare.*

G. L. Napier.—"Crottle" is a name used in some districts for lichens. The plant referred to is probably *Parmèlia parietina*, Ach., the common yellow wall lichen. Its colouring principle is chrysophanic acid.

J. C. Williams.—*Galium palustre.*

"*Student.*"—(1) Eight candidates, and seven presented themselves for examination. (2) Dissolve the quinine in the hydrochloric acid and dilute with a portion of the camphor water. Dissolve the iodide in the remainder of the camphor water, and mix the two solutions. Lastly, add the liquor strychniæ and tinct. cinchon. co. The change you mention is due to the formation of herapathite (sulphate of iodoquinine). This will form beautiful crystals in two or three days if the tincture and strychnia be omitted.

W. W. P.—Cocculus Indicus is included amongst the list of homœopathic remedies; but we do not know that picrotoxin has yet been prescribed for internal administration.

W. Parker.—(1) We are informed by Mr. Van Voorst, that a sixth (illustrated) edition of Attfield's Chemistry will be published on the 1st of October. For the particulars as to price, etc., see advertisement; (2) An edition of Pereira's Elements of Materia Medica in one vol., edited by Professor Bentley, and including the recent "Additions" to the B.P., has been published by Messrs. Longmans.

"*One that wishes to see Fair Play.*"—The Pharmacy Act does not prohibit the employment of an unqualified person as dispenser, either in a surgery or in a pharmacy.

Communications, Letters, etc., have been received from Messrs. Jackson, Robertson, Cowles, Gerrard, Brady, Maggs, Pocklington Medicago, Suburban, Thirsty, Alpha.

COMBINATIONS OF GLACIAL ACETIC ACID WITH OILS.

BY J. B. BARNES.

In my paper on 'The Solubility of Alkaloids in Oil,' it is stated that glacial acetic acid mixes with "fixed and essential oils in all proportions." Although this is true in a large number of cases it is not so in all, and lest some of the readers of the Journal might infer that my statement applies to all oils, I beg leave to submit the following, showing the result of experiments made to ascertain the exact proportions in which a considerable number unite with glacial acetic acid.

The *minimum* combining proportions of the following five commercial samples of oil I find to be:—

Almond Oil . . .	7 vol.
Glacial Acetic Acid	1 "
Olive Oil	8 "
Glacial Acetic Acid	1 "
Cod Liver Oil . .	7 "
Glacial Acetic Acid	1 "
Linseed Oil . . .	7 "
Glacial Acetic Acid	1 "
Oil of Rhodium . .	4 "
Glacial Acetic Acid	1 "

In this series the oils appear to dissolve the acid.

The *maximum* combining proportions of the next five are:—

Oil of Turpentine .	1 vol.
Glacial Acetic Acid	2 "
Oil of Lemon. . .	2 "
Glacial Acetic Acid	1 "
Oil of Lemon Grass	2 "
Glacial Acetic Acid	1 "
Oil of Copaiba . .	1 "
Glacial Acetic Acid	20 "
Oil of Juniper . .	1 "
Glacial Acetic Acid	1 "

Here the order is reversed, the acid dissolves the oils.

The following is a list of forty-one oils that will mix with glacial acetic acid in all proportions:—Castor, croton, cloves, caraway, rosemary, sandal, cajeput, orange, bergamot, anise, essential oil of almonds, origanum, chamomile, eucalyptus, sage, cinnamon, cassia, lavender, myrtle, marjoram, pennyroyal, citronella, pimento, sassafras, calamus, spearmint, wormwood, neroli, cubebs, coriander, cumin, peppermint, geranium, male fern, citron, fennel, rue, savin, amber, nutmeg, and essential oil of mustard.

BROMIDE OF LITHIUM.

BY M. YVON.

For some time past therapeutic experiments have been made with bromide of lithium, a body that is obtained by the direct combination of hydrobromic acid with lithia. A memoir that has recently been published by Dr. Roubaux has led the author to bring the subject before the Société d'Emulation pour les Sciences pharmaceutiques, in a paper* from which the following is taken:—

It is certain that lithia possesses considerable solvent power in respect to uric acid, and that its salts also possess this property. But for various reasons, which he states at length, the author doubts that bromide of lithium will prove most suitable and effective when administered with this object. He is inclined to think that in the citrate are combined the advantages of a soluble and an alkaline salt. But as a considerable demand for the bromide of lithium is springing up in France, and the price of it is, he considers, rather exaggerated, M. Yvon suggests the two following methods of preparing it to his brother pharmacists:—

(1) Thirty-seven grams of carbonate of lithium are suspended in 200 grams of distilled water, and 80 grams of bromine added. A current of sulphuretted hydrogen is then made to pass through the mixture until the whole of the bromine has disappeared. Hydrobromic acid is at once formed which decomposes the carbonate of lithia, bromide of lithium being produced and sulphur set free. A slight heat is then applied to drive off excess of sulphuretted hydrogen and to agglutinate the sulphur. After filtration the liquor is concentrated, and if it be desired to obtain the bromide in crystals the desiccation is finished under a glass in the presence of sulphuric acid. If not it may be kept in a solution of known strength.

(2) Bromide of lithium can also be prepared by double decomposition. Sulphate of lithia is first prepared by treating 37 grams of carbonate of lithia with 49 grams of monhydrated sulphuric acid, diluted with its own volume of water. On the other hand, 119 grams of bromide of potassium are dissolved in the smallest possible quantity of water. When the two solutions are mixed there is an abundant precipitate of sulphate of potash, the formation of which is assisted by agitation or the addition of a little alcohol. The whole is then evaporated to dryness, finishing the operation on a water bath. The residue is treated with alcohol, which removes only the bromide of lithium and deposits it again upon evaporation. The bromide may then be obtained crystallized by dissolving it in water and evaporating, or it may be kept in solution of known strength.

JAPANESE EDIBLES.*

(*Concluded from page* 202.)

Amongst other oleaginous seeds may be mentioned the Sasanqua of the Japanese (*Camellia Casanqua*), a tree or shrub sometimes cultivated in English gardens, and very similar in appearance to the well-known *Camellia japonica*. It is found in many parts of China and Japan, and the seeds, which are irregularly three-sided, about the size of a hazel nut, are largely collected for the purpose of expressing the oil, which is of a clear bright yellow colour, and is much used for culinary purposes. To obtain the oil the seeds are first crushed and then boiled, and submitted to heavy pressure. The walnut (*Juglans regia*), which grows abundantly in Kashmir, Nepal, and in other parts of India, where the fruits are largely used, is grown also in Japan, where they form, likewise, an important article of consumption, quantities being eaten in a raw state. Large quantities are also used for making a kind of confection, by cracking and removing the shell without breaking the kernel, which is afterwards coated with white sugar, thus making an attractive and agreeable sweetmeat. The walnut also furnishes a bland oil, used for domestic purposes. Another plant, the seeds of which are very oily, is the *Torreya nucifera*, a small evergreen tree or shrub belonging to the natural order Taxaceæ. The fruits are drupaceous, each containing a single seed, with a hard, bony, brown-coloured shell, very similar both in shape and appearance to the seeds of *Carya olivæ-formis*, quantities of which were at one time to be seen in shop windows in London under the name of Japan walnuts. Though the oil of the Torreya is valuable for cooking purposes, the kernel of the seed itself is said to be too astringent to be agreeable. The other seeds valued specially for their oils are poppy, rape, mustard, and hemp.

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* *Répertoire de Pharmacie*, September 10.

* From the *Gardeners' Chronicle*, August 28, 1875.

Turning now to farinaceous substances, other than those referred to as being produced from seeds or grains we find one or two curiosities. Thus, from the rhizome of *Pteris aquilina* is prepared a fine white starch-like flour, but how it is prepared we are not told, nor have we any information as to the mode of preparing for table the young unopened fronds of the same fern, which are included in this remarkable collection. Another plant, singular in its application in the preparation of a meal or starch, is the *Erythronium dens canis*, a liliaceous plant, native of southern Europe and temperate Asia. The starch is very white, and similar in appearance to fine rice starch. The sweet potato (*Batatas edulis*), a rambling or twining plant, with pale purple convolvulus-like flowers, is said to be originally a native of Brazil, from whence it was introduced into Spain about the middle of the sixteenth century, large quantities of the tuberous roots being sent both from Spain and the Canary Islands to this country. At the present time the plant is cultivated in considerable quantities in most tropical and sub-tropical countries, and in smaller quantities even in Southern Europe. In the Southern States of America the plant is considered a very valuable food crop. The tubers are eaten either roasted or boiled, or grated and made into puddings; sago is also manufactured from them, and largely used, besides which, on the plantations, they furnish a large quantity of food for cattle. Several varieties are known, some with white tubers and others with red; they also vary much in size, the average weight being from 3lb. to 4lb. each, but in tropical countries they sometimes weigh as much as 50lb. The flour, as prepared by the Japanese, is very fine and white. Another very white starch in the collection is labelled as being prepared from *Pueraria tuberosa*, a twining leguminous plant, native of the Himalayas. It has, as its specific name indicates, large tuberous roots. In India cataplasms are made from these roots, used by the natives to reduce swollen joints. Its use as a food plant is not mentioned in any book to which we have referred.

The taro (*Caladium esculentum*, or *Colocasia esculenta*), an aroideous plant largely cultivated throughout the tropics for the sake of the rootstocks, which furnish such a quantity of starch as to be a staple article of diet, in many countries, seems also to be grown in Japan for the sake of its stems, specimens of which, dried and tied in bundles, are exhibited.

Two other remarkable food products are the seeds of *Perilla ocymoides* and the fruits of *Quadriala lanceolata*, about which no information is given, further than that they are included in a food collection. The first is an East Indian labiate plant, and the second is now referred by Bentham and Hooker, in their 'Genera Plantarum,' to a species of Buckleya, natural order Santalaceæ. The fruits are small, somewhat resembling a shuttlecock, being crowned with four spreading wings; they are apparently very oleaginous, and have a similar flavour to a walnut.

Amongst lichens one specimen only occurs, which appears to be a species of Gyrophora, much resembling the Tripe de Roche, a black, disagreeable-looking lichen, which though containing a strong bitter principle, has, nevertheless, nourishing properties, and has saved the lives of Arctic travellers. The fungi are interesting, two new species occurring amongst them, provisionally named by Mr. Berkeley *Agaricus* (*Pleuropus*) *russaticeps* and *Hydnum asperatum*. The other species is *Hirneola* (*Exidia*) *rufa*.

The seaweeds, also, are interesting, showing, as these preparations do, what can be done with these too generally neglected plants, and showing, also, the great ingenuity of the Japanese in their manipulation. Thus, for instance, a quantity of small curled pieces, closely resembling black tea, proves upon examination to be a species of Gigartina, or Chondrus. In the same way some very thin sheets, of entirely uniform thickness, very smooth on both surfaces and measuring a foot or two in length, by six or eight inches in width, of a dark purple colour, are prepared from a species of Porphyra, or Nostoc. Another form in which this prepared seaweed seems to appear in the market is in small pieces, evidently stamped out of these sheets, in the forms of flowers, leaves, and other devices. *Porphyra vulgaris* furnishes cakes of a reddish purple colour, while from *Gelidium corneum* a fine thread-like substance, looking like tangled thread or cotton, of a bright red colour, is prepared; from this species also is produced a variety of products of a gelatinous character, some in long straight pieces, others in regular masses or bundles of various colours, such as red, white, blue, and green, having to the eye a very attractive appearance, but probably not suited to the taste of a European. We have not, however, been tempted to try the flavour of these, but some other less easily determined articles of food and confectionery we attempted to solve by the sense of taste, which, however, was not easily effected, and resulted only in confirming our previous opinion that all the preparations looked better than they really were.

FERRATED COD LIVER OIL.*

In the *Archiv der Pharmacie* for July last, C. Bernbeck proposes for this purpose to prepare oleate of iron which may be kept for a long time without alteration. A pure olive oil soap, the neutral behaviour of which has been previously ascertained by moistening it with some solution of corrosive sublimate, is dried in thin slices at a temperature of 30° to 40° C. (86° to 104° F.); it will then still contain about 12 per cent. of water. One part of this soap is dissolved in 20 parts of boiling distilled water, strained, and a solution of one part of ferrous sulphate in 10 parts of water added, with continued agitation. The whitish-grey precipitate, which, in contact with the air, speedily turns greenish and finally brown, is rapidly collected upon linen, washed and expressed. This press cake is externally red-brown from ferric oleate, internally grey (ferrous oleate), and does not alter on keeping. To prepare the ferrated oil, four parts of this oleate of iron are fused by means of a steam bath, when 96 parts of cod-liver oil are added in small quantities and the heat continued for about 45 minutes; it is then filtered, or, better, allowed to settle in a closed vessel, and decanted.

Thus prepared, ferrated cod-liver oil has a mild taste, and contains the iron mainly as a ferrous salt; it contains about 1 per cent. of metallic iron.

THE INNOCUOUS PROPERTIES OF SOME ACONITES.*

The statement on page 8 of 'Flückiger and Hanbury's Pharmacographia,' that the poisonous qualities of *Aconitum napellus* are not developed in certain localities, forms the subject of an interesting essay by Professor C. D. von Schroff.† According to his views, the poisonous properties of aconite (and other plants) are not materially affected when growing wild in different localities, provided the position be a natural one. In Lapland, the leaves of *Aconitum septentrionale*, Koelle, which may be regarded as a variety with blue flowers of *A. lycoctonum*, Lin., are used as a pot-herb; Schroff, Jr., obtained (1871) from the root of the Norwegian *A. septentrionale*, a very poisonous bitter alkaloid, while the herb contains the same principle in such a minute quantity that it cannot be regarded as poisonous, except in very large quantities. *A. lycoctonum* shows the same relation of the root and herb.

Hooker states, in his 'Flora of British India,' that the roots of *Aconitum multifidum* and *A. rotundifolium* are eatable; and Royle describes the former plant as being allied to *A. anthora*, the root of which was formerly medicinally used as a tonic. Aconite, it appears from these accounts, does not become innocuous when growing in particular localities; but the root and herb of some species of *Aconitum* are destitute of poisonous properties.

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* *American Journal of Pharmacy* for September.

† *Zeitschr. d. Oster. Apoth. Ver.*, 1875, Nos. 19 and 20.

The Pharmaceutical Journal.

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INDIAN HOME-MADE "QUININE."

Continued misfortune appears to attend the attempts to manufacture quinine in India. Some time ago we had to report that the preparation made at the Government Factory was so largely contaminated with copper as to be unfit for use, and now we learn from a Madras paper, which has been kindly forwarded by Mr. J. E. Howard, F.R.S., that it is contemplated to abandon the manufacture altogether at the Neilgherry factory.

It appears that last year the Commissioner of the Neilgherries having reported that Mr. Broughton considered some of the branch Crown bark was not worth the expense of manufacturing, the question was raised whether the working of the factory was satisfactory. The Government consequently deputed Mr. Cornish, the Sanitary Commissioner, and Mr. Cockerell to investigate the matter on Mr. Broughton's return to India, and to report specially on the cost and medicinal value of the "amorphous quinine" made at the Neilgherry factory. The Commissioners accordingly visited the factory, examined Mr. Broughton and Mr. McIver, and last November submitted the result of their inquiry.

From this report it appeared that in 1871—72 and 1872—73, the quantity of "amorphous quinine" made was 445 pounds, and that the cost of this amounted to about £3,000, while it was set down as being worth only £1,500. The results for 1873—74 were not given, and it was stated that in the current year a mistake in one of the operations led to the loss of a considerable quantity of material.

Under these circumstances an opinion seems to prevail that the manufacture should be abandoned at once, since there is little reason to expect any material improvement to compensate for the great waste of alkaloids or to render the establishment of a public manufactory by the Government desirable. It is urged that similar attempts have failed in Java and America, and that by discontinuing the experiment a considerable saving would be effected, since the proposed new buildings for drying the bark as harvested, need not be constructed at Nedivuttum.

We learn also from the same source, that Mr. Broughton has formally resigned his appointment as Quinologist, and that the question whether anyone should be appointed to succeed him has been referred by the Government of India to the decision of the Secretary of State for India.

Notwithstanding this apparently impending abandonment of the alkaloid manufacture in India, it would seem that the importance of utilizing the cinchona alkaloids other than quinine is not therefore to be lost sight of by the Indian Government. The *Madras Mail* states that the Secretary of State will be moved to endeavour to arrange with Messrs. Howard, or other suitable persons, for the manufacture from Neilgherry bark of cinchonidine sulphate, as suggested by Mr. J. E. Howard, or of a combination of the different alkaloids, as suggested by Dr. De Vrij, Mr. Cornish and others. We notice that a step in the latter direction has recently been taken in this country.

SPOONFULS.

A short time ago, Dr. Leared called attention, in our correspondence columns, to a possible loophole for error to creep in by, in the administration of medicines by table-spoonfuls, even when the precaution was taken of ordering the quantity to be estimated in a glass measure. We believe that the pertinence of Dr. Leared's remarks has already led to an alteration in the manner of marking the gradations of these measures. We wish that a similar result might follow a recent protest of the coroner of the city of Exeter, against the too common practice of prescribing by tea-spoonfuls without taking notice of the innumerable variations in the sizes of tea-spoons. The occasion of the protest was an inquest respecting the death of a child, which the jury considered had resulted from an overdose of opium, innocently administered "from a modern tea-spoon containing two drachms, instead of from a tea-spoon of older date containing one drachm." As the evidence upon which the verdict was based does not appear to have been published, we are not prepared to accept or to deny the characteristic assumption of the *Lancet*, that probably the mixture was "one of those deleterious compounds known as 'soothing syrups,' and that the directions for use prescribed the tea-spoonful." But bearing in mind the usual statement in books that a tea-spoonful is equivalent to one drachm, we would simply remark that such might have been the case, or that the result might have followed the prescription of many a medical practitioner were a tea-spoon of the size fashionable in the present day used.

THE FRUIT TREASURES OF CALIFORNIA.

Gold, it would appear, is not the only wealth by far that is yielded by the soil of California. Indeed, according to the last published report of Her Majesty's Consul at San Francisco there is a probability that the State will soon be an important competitor with Mediterranean countries,—at any rate in the United States' market,—as a producer of oranges, lemons, almonds, figs, olives, grapes, and other semitropical fruits. Oranges and lemon trees have been cultivated in the south of the State for some time, and last year upwards of four and a-half millions of home grown oranges and a half a million of lemons were received in San Francisco. But during the past two years, it having been found that with a little care in the selection of the soil these trees could be grown throughout the State, they have been planted in immense numbers. It is estimated that in seven or eight years the produce will be equal to the requirements of the Pacific States and Territories; and that ultimately the whole of the United States may be supplied with oranges and lemons from California. As New York imports from the Mediterranean annually about 110,000,000 oranges and nearly as many lemons, of a invoice value of more than half a million sterling, besides a considerable quantity from the West Indies, the trade coveted by the Californians is no trifle. At present the orange and lemon orchards are a source of actual wealth to their owners, the produce of each tree netting from thirty shillings to sixty shillings. Fifty trees are planted to the acre, and the yield of a ten year old tree is estimated at from eight hundred to one thousand oranges, increasing with age to two thousand, or even more. The agriculturists, also, who have planted walnut, fig, almond, and olive trees are reported to be reaping a rich harvest. The product of the vineyards last year exceeded that of any previous year, and the wine manufactured is estimated at from eight to ten million gallons; but the wine is as yet of a very variable character. Further, the preparation of dried fruits is largely increasing, and currants and raisins of first class quality have been received in San Francisco. The quantity of dried fruit sent into that city last year amounted to 850,000 lbs.

ADMIXTURE OF HENBANE WITH CHICORY.

M. J. Clouet, Professor in the Medical School at Rouen, has published in the *Répertoire de Pharmacie*,* an account of a curious case of poisoning, which has been investigated by him. A whole family had been seized with symptoms of illness which could not be accounted for until the father, noticing a considerable dilation of the pupil of the eye, shrewdly suspected the presence of some poisonous ingredient—such as belladonna—in the chicory used to mix with their coffee. He therefore sent a portion of it to Professor Clouet. Chemical tests gave the reactions of hyoscyamine, and an examination of the chicory under the microscope showed that it contained a considerable admixture of fragments of henbane root. The admixture is considered to have been accidental and due to careless collection of the roots.

At a recent meeting of the French Academy of Sciences, some magnificent specimens of crystalline monobromide of camphor were exhibited, which were stated to have been prepared by M. Clin, by submitting camphor to the direct action of bromine at 100° C., without pressure or distillation.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(*Continued from page* 216.)

Wednesday, August 25.

Professor Attfield read the following list of names of persons proposed for membership:—

Alcock, H. (Coventry); Bickerdike, W. E., F.C.S. (Church); Brattley, F. (London); Bullock, Lloyd, F.C.S. (London); Churchouse, W. J. F. (Chard); Cowan, W. M., F.C.S. (Greenock); Driver, A. (Clifton); Frankland, Dr. E., F.R.S. (London); Fardon, H. (Bristol); Freestone, T. (Bristol); Glassford, J. McL., F.C.S. (London); Gardner, W. (Bristol); Hobson, A. S., F.C.S. (London); Hume, J. W. D. (Gloucester); Jennings, F. M., F.C.S. (Cork); Jennings, T. H. (Bristol); Jones, E. W. T., F.C.S. (Wolverhampton); Kinch, E., F.C.S. (London); Kingzett, C. T., F.C.S. (London); Lindsay, T., F.C.S. (Glasgow); Martin, R. (Bolton); Matthias, J. J., (Weston-super-Mare); Newton, T. A. C. (London); Odling, Prof. W., F.R.S. (Oxford); Plumley, J. J. (Bristol); Pridmore, W. (Hinckley); Pugh, H. (Llanegryn); Richardson, Dr. B. W., F.R.S. (London); Savory, A. L. (Bath); Savory, J. F. (Clifton); Schorlemmer, Prof. C., F.R.S. (Manchester); Smith, A. P., F.C.S. (Rugby); Stevenson, Dr. T., F.C.S. (London); Stewart, A. Y. (London); Stewart, G. C., F.C.S. (Greenock); Stroud, J. (Bristol); Thompson, Dr. R. E., F.C.S. (London); Thomson, W., F.C.S. (Manchester); Tod, J. (Coventry); Tritton, C. (Bristol); Wheeler, J. W. (London); Whewell, G., F.C.S. (Blackburn); White, J. W. (Clifton); Wiltshire, T. P., F.C.S., M.R.A.C. (Widnes); Woodcock, R. C., F.C.S. (Cirencester).

These gentlemen were unanimously elected.

Mr. Greenish proposed the name of Professor Dragendorff as an honorary member. He said Professor Dragendorff was professor at the Dorpat University in Russia, and had an European reputation; there could scarcely be any pharmacist to whom his name was unfamiliar. He was sure this Conference would gladly receive papers from him.

Mr. Brady had great pleasure in seconding the nomination.

The motion was agreed to unanimously.

The first paper read on Wednesday was a—

Note on Chloroform Water.

by T. B. GROVES.

On January 13, this year, my assistant was preparing a mixture containing sulphate of quinine, iodide of potassium, and chloroform water. He did it by dissolving the crystallized acid sulphate of quinine in chloroform water and then adding the iodide in mass. Soon afterwards a varnishy precipitate of iodide of quinine having made its appearance the liquid was decanted, and the iodide having been dissolved in a little dilute sulphuric acid, the bottle was refilled with its previous contents. Very shortly afterwards a red cloudiness was observed, which rapidly increased until a considerable precipitate had formed. This after a short time assumed the form of crystalline plates which when placed under the microscope were recognized by their tourmaline effects, as those of herapathite.

The mixture was made a second time, the iodide of potassium being added last in strong solution, and the same result was obtained. When, however, the iodide was added in weak solution, and the mixture was kept well stirred, the formation of herapathite did not take place.

The chloroform water had, I ascertained, been made some six months previously—hence this unexpected result. It had, however, every appearance and taste of freshness, and when added to starch mucilage and iodide of potassium did not develop a blue colour. The iodide of potassium was not found to contain an appreciable trace of iodate, which, supposing the chloroform water to have been acid might have accounted for the liberation of free iodine and the production of herapathite.

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* August 25, 1875.

The mixture made with freshly prepared chloroform water retained its transparency and colourlessness, but on adding to it a little perchloride of iron, herapathite was at once precipitated. The same, of course, occurred when pure water was substituted for chloroform water, but in the latter case it was observed that many of the crystals were in the form of stout needles and were opaque.

In order to observe the time required to produce this change of condition in chloroform water, and, if possible, to ascertain its nature, a quantity of it was prepared on the 16th of January, and set aside in a stoppered bottle, partly filled, and exposed to diffuse daylight in the laboratory, where the temperature never varied more than ten degrees. The stopper of the bottle was occasionally removed and its contents shaken.

Tested on the day it was made no result was observed, but on leaving some of the mixture for a day or two exposed to the air in an open tube it was found that a few crystalline plates of herapathite had been deposited. The testing was repeated from time to time. On February 6th some of the mixture was set aside in an open tube, and by the side of it, exposed to the same conditions, was placed a tube containing a similar mixture in which pure water was substituted for chloroform water. A fortnight after, the first was found to contain a rather considerable crystallization, the latter was apparently unaltered. May 12th, no immediate result was obtained, and on exposing the mixture it became yellow in colour but deposited no crystals. Tested with starch mucilage the colour was found to be due to free iodine. This reaction was observed on several occasions; sometimes a development of crystals accompanied the liberation of iodine.

The experiments were continued up to August 17th, when after varying the mode of mixing in every way it was found that the original instantaneous reaction could not be repeated.

The chloroform water was at that date neutral to litmus paper, and could not be found to be perceptibly altered in any way. I cannot account for the original reaction except by supposing that the chloroform of which the water had been made was impure, and that it had acquired, by being kept for a long time in contact with water and air, an ozonized condition. Its failing to react on iodide of potassium and starch showed that it did not contain free chlorine, or any chlorous body capable of liberating iodine from its potassic combination.

Professor ATTFIELD said he could understand one possible mode in which these herapathite crystals might have been formed somewhat slowly; but he did not understand how they could have been formed instantly. He had occasionally, once or twice, within the last few years met with samples of chloroform containing a little moisture and traces of hydrochloric acid, which would liberate hydriodic acid from the iodide of potassium, and, slowly, the air would act on the hydriodic acid liberating iodine. There would then be present all the elements for the formation of iodoquinine; but how it was to occur instantaneously he did not understand.

On the motion of Mr. Schacht the President was thanked for his communication.

The next paper read was a—

SUMMARY OF RESEARCHES ON THE LIMITED OXIDATION OF THE ESSENTIAL OILS.

BY CHARLES T. KINGZETT, F.C.S., ETC.

These researches originated during an investigation of the supposed production of ozone by the slow oxidation of various bodies, and I was led to study more especially the oxidation of oil of turpentine, the results of which examination were communicated to the Chemical Society in two parts (*Journ. Chem. Soc.*, Series 2, vol. xii., p. 511, and vol. xiii., p. 210). In the third part of this research, I have generalized this method of experiment to the members of the several families of terpenes, and to cymene.

My results prove, that by oxidation of turpentine atmospherically, ozone is most certainly *not* produced, neither is peroxide of hydrogen as a direct product, but that an additive compound—an organic peroxide—is formed, which, on treatment with water, yields peroxide of hydrogen. If the oxidation, therefore, is effected in the presence of water, peroxide of hydrogen is found in the aqueous solution, but beyond doubt it results as a decomposition product, as above stated.

Side by side with the peroxide of hydrogen is found camphoric acid, both bodies having been established by analysis, etc., and I have suggested that they are formed from the action of water on camphoric peroxide.

$$C_{10}H_{14}O_4 + 2H_2O = H_2O_2 + C_{10}H_{16}O_4$$

Brodie has by his researches on organic peroxides demonstrated the existence of camphoric peroxide, but my attempts to produce this compound in the free state synthetically have not been successful.

I should state here, that the limited oxidation of the essential oils or of the terpenes peculiar to them, may be effected in two ways, either by simple exposure of the body with or without water to air and sunshine, or by the passage of a current of air at about 40° C.

The oils of nutmeg, caraway, bergamotte, juniper, cubebs, lemon, and chamomile, absorb oxygen from the air, producing in the presence of water, peroxide of hydrogen, but whether this is true also of their peculiar terpenes I have not in all cases determined.

But so far as I have examined, *all terpenes represented by the formula* $C_{10}H_{16}$ *give under the afore-stated conditions peroxide of hydrogen.* This, I have proved to be true of the terpenes of the oils of turpentine, nutmeg, orange peel and wormwood.

It would further appear *that terpenes of the formula* $C_{15}H_{24}$ *do not produce peroxide of hydrogen* in this way. This at least is true of the terpene of oil of cloves, isolated by Church and proved by him to have that formula. Patchouli, another member of this family, apparently fails also to yield hydric peroxide.

The remaining class of terpenes, viz., those of the formula $C_{20}H_{32}$, I have not yet examined.

Cymene from all sources is identical, as proved by the researches of Fittica, Wright, Paterno, and other chemists. I have examined cymene from camphor, from cajeputol, and from oil of nutmeg, and all three gave parallel results, that is, they produced peroxide of hydrogen in estimable quantities, when oxidized in the presence of water, and evidence was obtained also of the formation of a toluic acid. There was not sufficient material to establish this last named point by analysis.

Thus another proof is afforded of the fact that cymene constitutes the nucleus form of matter of the terpenes of $C_{10}H_{16}$ formula, and it appears that in the $C_{15}H_{24}$ bodies the carbon exists in an allotropic condition.

Fittica regards cymene as normal methyl propyl benzene, in which the methyl and propyl occupy the *para* position.

Its atmospheric oxidation may possibly be expressed thus—

$$C_6H_4(CH_3)(C_3H_7) + O_6 = C_6H_4(CH_3)CO(OH) + CH_3CO(OH) + H_2O_2$$

obtaining acetic and a toluic acids and peroxide of hydrogen.

When dilute nitric acid is employed as the oxidant, paratoluic acid is formed, but no peroxide of hydrogen, and when the oxidant is stronger, terephthalic acid is produced, together with acetic acid which is formed in all three cases.

The production of hydric peroxide from cymene is another bond of connection between the terpenes and the benzene series, and serves as an important diagnosis between terpenes which contain the cymene nucleus, and terpenes which do not.

It is of interest here to note the formation of valeric acid by the limited oxidation of amylene, with dilute chromic acid (Berthelot, *Compt. Rend.*, lxxix., 1435—1442). When stronger oxidants are employed, valeric acid is not produced, but more oxidized acids. I venture to think that the results I have obtained in my researches and the results of other chemists in various directions, will ultimately lead to a great modification of the views of the constitution of hydrocarbons now generally entertained.

It is to be noted that in what has gone before, the word "terpene" has been used to designate certain bodies having relations to each other, although those relations are but little understood. Literally, however, the three classes of bodies represented by the formulæ $C_{10}H_{16}$, $C_{15}H_{24}$, and $C_{20}H_{32}$, belong to three different series. Thus, $C_{10}H_{16}$ is a member of C_nH_{2n-4} series, while $C_{15}H_{24}$ is a member of C_nH_{2n-6} series, and $C_{20}H_{32}$ belongs to a series represented by C_nH_{2n-8}. But these different bodies are beyond doubt interrelated, for $C_{20}H_{32}$ can be obtained from $C_{10}H_{16}$ by the action of sulphuric acid, and there is reason to believe $C_{15}H_{24}$ to be likewise related to $C_{10}H_{16}$.

The PRESIDENT said no doubt this was an excellent paper. It dealt with a high class of chemistry; almost too high, he was afraid for the majority of those whom he was addressing; it was certainly too high for him to discuss it off hand. The results were interesting and might be practically useful to pharmacists by enabling them to identify essential oils and detect admixtures and adulterations. He was not in a position to discuss the paper now, and would therefore only offer the thanks of the Conference to the author for bringing it forward.

Professor ATTFIELD said he agreed that the thanks of the meeting were quite due to the author for his kindness in giving this *résumé* of the researches already made, as well as original matter which had not been published till then. It was known that the constitution of essential oils had interested the Conference since its establishment. One of the first questions submitted in the list of subjects for research issued by the Conference was that of rare essential oils, and twenty were mentioned of which we had little or no knowledge respecting their chemistry. Since then Dr. Wright, and now Mr. Kingzett, had made researches respecting them which must be extremely valuable. Though the utility of these researches might not be apparent to all pharmacists at first sight, still it was unquestioned that all observations of the kind must prove useful, inasmuch as every truth must have its use. There were still essential oils of which information was desired; the list in the circular of subjects for research was very large. He hoped Mr. Kingzett would continue his investigations, which he was obviously so well able to do, and would give the results at future meetings. Perhaps it was not generally known to members of the Conference, that in addition to the grants made from the Bell and Hills fund to members in aid of research, the Conference had now a balance of funds quite available for grants to gentlemen who might be anxious to make investigations. And not only investigations which were extremely expensive, as some of these would be, but any investigations in which the materials were costly, and where a considerable sum might have to be spent in the purchase of them. He could not conceive any question more fitted for a grant than the examination of essential oils. Were he working at them, he should, as a matter of principle, apply for a grant in aid. It was in such directions that the Conference was anxious to expend its surplus income.

Mr. ROBBINS said this was an interesting paper, well adapted to the Pharmaceutical Conference; and the subject was one the investigation of which might produce valuable results. He did not know whether the experiments of Dr. Day, of Geelong, were known in this country. Dr. Day had spent several years in the investigation of the action of essential oils, and had found all the oils he had examined to produce peroxide of hydrogen by long keeping, and some produced it in very large quantities; the oil which produced it in the largest quantity was the eucalyptus oil. By means of this product he claimed that he could destroy all poisonous matter such as the virus of small-pox, in fact he believed he could destroy all poisons. Vaccine matter might be destroyed by it so as to cease to act; therefore Dr. Day believed he could get rid of small pox altogether by the application to the patients of an ozonized ointment, made with the highly oxidized essential oils, or still better with ozonic ether, in the proportion of one drachm to the ounce of lard, contact with which destroys all poisonous matter. Dr. Day had also read, a short time ago, before the Medical Society of Geelong, a paper in which he recommends that turpentine, eucalyptus oil, or kerosene, should be spread on canvass near hospitals; by that means he hoped to get rid of the spread of contagious diseases. Dr. Day had been investigating the subject for several years, and the result of his experiments had been published in the Australian medical journals.

Mr. KINGZETT said he should feel obliged by the loan of the journals. He knew indirectly of Dr. Day's work from an English book in which the facts stated were truly astonishing. In no case, however, was peroxide of hydrogen directly produced by the oxidation of an essential oil, but an organic peroxide. There was no such thing as antozone as a specific substance; what was so called was peroxide of hydrogen, and this resulted only when the oxidized product was treated with water. As to the medical issues, Mr. Kingzett said experiments were already being made, though he was not yet in a position to state the results. Mr. Kingzett remarked that terebene was the name of turpentine that had been subjected to the action of sulphuric acid. He was somewhat amused to find an article on sale under the title of "Terebene, the New Antiseptic." He had purchased a pint bottle for two shillings, and had examined it with some interest. That turpentine has an antiseptic value, is knowledge almost as old as the hills, but that this so-called terebene had a greater or even equal value he was not prepared to admit. It might be regarded as turpentine which had undergone some treatment which robbed it of its most important character as an antiseptic, viz., its power to produce peroxide of hydrogen. Moreover such an antiseptic had several great objections to its use; thus its oily nature, its odour, and, above all things, its inflammable character, would militate against its employment.

Mr. MARTINDALE said it had a distinct odour. He had not examined it carefully, but he thought the turpentine must have been treated with sulphuric acid. It had the odour of freshly sawn fir, or of pine oil.

Mr. WILLIAMS said this was really a curious subject, well worthy of investigation. Terebene was produced by the action of sulphuric acid upon turpentine, and it was apparently an isomeric change. There was no combination between the two in any way. It was mentioned in Watts's Dictionary, but not so technically that its nature could be readily understood. Now that chemists had commenced working upon the subject, more would soon be known concerning it. In the meantime, terebene, whatever might be sold for it, could be procured as a chemical body by those who wished to experiment upon it. The action was most extraordinary. A small quantity of sulphuric acid was used, no chemical change went on, but the change was purely a molecular one, produced by contact with another substance.

The next paper read was entitled—

A Chemical Research upon Jaborandi.

BY A. W. GERRARD,

Teacher of Pharmacy to University College Hospital.

Of recent introductions to the catalogue of European materia medica, there are, I consider, none presenting more interesting features for the study of the chemist and therapeutist than the drug known as "Jaborandi," a plant of the natural order Rutaceæ, and said to be the *Pilocarpus pennatifolius* of Lemaire.

About eighteen months ago, Dr. Coutinho, in the *Répertoire de Pharmacie*, vol. ii., page 171, first brought it before the notice of the French faculty, describing it as a powerful diaphoretic and sialogogue. In the same communication he mentions the verification of his statements by Professor Gubler, who had administered the drug several times in the Beaujon Hospital, whereof he states that "this Brazilian plant forwarded by Dr. Coutinho will be the first indisputable example of a diaphoretic truly worthy of the name." Following this was a paper in *L'Union Pharmaceutique* by M. Rabuteau, detailing a chemical examination of the leaves of jaborandi. An abstract of this paper is given in the *Pharmaceutical Journal* of May 16, 1874. The conclusions arrived at by the author, after submitting the leaves to distillation, and the action of alkaloidal re agents, were, "that jaborandi leaves have an odour due to a volatile principle which is not analogous to the essential oils contained in aromatic plants; it has a bitter taste, due to a principle soluble in water and in alcohol; lastly, the leaves do not appear to contain any alkaloid." The author, however, did not consider the investigation conclusive, by reason of the small amount of leaves operated upon.

The first general intimation of the presence of jaborandi in this country was at an evening meeting of the Pharmaceutical Society, November 4, 1874, when Mr. Martindale exhibited a specimen of the leaves, making a few remarks thereon. Again, in the *Pharmaceutical Journal* of January 16, 1875, Mr. Martindale gives an interesting account of a self-administered dose of the leaves, on which occasion, besides its usual action, he was the first to observe its effect upon the vision. At this time Dr. Sidney Ringer instituted some therapeutic investigations upon the drug; the results were published in the medical journals, and fully bore out the statements that had previously been made as to its extraordinary properties. The pharmaceutical preparations of jaborandi used by Dr. Ringer in his experiments being prepared by me brought the drug frequently under my notice, enabling me to make observations which induced me to undertake some experiments with the view of testing whether the plant really contained an alkaloid, as after the statement of Rabuteau it appeared doubtful.

Whilst pursuing my investigations, an abstract of a paper by M. Byasson, taken from the *Répertoire de Pharmacie*, appeared in the *Pharmaceutical Journal* of April 17th of this year, entitled "A Chemical Examination of Jaborandi." The author reported the isolation of a small quantity of alkaloidal substance, sufficient to cause salivation when injected into the veins of a dog. The conclusions M. Byasson arrived at are as follows: "That the active principle in jaborandi leaves is a viscous aromatic alkaloid having an acrid bitter taste, and capable on distillation of being carried over like nicotine by the vapour of water in the presence of ammonia." This communication possessed a character of vagueness, and experiments I have made by distillation of the plant and also the alkaloid in the presence of ammonia, and examination of the distillate, failed to show any trace of alkaloid.

My first report of experiments upon jaborandi was published in the *Pharmaceutical Journal* of May 1st of this year; I then detailed the process by which I obtained a pale soft uncrystalline alkaloid, possessing well-marked reactions. This upon administration in ½ grain doses produced the full effects of the drug; at Mr. Holmes's suggestion I named it "pilocarpine," the name of "jaborandine" having been already appropriated to a substance obtained from a piperaceous plant. Again, in the *Pharmaceutical Journal* of June the 5th, I communicated the preparation of salts of the alkaloid of jaborandi, viz.: the nitrate, hydrochlorate, and sulphate, the two former yielding themselves crystalline, the nitrate being best defined.

The last report with which I am acquainted upon jaborandi is a communication to the *Répertoire de Pharmacie* of the 25th of June of this year, entitled "On the Composition of Jaborandi," by M. Ernest Hardy. The author describes a method by which he obtained an alkaloid, which he like myself names pilocarpine; his process of obtaining it differed entirely from that made use of by me, although I have no doubt from a description of its properties our alkaloids are identical. M. Hardy also mentions, that the plant contains a volatile acid and a second crystalline alkaloid. As to the acid the statement is correct, but from a study of the method by which he obtained the second crystalline substance and a comparison with my own observations, I believe it to have been none other than chloride of potassium, which is abundant in the plant and can be easily separated. That the plant may contain a second alkaloid is very probable. M. Hardy states that he communicated his experiments to the Société de Biologie, on the 13th March, 1875.

My investigations hitherto had been carried on upon small portions of the leaf and bark of jaborandi; being desirous of continuing them I was enabled, by the liberality of the British Pharmaceutical Conference, to obtain a supply of four pounds of leaf and two pounds of bark which I submitted to the following treatment:— Two pounds of powdered leaf was exhausted with 80 per cent. of alcohol, the alcohol recovered by distillation, and the residue, a dark green extract, was washed with water until the water passed void of bitterness; the insoluble portion was set aside and marked "1st alcoholic residue." The bitter watery solution, which possessed an acid reaction, was now evaporated to a soft extract and ammonia added in slight excess; this was shaken with three separate portions of chloroform; the chloroform, upon removal and evaporation, yielded 2 drachms and 4 grains of impure alkaloid, of a pale green colour and syrupy consistence; the portion not taken up by chloroform was marked "2nd alcoholic residue." The impure alkaloid I now dissolved in water and neutralized with nitric acid; this treatment dissolved two-thirds of the substance, the insoluble third was marked "3rd alcoholic residue." The solution now containing the nitrate of pilocarpine was passed twice through animal charcoal, evaporated to a small bulk, and set aside to crystallize; in two days it had yielded 56 grains of pale brown-coloured crystals. This yield of alkaloid is very small, and must not be taken as the average percentage to be obtained from the leaves; the reason of the small quantity obtained is due to the well-known absorptive and retentive powers of animal charcoal upon these substances.

The remaining two pounds of leaves were exhausted of their bitterness with distilled water, the solution evaporated over a water-bath to a fluid extract; to this an equal volume of alcohol was added, which precipitated a large amount of albuminous and crystalline matter; this was separated and marked "1st aqueous residue." The remaining solution was evaporated to a small bulk and set aside to cool; upon examination, an abundant mass of crystals had formed, which I separated and marked "2nd aqueous residue." To the solution ammonia was added in slight excess; it was then treated with three portions of chloroform, which upon subsidence, removal, and evaporation gave 110 grains of impure pilocarpine; this I converted into hydrochlorate, and it yielded, after treatment with animal charcoal—which decolorized it indifferently—63 grains of moist crystals of a deliquescent character, becoming solid or liquid as governed by atmospheric changes.

The two pounds of jaborandi bark was treated in a similar manner to the last leaves; it yielded two residues, which I marked "1st and 2nd bark residues." The resulting alkaloid was converted into nitrate, and yielded without treatment with animal charcoal 107 grains of impure brown-coloured crystals; from this the alkaloid was again liberated with ammonia, and removed with chloroform it yielded 62 grains of pale brown-coloured alkaloid, which I reserved for the following experiments:—

Small portions of pilocarpine were dissolved in water, alcohol, and chloroform, and allowed to evaporate slowly; examined from time to time, at the end of a month they showed no trace of crystallization; the remaining alkaloid was subjected to the action of colour and other chemical reagents with the following results:—

Reagents.	Precipitate	Colour.
Acid, Sulphuric	None.	Brownish Black.
,, Nitric	,,	Faint Pink.
,, Hydrochloric	,,	None.
,, Phosph. Syrupy	,,	Faint Pink.
,, Chromic	,,	None.
,, Tannic	Yes	White.
Liquor Potassæ	None	None.
,, Ammoniæ	,,	,,
,, Sodæ	,,	,,
Sulphuric Acid, and Bichromate of Pot.	None	Emerald Green.
Iodine	,,	None.
Bromine	,,	,,
Perchloride of Iron	,,	,,
Sulphocyanide of Potassium	,,	,,
Iodide of Potassium	,,	,,
Perchloride of Mercury	Yes	White.
Iodo-hydrargyrate of Potassium	,,	,,
Phosphomolybdate of Soda	None	None.
Phosphomolybdate of Ammonia	,,	,,
Perchloride of Gold	Yes	YellowCrystalline
,, Platinum	,,	,, ,,
Chlorine	None	None.

My attention was next directed to an examination of the various residues.

First Alcoholic Residue.—This, consisting principally of resinous oil and colouring matters, was added to water and distilled; the distillate upon examination had a peculiar aromatic odour characteristic of the plant. Upon its surface were floating numerous oily globules; these were separated and found to be solid. Placed upon a watch glass the heat of the hand immediately dissolved them, on cooling them they again solidified. A portion of this substance was placed upon a glass slide and examined under a microscope; although solid I observed no trace of crystalline form. Small portions were treated with caustic alkalies without any visible effect. From its solid character I am incline to consider it a stearoptin. The watery solution from which this oil was removed possessed an acid reaction; a volatile acid had therefore passed over, which the time at my disposal would not allow me to examine.

Second Alcoholic Residue.—This consisted of a mass of crystals imbedded in a dark-coloured viscid extractive. Portions of the crystals were separated, purified, and examined; they proved to be chloride of potassium, and this is the substance, as I have before stated, which I have good reason to believe M. Ernest Hardy has mistaken for a second alkaloid.

Third Alcoholic Residue—This it may be remembered was an insoluble portion remaining after neutralizing the impure alkaloid with nitric acid; it had a powerful bitter aromatic taste, was soluble in alcohol, ether, and chloroform, also in alkalies; treated with an excess of diluted nitric acid, and the resulting solution filtered and evaporated, it yielded an acid crystalline salt, leaving alkaloidal characteristics. To what extent this substance may differ from pilocarpine, or whether it may be identified with it, I cannot say, but this is certain, that after neutralizing the mother liquor with nitric acid, and removing the neutral nitrate of pilocarpine, a second crop of crystals can be obtained on treating the residue with an excess of nitric acid. This new substance has neither been examined chemically or physiologically; it is therefore interesting matter for further research.

First Aqueous Residue.—This was composed of starch, albumen, and chloride of potassium.

Second Aqueous Residue.—This consisted of a large proportion of chloride of potassium, some tannic acid, and the unknown volatile acid previously mentioned.

The bark residues were not examined, as the essentials are I believe identical with those obtained from the leaves.

The practical results to be deduced from the preceding investigation may be enumerated as follows:—That the jaborandi known as *Pilocarpus pennatifolius* possesses a complex organization containing an alkaloid possessed of well-marked chemical and physiological properties, which is itself non-crystalline, but is capable of forming with acids crystalline salts. Jaborandi also contains a probably second alkaloid, forming acid salts. Besides these are present an aromatic essential oil, solid at ordinary temperatures, tannic acid, a peculiar volatile acid, and chloride of potassium.

The uses and position this new remedy will obtain for itself in materia medica it is not my province to dwell upon; this matter is being studied by universal therapeutic investigators, and I trust, and am certain, that any assistance they may claim from pharmaceutical science will be freely rendered.

This was followed by the reading of—

A Report upon the Physiological Action of an Alkaloid obtained from Jaborandi.

BY WILLIAM MURRELL, F.R.C.P.

I have made, under the superintendence of Dr. Burdon Sanderson, several experiments in the physiological laboratory of University College, on an alkaloid obtained by Mr. Gerrard from jaborandi.

A $\frac{1}{10}$th grain dissolved in a few drops of water and injected into the jugular vein produced profuse salivation in a dog and rabbit which had been rendered insensible by chloral and morphia. In the rabbit the salivation commenced five minutes after the injection, and in the dog—a small black and tan—the effect was almost instantaneous, the viscid saliva at the expiration of two minutes running freely from the mouth. In both animals the flow continued for over an hour, but was readily arrested by the injection of gr. $\frac{1}{200}$ of sulphate of atropine. In the dog especial attention was paid to the condition of the skin, but there was no increase in its secretion, a result which excites no surprise when the difficulty and rarity with which dogs ordinarily perspire is taken into consideration. In both animals the injection caused a retardation of the heart's action, and had a marked influence on the blood pressure.

The effect of the drug upon the lower animals was equally apparent. In frogs the subcutaneous injection of $\frac{1}{2}$ grain produced powerful tetanic symptoms, comparable to those resulting from the administration of strychnia. The tetanus was extremely powerful, the animal in several instances being jerked completely off the table. It was usually produced in from a quarter of an hour to an hour from the injection of the drug, and after its first appearance a paroxysm could be readily excited by the slightest touch, sometimes even by a breath of air; the injection of $\frac{1}{4}$ or $\frac{1}{8}$ grain was followed by the production of similar phenomena, although their appearance was longer delayed. Death usually resulted in from two to three hours, often in a much shorter time.

Smaller doses — gr. $\frac{1}{75}$ — $\frac{1}{50}$ — produced no tetanus, but caused well-marked neurotic symptoms, which proved fatal in from six to twelve hours. The gr. $\frac{1}{200}$ was the smallest dose which in the frog produced definite results. The gr. $\frac{1}{1000}$ was in several experiments found to have no effect on the animal. In frogs the drug, even in the smallest doses, produced an extremely viscid condition of the skin, but no salivation.

The drug proved equally fatal to animals still lower in the scale. A fly was immersed for a few seconds in a 1 in 50 solution of the alkaloid. On being removed its wings were wet and impeded its movements. When dry the animal was placed upon the table and soon commenced crawling about, its movements being slow and unsteady, and no attempt to escape being made. On being thrown in the air there was no effort to fly. A slight breath sufficed to blow it over on its back, where it appeared to be quite incapable of retaining its normal position. It died in about three-quarters of an hour. The absolute necessity of obtaining the active principle of jaborandine was recognized from its first introduction. Mr. Gerrard has removed the chief difficulty in the way of a physiological or clinical investigation of its properties, the alkaloid being clearly capable of producing in a very much smaller dose the full effects obtained by the use of the plant itself. Its free solubility in water is for scientific purposes a matter for congratulation. The antagonism to atropine is a property of especial importance, and would seem likely to be productive of the most valuable results.

The **President** remarked that Mr. Gerrard was the real discoverer of this alkaloid, and the means for the research had been furnished to him by grants from the Conference. He hoped others would imitate Mr. Gerrard's example, and not be slow to ask for grants if they had matter worthy of research. It was singular that jaborandi should have been used in Brazil for so many years and yet have been introduced into this country so lately; but doubtless it would come into general use. It was stated that the salivation of a dog was arrested by an injection of atropine; it would be interesting to know whether it would also arrest perspiration. It was known that dogs perspire only through the mouth, and not through the skin at all, but he fancied that fact had been overlooked.

Mr. **Mackay** said there could be but one opinion as to the value of the paper by Mr. Gerrard. He would, however, like to ask Mr. Gerrard a question. Quite lately there had appeared in some of the price lists the name of Jaborandi wood, and the discrepancy between the price of the wood and the price of the leaves and stems was considerable. Had Mr. Gerrard examined the wood, and if so did he find the alkaloid present, and to what extent? The relative prices of the wood, and of the leaves and stems, were five shillings and twelve shillings a pound.

Mr. **Gerrard** stated that he had used two pounds of the bark removed from the stem. He had tried no experiments with the wood itself. The bark yielded rather less alkaloid than the leaves. The bark was not imported as bark, the plant being imported entire. Specimens had been brought to this country which consisted largely of leaves; the last bales he had seen consisted almost entirely of leaves. He was not aware whether any experiments had been made with the wood. He himself had had no time to work upon it; but was inclined to think the wood did not contain any alkaloid.

Professor **Attfield** said he had an impression that the wood had been experimented upon by some one.

Mr. **Martindale** said he rather thought the wood might be of service. He had some under examination. He had also repeated some of Mr. Gerrard's experiments, and had obtained some alkaloid and also the nitrate, but he had not got any so pure as Mr. Gerrard had. He agreed it was probable that there was more than one alkaloid present. Some six months ago he had published the effects of the drug on himself. A drachm dose of it had induced approximated vision, and also an excessive perspiration and salivation. The first portion of the time he was under its influence there was an apparent dilation of the pupil of the eye. He was informed there was an apparent inconsistency in the statement that dilation of the pupil and approximated vision were produced at the same time, but undoubtedly it produced contraction of the pupil after about ten minutes' use when applied locally. Jaborandi was opposed to atropine in its action in this respect, and also in the approximation of vision. He (Mr. Martindale) had worked at the leaf and the bark, and Mr. Gerrard had worked at them for the reason that they both promised a more abundant yield of the active principle than the wood, which had but little taste, and was almost void of the bitterness and acridity so evident in the bark and the leaf. As however the alkaloid obtained possessed none of that acridity, he was led to believe the acrid taste did not belong to the substance which causes the diaphoretic and salivating action. He agreed with what had been stated as to the alkaloid being volatilized in vapour of ammonia. He had failed to get anything more than empyreumatic oil by distilling the purified alcoholic extract with milk of lime, one of the processes described by M. Byasson for its preparation. The alkaloid obtained produced in the half grain dose all the physiological effects of a dram dose of the leaf. He thought there was a probability of more than one alkaloid being present, though pilocarpine possessed most of the action. The salts of pilocarpine proproduced a much greater salivating and sudorific action, as well as vomiting, when injected hypodermically than when administered by the mouth.

Mr. **Brady** said that he had had some correspondence with physiologists at Cambridge respecting jaborandi and pilocarpine. Mr. Gerrard had been good enough to supply him with specimens of pilocarpine and pilocarpine nitrate for their use, and he had heard from Mr. Langley, of St. John's College, something of the effects of pilocarpine. He should not have mentioned this, because the experiments were not concluded, had not Mr. Martindale mentioned the dilation of the pupil as a symptom, a result which agreed with Mr. Langley's, who seemed to regard the action of pilocarpine as in many respects analogous to that of atropine.

Mr. **Martindale** said he had that morning tried an experiment upon himself with respect to this point, and he thought that if his eyes were examined then it would be found that they were still under the influence. He had put a little solution of the nitrate into the right eye. There was at first a slight dilation, but in ten minutes there was evident contraction and approximated vision. He could not even then see gentlemen comparatively near to him with the right eye. It seemed that in almost every respect pilocarpine was antagonistic to atropine. One caused perspiration, the other would check it. In a case of poisoning by atropine also, it was possible to check the effects by administering pilocarpine.

Mr. **Brady** said he thought Mr. Langley's idea was that there were two distinct active principles.

Mr. **Umney** said he could corroborate what had been said about the contraction of the pupil. He examined Mr. Martindale's eye that morning, and found that the pupil of the right eye was contracted to at least one-third the size of the other. Mr. Gerrard's idea of the essential oil found floating on the surface of the water being a stearoptene was, he thought, in all probability correct. Eight or nine years ago he had made some experiments with buchu (a plant of the same natural order), and noticed a large quantity of crystalline matter separating from the essential oil after the distillation with water; being in all probability an analogous result.

Mr. GREENISH asked what would be considered the best pharmaceutical preparation of jaborandi.

Mr. GERRARD said that considering the active principle of the plant was soluble in water, he was inclined to think a liquid extract would be the best form of preparation. The active principle was exhausted by rectified spirit, by proof spirit, and by water; but there was no occasion to use rectified spirit if water would suffice. He thought a liquid extract of similar strength to the liquid extract of ergot (1 in 1), would be the best form of preparation.

Professor ATTFIELD said he presumed that at present the chemistry and physiology of the matter must be accepted with some little hesitation as it was not by any means certain that a pure principle had yet been obtained.

Mr. GERRARD said he had endeavoured to purify the pilocarpine on several occasions. He had passed it two or three times through animal charcoal; and he had found that the more he purified his charcoal the less he purified his alkaloid. He had thought the charcoal might be contaminated with phosphates, but though these could be got rid of by precipitation, it did not yield any. For these reasons he was sorry to say he had not been able to place in Professor Attfield's hands a sufficient quantity of the pure alkaloid for chemical examination.

Mr. KINGZETT asked Mr. Gerrard whether he had tried Sonnenschein's method with phosphomolybdic acid.

Mr. GERRARD said some phosphomolybdic acid he had obtained gave no precipitate with the alkaloid; but whether the phosphomolybdic acid was reliable or not he was unable to say.

Mr. WILLIAMS said he was much interested in the process of producing this alkaloid; it reminded him much of the alkaloid eserine of the Calabar bean. The Calabar bean also had a contrary action to the belladonna and produced contraction of the pupil. It was interesting to find the alkaloid from this plant and the Calabar bean seeming to run so parallel and to be so similar in many of their characters. He would mention a few facts respecting the bean alkaloid which might throw some light on the reason why Mr. Gerrard did not get his alkaloid pure and white. It was found essential that ammonia should not be used in the preparation of eserine. It was precipitated with carbonate of soda, and acetic acid had been found to be a proper solvent. The extract of the bean being produced it should be treated with organic acetic acid, which preserved it from decomposition better than water. The account given of the treatment with chloroform quite agreed as far as his experience went with eserine. Eserine was not allowed to come into contact with the atmosphere, as it took up oxygen immediately if it were by accident exposed. It might be obtained almost white, and he hoped some day to obtain it in the form of white crystals. With regard to the alkaloid from jaborandi, he should like to know whether an experiment had been tried with acetic acid and carbonate of soda; that treatment would probably avoid what had been spoken of, the subsequent colouring and decomposition of the alkaloid. He had no doubt that what was meant by saying it became darker and darker was analogous to the absorption of oxygen by eserine.

Professor ATTFIELD said it was only fair to Mr. Gerrard to say that the chemistry of the matter had been scarcely entered upon. It was proposed to obtain a large amount of material under a Conference grant and to carry on investigations under more favourable circumstances than hitherto had obtained.

Mr. GERRARD said he could partly answer the questions put. He had used carbonate of potash, and had noticed an evolution of ammonia; and of course the same result would follow the use of carbonate of soda. Whether it was pilocarpine being changed into ammonia compounds he did not know; he scarcely thought it was, because the bark yielded just the same proportion of alkaloid by treatment with carbonate of potash as it did by the use of ammonia. One great drawback to the preparation of this alkaloid as a commercial product was its free solubility, and the quantity of chloroform it was necessary to use. It was so soluble that on shaking with chloroform only a portion was removed. It takes a large quantity of chloroform to remove a small portion of alkaloid. The mother liquor after being used three or four times even then still contained an appreciable amount of alkaloid.

The next paper read was—

ON THE HORSLEY-STODDART METHOD OF ESTIMATING THE FAT OF MILK.

BY ALFRED H. ALLEN, F.C.S.,

Professor of Chemistry at Sheffield School of Medicine: Public Analyst for Sheffield and North Derbyshire.

It will be in the recollection of many gentlemen now present, that on the occasion of our London meeting Mr. Stoddart described and exhibited Mr. Horsley's ingenious method of estimating the proportion of fat in milk, and a discussion took place in which I expressed doubts as to the accuracy of the method described by Mr. Stoddart.

Since the last meeting I have thoroughly investigated the process, and beg to lay before you the results of my experiments.

As employed by Messrs. Horsley and Stoddart the process is as follows:—15 c.c., or 250 fluid-grains of milk are placed in a graduated tube about eleven inches long and three-quarters of an inch in diameter. An equal bulk of methylated ether is added, a cork or stopper inserted, and the whole shaken vigorously for five minutes. A like measure of methylated spirit is next added, and the whole well shaken for at least five minutes more, when on setting it to rest the oily or fatty matter will rise to the surface almost instantly, and can be easily read off, each division which it occupies being equivalent to 4·15 grains of butter-fat.

It is evident that the process is of an exceedingly rapid and simple character, and if capable of giving trustworthy results would be extremely useful as a means of estimating the proportion of butter fat contained in any sample of milk, though the well-known fact that the fat is the most variable of all the constituents of milk renders the method fallacious as a means of ascertaining the presence of added water—a capability which Mr. Horsley appears to claim for it.

It is an interesting fact, that a method almost identical with the above was described by M. Marchand as long ago as 1854, in a paper contributed to the *Journal de Pharmacie et de Chimie*, entitled 'Nouvelle Méthode de Dosage du Beurre dans le Lait.' Whether Mr. Horsley was aware of the existence of this paper at the time of publication of his process about two years since (in which no reference whatever is made to any previous experiments), it rests with him to say.

M. Marchand employs a graduated tube of the same length as that used by Mr. Horsley. He also employs the same proportions of milk, ether, and alcohol as are recommended by Mr. Horsley. To keep the casein in solution, M. Marchand adds to the original milk a single drop of potash solution, and to ensure the rising of the whole of the fat, he places the tube in a vertical position, and warms it in a water bath to about 40° C. (blood-heat), until the oleaginous layer which rises to the surface no longer augments.

Mr. Horsley makes no mention of the addition of potash solution, but specially states that no heating or waiting is necessary. With this exception, his process is identical with that of M. Marchand. M. Marchand says that the proportion of fat obtained by his process should be from 3·05 to 3·64 grammes per 100 c.c. of milk, which is equal to from 2·96 to 3·54 of fat from 100 parts by weight of milk.

In considering the nature of the process, it at once appeared highly improbable that the oleaginous layer obtained would have a constant composition, being, as it is, a mere solution of ether and alcohol in butter fat, and therefore likely to vary in composition with the temperature at which the experiment is conducted, the proportion of fat present, etc.

As far as can be gathered, either from Mr. Horsley's pamphlet, or Mr. Stoddart's paper, no attempt is made to read to a greater degree of accuracy than one-quarter of a division, in fact the deficient and eccentric graduation of the tube renders any closer reading impossible; as one-quarter of a division, according to Messrs. Horsley and Stoddart, corresponds to 1·04 grains of butter fat, and they work on 250 fluid grains of milk, it is evident that the apparatus is incompetent to estimate fat more nearly than ·415 per cent., a percentage of error quite inadmissible in any but the very roughest analyses.*

The impossibility of really accurately measuring the oily layer with the tube employed by Messrs. Horsley and Stoddart, appears to have prevented them from detecting the variations in the measure of the fat as compared with its weight when separated from its dissolved ether; and has led to some very positive statements on the part of their disciples respecting the constant ratio of the measure to the weight.

For the purpose of ascertaining whether the ratio of the volume of the oily layer to the weight of its contained fat, were constant or nearly so, I instituted a series of experiments. A miniature pipette was made by drawing out a piece of quill tubing, a mark being made on the neck with a file. A piece of india-rubber tubing was attached to the upper end, for convenience in sucking up the oil into the tube.

I placed in each of four tubes 15 c.c. of the same sample of milk, added 15 c.c. of methylated ether to each, corked each tightly, surrounded the whole with an india-rubber band, and shook the tubes simultaneously for fully five minutes; 15 c.c. of methylated spirit were then added to each, and the shaking repeated for at least five minutes more. The tubes were then placed vertically, the corks removed, and the oil allowed about ten minutes to rise. Portions of the layers from each of the tubes were then sucked up into the little pipette as far as the mark, and the equal volumes so obtained were evaporated at a steam heat in very small porcelain crucibles. The following were the weights obtained from equal volumes of the oily layer yielded by four tubes of the same sample of milk shaken side by side:—

·211 gramme.
·212 ”
·261 ”
·204 ”

A second series of experiments on the same milk gave:—

·230 gramme.
·231 ”
·236 ”
·249 ”

Another series of experiments conducted in a precisely similar manner, but with a different pipette gave:—

·161 gramme.
·162 ”
·148 ”

A further series with the same pipette as the last, but with a different sample of milk gave:—

·200 gramme.
·188 ”
·186 ”
·171 ”

These experiments clearly prove that the ratio of the volume to the weight is not constant, and that two experiments made side by side on the same sample, might give very different amounts of fat, though the error would be scarcely appreciable by the apparatus employed by Messrs. Horsley and Stoddart.

In order to ascertain the actual ratio of the weight of the fat to the volume of the layer, the pipette employed in the two last series of experiments was filled up to the mark with distilled water, which was then carefully weighed. Two experiments agreed in giving a weight of ·458 of a gramme, so that the capacity of the pipette was ·458 c.c. The last two series of experiments show therefore that 10 c.c. of the oily layer would correspond to the following weights of real butter fat.

·161 gramme	correspond to .	3·526	of fat per 10 c.c. of layer.
·162	” ”	3·548	” ” ”
·148	” ”	3·231	” ” ”
·200	” ”	4·356	” ” ”
·188	” ”	4·105	” ” ”
·186	” ”	4·061	” ” ”
·171	” ”	3·733	” ” ”
Mean ·174		3·794	

It appears therefore that so far from 10 measures of the oil corresponding to a constant quantity of butter fat, seven experiments gave results varying from 3·231 to 4·105. Therefore, even supposing that the apparatus employed by Messrs. Horsley and Stoddart admitted of accurately measuring the volume of the layer (which it does not), the percentage weight of fat deduced from it would be untrustworthy.

The capacity of Mr. Horsley's tube when filled to the zero point is 820 fluid grains, and as each division is said to be 1 per cent. of the whole, the capacity of each "line" or division is 8·2 fluid grains. This quantity of oily layer is said by Messrs. Horsley and Stoddart to correspond to 4·15 of real butter fat. If this is the case 10 fluid grains would yield 5·061 grains weight of real butter fat.

So far from this proportion being constant, it appears from my experiments that the real yield of butter fat varied in seven experiments from 3·23 to 4·10, the average being 3·79, against 5·06 as stated by Messrs. Horsley and Stoddart. The result of the substitution of one number for the other would be that the same milk would yield 2·49 per cent. of butter fat against 3·32 per cent.

I have already shown that the ratio of the volume of the layer to the weight of the fat varies considerably, even when the experiments are made side by side, and it is only to be expected that these variations will be still more marked when the time of the year, the quality of the milk, and the general circumstances are all different. It is therefore by no means surprising that Mr. Horsley should have fixed on a number so different from those obtained by me, but the variation conclusively proves how liable to error the process is when applied volumetrically.

At our last meeting Mr. Stoddart showed us a sample of milk taken from his breakfast table at a London hotel, and as he obtained four "lines" of butter fat from it, he contended that it must contain the extraordinary amount of 6·64 per cent. of butter fat. He also made the following suggestive remark: "There is such a tremendous difference of result between the London chemists' and Mr. Ekin's and my own examinations, that we cannot explain it at all."

I beg leave to suggest that the "tremendous difference" observed is due to the employment by Mr. Stoddart of an untrustworthy process added to an erroneous estimate of the value of each "line" of oily layer.

An independent proof that the value of each "line" has been seriously over-estimated is to be met with in the fact that Mr. Stoddart obtained 11¾ "lines" from 50 grains of a genuine sample of ordinary butter.* As he himself stated, the above measure of oily layer corresponded to 11¾×4·15×2=97·52 per cent. of butter fat in the sample of butter, assuming the process to be reliable. This leaves barely 2½ per cent. for water, salt, and curd together, though the sum of these three constituents averages 15 per cent. ! Except in cases in which the butter has been purposely fused, I believe I may say that such a percentage of real fat in butter is absolutely without a parallel.

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* When the percentage of fat is small, as in partially skimmed milk, any measurement of the volume of the layer is out of the question, as the oil does not form a layer but assumes a more or less globular form. I referred to this fact last year, though my remarks were somewhat misconstrued. *Pharm. Journ.*, September 12, 1874, p. 208.

It is evident, therefore, that the measurement of the oily layer, even when accurately performed, is only capable of giving results of the roughest possible kind, and that any estimation worth making by a chemist must be obtained by drawing off the whole of the oily layer (adding a little ether to dissolve the last portions) and gently heating it till it ceases to lose weight.

An additional source of error is to be found in the fact that the few minutes allowed by Messrs. Horsley and Stoddart for the rising of the oily layer are frequently quite insufficient for the purpose. On further standing, a considerable additional layer is sometimes obtained. This fact appears to have been fully recognized by M. Marchand, but the hasty manner in which the experiment is performed by Messrs. Horsley and Stoddart renders the results obtained by them of very inferior value.

M. Marchand also takes the precaution of warming the tube to ensure the complete rising of the fat. The cork must be firmly replaced before the tube is warmed or some of the liquid may be projected if the temperature of 40°C. be much exceeded. This is really essential, a sensible quantity of fat rising on heating, even though many hours have previously elapsed.

The extra amount so obtained is very variable, so that no constant correction or allowance can be made for it. In four experiments made simultaneously I obtained on heating:—

1. ·0180 gramme = ·12 per 100 by volume of milk.
2. ·0165 " = ·11 " " "
3. ·0305 " = ·20 " " "
4. ·0180 " = ·12 " " "

The same four quantities treated in the ordinary way (but allowing some hours for the rising of the layer, and weighing the fat obtained on evaporating off the ether) had previously given quantities of fat which, when added to the above supplementary weights obtained on heating, showed the following total percentages of fat :—

1. 3·18 of butter fat per 100 by volume of milk.
2. 3·14 " " "
3. 3·27 " " "
4. 3·17 " " "

Mean 3·19 " " "

According to M. Salleron, there is a loss in the process owing to a portion of the fat remaining in permanent solution. The existence of this source of error seemed extremely probable. With the view of ascertaining the extent to which it was likely to affect the accuracy of the process, two portions of the above sample of milk were evaporated to dryness, the fat extracted with benzoline, and recovered by evaporating the solution. The following results were obtained :—

1. 3·38 per 100 by volume of milk.
2. 3·30 " "

Mean 3·34

Thus this method, which may be regarded as giving the true percentage of fat present, and which certainly cannot give too high a result, yielded figures which were on an average ·15 higher than were obtained by Marchand's process. The difference is not great, and as one of the experiments by the latter method gave a result only ·07 lower than the mean of the above estimations, it may be said that Marchand's process, with sufficient time, careful warming, and weighing of the butter fat, gives fairly accurate results, though somewhat below the truth. The fault is here on the right side, for a low estimation of the fat would tend to make the proportion of "solids not fat" excessive, and therefore to the advantage of the dealer when adulteration of the milk by watering was in question. The natural proportion of fat in milk is so variable that a somewhat low estimation of it could not do any possible harm unless the percentage were so small as to bring it near the lower limit observed in experiments on undoubtedly genuine milks.

M. Marchand recommends the addition of one drop of caustic potash before shaking the milk with ether. The plan is of considerable service as the alkali dissolves the greater part of the casein (and probably the membranous covering of the fat globules), and thus facilitates the action of the ether and the subsequent rising of the oily layer. It is also useful for correcting any tendency to acidity and premature coagulation of the casein.

My thanks are due to Mr. L. N. Lean, for his assistance in making the series of experiments above recorded.

The general conclusions arrived at from the observations and experiments detailed in the above paper are therefore as follow :—

1. The method of estimating fat in milk described by Mr. Horsley is extremely fallacious, the chief sources of error being that,—

a. The graduation of the tube does not admit of accurate measurement of the oily layer.

b. When accurately measured the volume of the layer bears no constant ratio to the weight of its contained fat, and the conditions on which the ratio depends are entirely beyond control.

c. A considerable and very variable loss occurs from imperfect rising of the fat during the short time allowed for the purpose.

2. A method of estimating fat in milk closely resembling that of Mr. Horsley, was described by M. Marchand as long ago as 1854. In this process, loss from imperfect rising of the fat is completely guarded against by warming the tube to about 40° C., and allowing it to stand till no additional fat rises. The addition of a drop of caustic alkali at the commencement of the process is a decided improvement.

3. The method of Marchand is capable of giving results of very considerable accuracy, provided that the layer of oil is not measured, but drawn off and heated till of constant weight. The results so obtained are somewhat below the truth, owing to the slight permanent solubility of the butter fat in the subjacent mixture of alcohol, ether, and water. The loss due to this cause is very small, and is probably constant in amount.

4. The process with the above modifications and precautions is rapid, and requires but little manipulation. It can be advantageously employed instead of Wanklyn's method for the estimation of fat in milk. By subtracting the weight of fat obtained from that of the total solids, the proportion of "solids not fat" can be ascertained at least as accurately as by treating the residue with ether.

The PRESIDENT asked the meeting to record its thanks to Mr. Allen, and observing that he remembered they had an exciting discussion on this subject last year, declined offering an opinion on the vexed question.

Mr. STODDART said he supposed it was his place to reply to Mr. Allen's very positive and not very complimentary paper. First of all, the tube shown was not his tube; his tube was not of so great diameter, and, as he showed last year, he always used a stoppered tube. He was not surprised at Mr. Allen's discrepancy, because last year he could not produce a layer at all. Mr. Allen then got up and said he could not think how it was obtained; that was recorded in the Year-Book. Another thing, Mr. Peter Squire manipulated the samples of milk shown last year, and he got results which corresponded with his (Mr. Stoddart's), showing that there could not be any great discrepancy. With regard to there being eccentricities in the results he totally contradicted that in the most positive manner; and asked any gentleman who saw the array of tubes produced last year whether his position was not proved in the most incontestable manner. Mr. Allen's discrepancy of measurement might have been easily produced in this way. If a tube were used such as that shown which was closed by the thumb when the ether was put into it, and shaken up, if great care were not taken a little spirting occurred, and that made a wonderful difference. When the alcohol was added the spirting was four times as much as before, and that was the reason why he discarded a tube stopped by the thumb. With regard to the period of ten minutes, he never said it must be ten minutes exactly; and, in fact, the tubes were frequently left for half an hour. With regard to the addition of soda, he disagreed with Mr. Allen and Mr. Marchand in thinking that soda or potash were good additions. He tried them before he heard of Horsley's tube experiments, and he did not find the results as good as Mr. Allen's. The results given by the tubes were really very uniform, provided sufficient care were taken in ascertaining the lines, but if by the slightest inattention any of the fluid or spirituous vapour were allowed to escape, there was a tremendous inaccuracy. Between town and country milk there was a great difference. Somebody said last year that it was impossible he could have got the cream from his breakfast milk. He, therefore, went to the Golden Cross, where he had been staying and found that the milk had been standing, and the top of it had been given to him. As to the allegation that measure and weight were not identical, he would say that, making a reasonable allowance for difference, they were so. He contradicted the paper *in toto*, and was not the only one who did so. He did not, however, use these tubes for analyses. It would not be right to rely upon their indications alone, and he had never given a certificate based upon them. Although they would give accurate results he only used them as a sort of quick method of ascertaining whether it was necessary to proceed to analysis. It did not answer to use for this particular purpose spirit which was not 60° over proof. He should like to ask Mr. Allen whether the spirit he used had been tested, and whether it was always the same strength. He was surprised at Mr. Allen's positiveness, for Mr. Horsley had made experiments, and Mr. Ekin, of Bath, had made experiments, and they both corroborated his own observations. He really must be excused if he said that Mr. Allen's accusations of inaccuracy and eccentricity were incapable of proof.

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* *Pharm. Journ.*, September 5, 1874, p. 189.

Mr. **Siebold** said he had made a large number of experiments with Horsley's tubes, and could fully corroborate what Mr. Stoddart had just said. It was quite true it was impossible by this process to estimate the butter fat down to a decimal; but on the whole, results were obtained agreeing within a quarter per cent., which was enough for all practical purposes. By this process the butter fat was estimated in a comparatively short time, and if a sample of milk having a sp. gr. of 1·032 yielded more than two lines of fat, all thought of adulteration might be dismissed. The specific gravity alone meant nothing, the butter fat alone meant nothing; the two together meant a great deal. Without going through any tedious process it was possible in a short time to say with tolerable certainty whether it was needful to go further. He was in a position to explain the discrepancies noticed by Mr. Allen. He had himself tried several experiments and obtained uniform results. Mr. Stoddart had succeeded well by shaking for five minutes, but there was a difference in different people's shaking, and in his own case five minutes did not suffice; he needed to shake for seven or eight minutes, and to be safe he shook for ten. With five minutes' shaking his results disagreed as much as those of Mr. Allen. One might not shake as violently in one case as in another, and the difference must be made up for by increase of time. He allowed the tube to stand for an hour, and in winter he found it necessary to place the tube in warm water. In summertime half an hour was sufficient to obtain a clear layer of oil, provided the tube had been shaken a sufficiently long time, and spirit of at least 60° over proof used; manipulating in that way, he obtained very good results on evaporating equal bulks (1 c.c. each time) of the oily layer. Some of Mr. Allen's results too agreed very closely. He noticed that Mr. Allen's gave the figures of 111, 121, and 111, and it seemed surprising that from these there should be a jump to 160. The natural conclusion was that there was some fault in the manipulation. With all deference to Mr. Allen's undoubted ability as a food analyst, he believed he had made this mistake. He had stuck too closely to the directions given by Mr. Horsley. When he (Mr. Horsley) spoke of shaking for at least five minutes, it did not follow that one ought to stop directly the five minutes were up. The object to be effected was to get the butter fat as a clear oily layer on the surface, and unless the shaking were done with great force it was necessary to extend the time mentioned by Messrs. Horsley and Stoddart. He could recommend this test as an excellent way of deciding whether a more complete analysis was necessary or might be dispensed with.

Mr. **Ekin** said that as his name had been mentioned he would say a few words, although he would have rather not taken part in a tournament of public analysts, with whom it was rather early days to enact the tragedy of the Kilkenny cats. He had observed from the *Pharmaceutical Journal*, that this storm in a teacup was going to be reopened, and he thought he would make one or two experiments to see if they would fortify him in the impressions derived from former experiments. As Mr. Stoddart had said, he took it for granted no one would rely upon the tubes except within the limits named. Where a certain number of butter lines were thrown up one might be satisfied the milk was not adulterated. He had taken the milk supplied to his house on the previous Thursday morning, and first of all he put it into a 1000 grain measure. It threw up 6 per cent. of cream. He tried it by Mr. Horsley's plan and got 1·75 lines of butter fat, which corresponded to 2·9 per cent. He then took the total solids in the ordinary way by evaporation, and found them to be 10·5 per cent. This residue, exhausted by ether, gave a loss of 2·92 per cent. The ether washings were collected in another tared capsule, and on being evaporated, first in a current of warm air, the drying being afterwards completed on a water-bath, gave 2·92 per cent. of butter fat. Thus we have—

		Fat per cent,
By Horsley's plan		2·9
One hundred grains of the same milk giving total solids . . .	10·5 grs.	
Solids without fat . .	7·58 ,,	
Loss . .	2·92 grs., equal to . .	2·92
The ether washings also yielding, on evaporation		2·92

Therefore, so far as that experiment was concerned, it quite proved the accuracy with which the fat may be estimated by the Horsley tube. Indeed, he should have preferred that the figures had not agreed quite so well; as it was they looked suspiciously accurate, but he could simply give them as he found them. This milk was evidently adulterated. He might say in passing that he found Professor Redwood's modification of Mr. Wanklyn's plan, as mentioned by the Professor last year, to answer admirably. Mr. Wanklyn recommended that a small quantity of milk should be evaporated in a platinum capsule, but a horny layer was thus produced, from which it was troublesome to extract the butter. Professor Redwood suggested taking a larger quantity, say 100 grains, which, by being constantly stirred during evaporation, gives the residue in a beautiful granular condition, easily exhaustible by ether. Mr. Ekin further said that a gentleman had supplied him with some milk from a splendid Guernsey cow, which threw up 24 per cent. of cream in a 1000 grain measure, and gave 4·5 lines of butter oil, equal by calculation to 7·47 per cent. of fat. He treated it in the same way and got total solids 16·31; solids without fat 8·65, difference 7·66. The fat obtained from the ethereal solution amounted to 7·55. Here, again, it will be seen that the results obtained by the Horsley tube tallied closely with those obtained by other methods. The milk was undoubtedly genuine, but the total solids not fat were 8·65, and that was unfortunately below the analyst's standard of 9 per cent. He was much afraid that any person selling that milk would be liable to be fined. He thought that experiment disposed of the question about the richness of milk given from Alderney cows. He had noticed before that such milk was not so rich in casein, but he had not himself examined a sample before where the solids not fat were below 9 per cent. As to Mr. Allen, he did not despair of him; he had already made great progress, he had now obtained lines of butter fat, which he confessed last year he could not do, and if he continued his researches until the next meeting no doubt he would find all difficulties disappear.

Professor Redwood said it had been stated that if the specific gravity of milk were taken, and the amount of fat afterwards determined, from these two data might be decided whether milk was genuine or adulterated. He must say he had come to a different conclusion since the specific gravity of milk, irrespective of the butter-fat, did not give a perfectly reliable datum for calculation. The difference in the proportion of casein, milk sugar, and solids considerably varied the specific gravity of the liquid. The real specific gravity of the liquid deprived of fat indicated a proportion of solids in one case different from another, and therefore he thought that it would be unwise, as a general rule, to rely upon that mode of arriving at a conclusion; although it might go pretty near, yet it would not, as he believed, be accurate. Another point he would allude to was this: in the examination of milk from a Guernsey cow Mr. Ekin got a smaller proportion of solids not fat than was indicated by the analysts as their standard, although the milk was obviously genuine milk. It did not appear, however, that in that case a sufficient, or indeed any, allowance had been made for the fact that there was an increase in the quantity of butter fat—an unusually large quantity of butter fat—being upwards of 7 per cent.; whereas, when we estimate the solids not fat as being at least 9 per cent., we take only 3, or at most 3½ per cent. for butter fat. The quantity of milk operated on was a weighed quantity of 100 grains. If in that 100 grains there should be in one case 7½ or nearly 8 grains of butter fat, and in another case only 3; if from the two samples the solids not fat were estimated, corresponding percentages were not taken; in the one case the quantity of solids not fat was from only 92 or 93 grains, in the other taken the solids not fat were from 97 grains, consequently that would account for the slight discrepancy. The 8·7 which Mr. Ekin got from the 100 grains of milk would have amounted to something like 9 if he had taken a quantity of the liquid devoid of fat that would be equal to what he would take in another case.

Mr. Ekin said that what Professor Redwood had pointed out was self-evident, and he was glad it had been pointed out, because public analysts, judging from their reports, simply took the percentage as he had stated it, and, of course, if in 100 grains of milk they find the total solids without fat below 9 grains, it might happen that the milk would be condemned on that account. He was puzzled to know how it was that in London the analysts could speak so positively to such proportions as seven and seven and a-half per cent. of water being added. He could understand their saying that at least so much had been added; but he could not understand their relying to the extent they did on an arbitrary standard that had no existence in nature.

The President said to discuss that point would be going too far away from the subject.

Mr. Siebold said that what he had remarked about specific gravity had been misunderstood. He did not wish to imply that the determination of the specific gravity and of the amount of the fat was in all cases sufficient; by no means. But he stated that in many cases it would save the trouble of further analysis. Whenever the specific gravity was not under 1·032, and more than two lines of butter fat were obtained, one might be certain that no addition of water had been made. It was quite certain that the variations of specific gravity, corresponding with the quantities of milk, sugar, and casein, were not so great as to upset the result. If the specific gravity was below 1·030, and the butter fat was one and a half lines, the butter might be adulterated and in such a case a more complete quantitative analysis would be necessary.

Mr. Allen said he wished to disclaim being actuated by any such feeling as that attributed to him of wishing to raise a tempest in a teacup, or in any way to quarrel with his brother analysts. But when a process was brought forward, and a positive statement made as to its value, it behoved every man to test carefully whether it were accurate or not. If he did not find it so he was not to blame if he at once published the fact, before that same assembly which heard the original description. When a man was fortified by experiments the more positive he was the better. Mr. Allen claimed that the gentlemen who had spoken substantially agreed with him. When a person desired to test the accuracy and value of a process, he ought to adhere as rigidly as possible to the conditions laid down by the inventor, otherwise the inventor was entitled to say "You have not done what I directed you to do." He himself had tested the process as it was described, he had nothing to do with improvements since adopted privately. The tube shown in the wood-cut attached to Mr. Stoddart's paper last year was an exact facsimile of that invented Mr. Horsley, and shown that day. Last year Mr. Stoddart directed the measurement of the sample of milk and the use of methylated spirit, but he now said he weighed 250 grains of the sample and employed pure and absolute alcohol. In his paper last year, and in Mr. Horsley's original pamphlet, a few minutes only were allowed for the rising of the fat, but Mr. Stoddart now allowed a considerable time, as recommended by Marchand. Mr. Siebold went further, and admitted the desirability of warming the tube in winter, and in summer, of course, the temperature was already nearly that recommended by Marchand. The fact that Mr. Stoddart and Mr. Siebold had independently found these modifications and precautions desirable was the strongest evidence of the fallacious character of Mr. Horsley's original process. What he said a year ago about not obtaining layers of fat, corresponded to what had just been said during the discussion that very morning about the butter when the milk was poor forming globules. In that circumstance there was an indication that the process was only capable of being used when the amount of fat exceeded a certain proportion, and that was the reason why he could not obtain a measurable layer with certain adulterated samples of milk. There was nothing wonderful in that, and under the same circumstances any one else would obtain a similar result. (Mr. Stoddart: I use a narrow tube.) Accuracy of measure would depend upon the accuracy of the tube, the narrower the tube is, the more finely divided, the more exact one could be, and with his pipette he could measure to the hundredth part of a grain. No doubt if he had been content with Mr. Horsley's measure, he should not have discovered the variation between the weight of the fat and the volume of the oily layer. He had followed the directions of Messrs. Horsley and Stoddart as to time, and they said that the whole process need not occupy more than a quarter of an hour. He had shaken religiously for five minutes, and for another five minutes, after adding alcohol. It appeared that Mr. Stoddart had been misunderstood, for he now said he should not think of using this except as a rough process, and that was all he (Mr. Allen) contended for. All he would say was that the process was a fallacious one if used alone, but if it was only used as an indicative process, it was only necessary to affirm that it was not scientifically correct.

The Conference then adjourned for luncheon.

(*To be continued.*)

PHARMACEUTICAL SOCIETY OF IRELAND.

The first meeting of this Society was held at the College of Physicians at four o'clock on Friday, the 10th, Sir Dominic Corrigan, Bart., in the chair. Present, Drs. Aquilla Smith, Burk (Limerick), Frazer, Leet, Pring, Owens, and Macnamara; Messrs. William Allan, Collins, Goodwin, Goulding (Cork), Harrington (Cork), Hodgson, Holmes, and Prof. Tichborne.

The business transacted was quite formal, and consisted in appointing a temporary clerk, and in taking a ballot to determine what members of the Council should retire at the close, respectively, of the first and second years. Notice of motion was also given that the 15th Clause should be considered at the next meeting. This important clause is to the effect, that the Council may by resolution determine upon allowing certain persons to acquire the title of chemist and druggist, subject to such terms and conditions as the said Council shall think proper. The meeting adjourned to the 22nd instant.

SOCIETY OF PUBLIC ANALYSTS.

At a meeting of the Society of Public Analysts, held at Bristol on the 26th ult., a paper reviewing the Sale of Food and Drugs Act, 1875, written by Messrs. G. W. Wigner and J. H. Scott, was read by the former gentleman. The object of the paper was to point out in what respects the new Act differs from the old, and where the points of difference are (in the opinion of the authors) improvements or the reverse. It was noted that though the object of the Act of 1872 was confessedly to put down the adulteration of food, it contains no definition either of what was to be reckoned adulteration or what was to be included in the term "food." The Act of 1875 carefully avoided the use of the word "adulteration," but provided for the sale of food and drugs in a pure and genuine condition, and gave a definition of food and drugs which the authors consider to be both comprehensive and comprehensible.

The writers, while apparently accepting this as satisfactory, expressed a regret that the Government could not see its way to adopt the definition of an adulterated article, drawn up with considerable care by the Society of Public Analysts.

The authors consider that the new Act has one point of superiority to the old, inasmuch as it will not be necessary for the prosecution to prove that a defendant added the injurious admixtures knowingly, as knowledge will be assumed and a conviction will follow, unless the accused is able to satisfy the justices not only that he did not know of the impurity, but that "he could not with reasonable diligence have obtained that knowledge." The minor offence of selling "to the prejudice of the purchaser," an article "not of the nature, substance, and quality demanded," is qualified by the provision that no offence shall be deemed to be committed if the ingredient added is not injurious to health and is necessary in order to render the article sold fit for the purpose of commerce, or where the food or drug is a proprietary medicine or is the subject of a patent in force.

It is pointed out as important that any defendant who intends to rely for his defence on any one of the exceptions, shall prove that the mixture is justified by the exception. The shifting of the onus of proof from the plaintiff to the defendant will, the authors think, do much to render the Act operative.

The conditions as to the sale of drugs are extremely few and simple, namely:—

The "quality or potency" of the drug shall not be injuriously affected.

Proprietary or patent medicines may be sold.

Compounded drugs shall be compounded in accordance with the demand of the purchaser.

Mixed articles of food or drugs may be sold if the following conditions are observed:—

1. The mixture must be declared by a "distinct and legible" label.
2. The added matter must not be "injurious to health."
3. The admixture must not be intended to increase bulk, weight or measure, or to conceal the inferior quality of the article.

The importance of Section 9, which makes it punishable to "abstract from an article of food any part of it so as to affect injuriously its quality," was especially insisted on, and the fact that it is likely to put a stop to the illicit skimming of milk was pointed out.

The writers of the paper reviewed the various clauses of the Act (thirty-six in all) *seriatim*, pointing out amongst other things that it is likely to be, to a large extent, self-supporting, as all fines will now be applied to the expenses of executing the Act.

The result of an exhaustive consideration of the Sale of Food and Drugs Act, 1875, was, that on the whole it is a better measure than the one it is intended to supersede, but Messrs. Wigner and Scott were careful to point out that this conclusion had reference only to the Act as it passed, not as it was introduced, and claimed that for the very numerous amendments to which the Bill was subjected in its passage through the two Houses of Parliament, the Society of Public Analysts are entitled to the greater part of the credit.

The paper was well received and led to a lengthened and animated discussion.

Parliamentary and Law Proceedings.

A Coroner's Inquiry at Yeovil.

On Thursday, the 9th inst., an adjourned inquiry into the circumstances attending the death of a Mr. Turberville took place at Yeovil.

Dr. Aldridge deposed that he was a duly registered medical practitioner living at Yeovil, and did not know deceased until called in to see him, on August 16, between nine and ten o'clock at night. Deceased was ill in bed, and complained of great pain in his left leg at the back of the thigh. He said he did not require a medical man, and had not sent for one. He appeared to suffer great pain, but was perfectly sensible. As witness left the room, he jumped out of bed and locked the door. Witness asked that Mr. Maggs, sen., might be sent for, as he had told him he was a friend of deceased. Mr. Maggs came at once, and deceased unlocked the door when Mr. Maggs spoke. Deceased was in bed, but dressed. Mr. Maggs said, "I have wished you to see a medical man for some time. If you don't consent to see the doctor now, I shall withdraw and have nothing more to do with you." Deceased was raving and calling for chloroform. His manner made witness think he was mad at that time. Witness sent Mr. Maggs, sen., for an ounce of chloroform. Deceased, thinking it was long in coming, asked him to go and see if it had come. He was still raving. Witness left the room about three or four minutes, and returned with Mr. Maggs, sen., who had brought the chloroform. Deceased was in the same place, and still raving, but his speech was not quite so loud. He still called for chloroform, and witness dropped about twenty drops on a handkerchief. He was going to administer it, when he noticed a white fluid dripping over his lower lip, and immediately deceased vomited a crystal into the chamber utensil. Witness told Mr. Maggs, sen., to wait where he was, and ran off for remedies, as he saw that deceased had taken poison. While he was in Mr. Maggs's shop, Mr. Maggs, sen., ran in with another crystal, which he said deceased had vomited into his hand. Witness returned to the bedroom immediately and administered, as an emetic, 30 grains of sulphate of zinc. Deceased swallowed it and vomited freely almost directly. The mouth, gums, and tongue were burnt by the salt, and there was a loss of power in both legs, from knee to foot. Witness remained with deceased until one o'clock in the morning. After he thought deceased had fully recovered from the effects of the cyanide of potassium, witness gave him a full dose of chloroform, as he complained of intense pain in the leg. Witness dropped about three drachms on a handkerchief, and he fell asleep in about ten minutes, and slept from ten to fifteen minutes. When he awoke, he was in the same excited condition. Witness gave him about half-a-grain of morphia at about one o'clock in the morning, in solution; but deceased would not take more than about two-thirds. It did not relieve him in the slightest. Witness left at about one o'clock, leaving Mr. Wm. Maggs to take care of him, with the boots to assist him if he should require help. Witness simply ordered them to give him nourishment if they could get him to take it. He left the chloroform, but gave no directions for it to be used. He saw deceased again about two o'clock, and remained with him until four. The boots and Mr. Wm. Maggs were with deceased, who was still excited. He administered another dose of chloroform, about three drachms. It procured for him about ten or fifteen minutes' sleep, after which deceased was still very excited. He did not give him more chloroform, but gave another dose of morphia, about half-a-grain. Deceased swallowed as much as at first. Deceased took champagne and brandy. Witness left at four, and was sent for again at seven, by Mr. William Maggs. Deceased was still very excited. The second dose of morphia had no effect, and deceased was very excited at seven, when witness gave more chloroform, as he complained of great pain in the left leg. Deceased was quiet, and sensible at intervals, which were few and far between. The third dose of chloroform was sufficient to send him to sleep ten or fifteen minutes. Witness remained until ten o'clock, and before leaving he gave a quarter of a grain of morphia. Between half-past seven and ten, deceased took some champagne and a little beef tea. Witness saw him again at about eleven and three, when deceased did not complain of pain, but was excited. Witness had given Mr. W. Maggs directions to administer 15 to 20 drops of chloroform, if required, the latter being the highest dose he was to give. Witness saw deceased about half-past six or a quarter to seven, and remained with him until his death, which took place at about ten o'clock on Tuesday night. Witness believed deceased was dying of exhaustion, and he tried to prevent his exhaustion. The cyanide of potassium was thrown out of his mouth. Very little, if any, got into his stomach. If he had 10 grains in his stomach, he might have lived half an hour. Witness asked him if he had taken poison, and he said he had. He was sensible at that moment. Witness made a *post-mortem* examination. Mr. Wills assisted, and Messrs. Tomkyns and Colmer were also present. The body was in an advanced state of decomposition, and the head was not examined on that account. The medical men concurred that it would be useless to examine it. The chest was first examined. The lungs were healthy. The heart was free from any disease, although perhaps a little soft. The abdomen was next examined. The stomach was tied at both ends and removed. The heart was quite empty. There was not much fluid in the stomach. It was placed in a jar with a portion of the liver and the left kidney. The liver was healthy. The intestines were all removed and looked over, but were not opened. Witness's opinion was that deceased died from exhaustion, arising from madness. He failed to detect any organic disease in any part of the body.—By a juror: When he entered the room, he saw no chloroform, he examined every bottle there, by taking them up and reading the labels. He saw no bottle labelled "Chloroform." If the chloroform did not put him to sleep, it might have excited him temporarily, but the effect would soon pass off. When he first saw deceased, he believed he was suffering from sciatica. He did not know whether deceased had previously taken poison.

Examined by Mr. Riley: Mrs. Sharland sent for him; Mr. Maggs did not. When he first saw deceased he could not judge what was the matter with him. He did not know that Mr. Maggs had treated him. Mr. William Maggs was not witness's assistant, or ever connected with his surgery. He did not suggest to Mr. Maggs that it was irregular for him to have treated deceased; but, of course, it was improper for chemists to treat persons who were seriously ill. The first thing witness prescribed was sulphate of zinc as an antidote. The bottle produced (labelled "Cyanide of Potassium") might hold more than a drachm and a-half. Witness did not think it would be legitimate for a chemist to supply such a bottle of cyanide unless he knew the person buying it, and for what it was to be used. Judging from appearance he should think deceased took about 60 grains. Deceased did not take the poison in witness's presence, nor between the first and second visits. He thought deceased might have had the poison in his mouth three or four minutes, and took it he believed while he went to meet Mr. Maggs with the chloroform.

The witness was cross-examined by Mr. Bradlaugh at considerable length, but his answers did not materially affect the foregoing evidence.

Mr. Albert Jas. Bernays, Professor of Chemistry at St. Thomas's Hospital, London, then read a report of the result of his chemical analysis of the stomach. After describing the appearance of the stomach, Mr. Bernays continued:

"As I received no information whatever as to the probable cause of death, or even at to any suspicions, I set to work upon the analysis as systematically as possible. I first ascertained that the contents of the stomach were distinctly, although faintly alkaline. The alkalinity was permanent, and therefore did not proceed from ammonia. I could not estimate the degree of alkalinity, but state the fact, leading me from experience in a similar case to look at once for cyanide of potassium. A portion of the stomach, with commensurate contents, was left covered with a glass plate dotted on the under surface with silver nitrate; there was no result. On distillation with tartaric acid, I cannot say that I was able to discover for certain the presence of cyanogen, because I only obtained a doubtful result with a ferrous-ferric salt and hydrochloric acid, and none with silver nitrate. A portion of the contents of the stomach and of the blood, I examined for the ordinary metals, and found none. But, in the tissues of the stomach, in the kidney, and in the liver, I found very distinct traces of antimony. The galvanic process proved very satisfactory, and afforded a violet-coloured deposit, soluble in ammonium sulphide; a portion I submit for inspection. On passing the gas, obtainable from the hydrochloric acid solution with zinc, through a solution of silver nitrate, a dark deposit of silver antimonide was obtained. Paper soaked in silver nitrate was also darkened after a short time, and no arsenic was found in solution of the silver nitrate. That antimony in any form had been recently employed, did not appear from the analysis. Possibly it can be readily accounted for; but it may be of months' standing.

"From information which I received on the morning of the 27th August, I continued the experiments which I had commenced on the 25th, so as to include the search for the ordinary alkaloids, strychnia, and morphia. I adopted the well-known process of Stas, using, as recommended by Dr. Taylor, acetic instead of tartaric acid. I found no trace of either morphia or strychnia. There can be no reason for describing negative tests, and the less because this report will be read by a medical man.

"On Monday morning, August 30th, I found a hamper from Yeovil awaiting my arrival, containing articles which I should have received on Saturday. It was properly directed and sealed with an unbroken seal. Mr. Riley, who was present at the unpacking, and had also been present at the packing at Yeovil, informed me of the nature of the contents.

"The hamper contained two chamber-pots. The top one, from which the urine had been emptied (acccording to Mr. Riley), contained deposits of an obviously urinous character. There were distinct crystals of uric acid, and the chemical behaviour was that of uric acid and of phosphates. In fact, the deposit was exactly what one would have expected from stale urine. The second chamber-pot only contained a little dried-up excretal matter, and mucus. There was so little, that I simply tested it for antimony, and found none.

"There was also a brown-paper parcel, sealed and labelled, 'Glass. Immediate.' It was forwarded by Mr. Riley, and I opened it in his presence. The parcel contained two cigar-boxes. In the one cigar-box, I found a wide-mouthed bottle, carefully stoppered and closed with white leather. It was said to contain refuse medicine. The liquid was whitish in colour, and amounted to 10 ounces by measure. Next to water, a little spirit, and an 'idea' of chloroform, potassium cyanide was the most marked constituent. The quantity of potassium cyanide I found to be 2·457 grains in the 10 oz. I also found zinc sulphate, zinc carbonate, a distinct trace of morphia, and a small quantity of a chloride. There was no antimony, and no strychnine.

"In the second cigar-box was also a wide-mouthed bottle, similarly closed to the first. It contained half-a-pint of an exceedingly offensive urine. As there was no proof that this urine was voided by the deceased, I only examined it for antimony, and found none.

"On the evening of Monday, the 30th of August, I received from the hands of the superintendent of the Yeovil Police, and by the order of Dr. Wybrants, a box bearing two unbroken seals. I broke the seals of the box, and took therefrom sixteen different articles. By the coroner's order, conveyed to me by letter of Messrs. Slade, Mayo, and Marsh, I have made an analysis of each, as far as it seemed necessary. I have distinguished the articles by numbers.

"No. 1. A six-ounce phial, corked, contained two ounces of a slightly-coloured liquid. The bottle had a printed label:—'T. C. Maggs, chemist and dentist, Medical Hall, Yeovil,' and there was written: 'A sixth part to be taken in water every four hours. H. Turberville, Esq.' The liquid was alkaline and smelt of ammonia. It fumed on addition of hydrochloric acid, owing to the presence of carbonate of ammonia. It contained iodide of potassium, and nitrous ether, and some flavouring matter. I found no alkaloids, and no antimony in any form.

"No. 2. A two-ounce corked phial, labelled: 'Sal volatile.' It proved to be sal volatile, and contained nothing extraneous.

"No. 3. A four-ounce bottle, containing a clear liquid, with the writing: 'A fourth part to be taken every three hours, H. Turberville, Esq.' A clear liquid, consisting principally of water, containing a little spirit, odorous of chloroform; alkaline from the presence of ammonia. In solution, hydrochlorate of morphia, and a slight white precipitate of morphia. About one-eighth of a grain of morphia in the dose. Two doses had been taken from the bottle.

"No. 4. A 12-ounce bottle, labelled "T. C. Maggs, Chemist and Dentist, Medical Hall, Yeovil." The legend: "Mistura Spiritus Vini Gallici." It consisted mainly of brandy with some sugar, but no alkaloids and no antimony. In fact, it was what it professed to be.

"No. 5. A four-ounce bottle, with a written label. Two ounces of the liquid had been taken out. I found this also to consist of the ingredients mentioned upon the label, and of nothing else.

"No. 6. A bottle of two-drachms capacity, containing some preparation against toothache, and consisting chiefly of oil of cloves.

"No. 7. A bottle of two-drachms capacity, containing oil of wormwood.

"No. 8. A square bottle of about half-an-ounce capacity, containing a drop of oil of cloves in water.

"No. 9. A four-ounce medicine bottle containing three ounces of 'elder-flower water' from 'Sandell, pharmaceutical chemist by examination, Yeovil.' I found it to be elder-flower water without any addition.

"No. 10. An eight-ounce bottle, labelled 'T. C. Maggs, chemist and dentist, Medical Hall, Yeovil. The Mixture.' 'Three table-spoonfuls to be taken every four hours until the bowels act freely. H. Turberville, Esq.' This bottle was full, and was a species of black draught. I only examined it with reference to antimony.

"No. 11. A bottle labelled 'Essential oil of Copaiba; J. Partridge, dispensing chemist, Apothecaries' Hall, Barnstaple'—was found to be what it professed.

"No. 12. A two-drachm stoppered bottle, quite empty. The label had the word 'Poison' upon it in print, and 'Chloroform' in writing. 'Maggs, pharmaceutical chemist and dentist, Medical Hall, Yeovil.'

"No. 13. A large wine-bottle, labelled 'Natural Friedrickshall bitter water.' The bottle was nearly half-full, and contained the salts peculiar to this water, the chlorides and bromides of sodium and magnesium.

"No. 14. An ordinary pill-box, labelled, 'The blue pill, as before. H. Turberville, Esq. J. Partridge, chemist, Apothecaries' Hall, Barnstaple.' I found the description correct.

"No. 15. Also a pill-box containing pills, with the direction: 'A pill to be taken night and morning,' from the shop of Mr. Partridge. The only active ingredient in this pill I found to be mercury.

"No. 16. A wide-mouthed, one-ounce stoppered bottle with a written label—'From H. Turberville.' This contained cyanide of potassium of the following composition:—

Potassium cyanide	64·55
Potassium chloride	2·11
Potassium carbonate	24·79
Water, etc.	8·55
	100·10

"The potassium cyanide weighed 14 grains.

"No. 17. A wide-mouthed glass-stoppered bottle of 1 oz. capacity, with a label, and the words 'Poison' and 'Cyanide of Potassium' in print. It contained 29 grains of the ordinary commercial cyanide.

"All these different drugs, when labelled have proved themselves to be what they professed. I have not thought it necessary to state all that I have done in the way of examination, but can state confidently that these medicines are of very good quality. The cyanide of potassium is less poisonous than many samples, owing to the presence of so great an excess of potassium carbonate. There is no indication where it has been purchased. It will be observed that no preparation of antimony has been discovered among the drugs."

Dr. Wills, of Crewkerne, confirmed Dr. Aldridge's description of the *post-mortem* examination. The mouth and tongue had the appearance of having been burnt by some corrosive substance. He formed no opinion as to the cause of death, except from what he had heard that day. He did not think the taking of cyanide of potassium 24 hours before would cause death or exhaustion. Chloroform administered very frequently would tend to cause exhaustion. He should say five drops administered every half-hour would produce no appreciable effect. The effect would depend upon whether a man was in the habit of taking chloroform. Two ounces administered during the night, in addition to the doses of morphia and cyanide of potassium, would tend to cause exhaustion. If the patient were depressed by pain previously, it would hasten the exhaustion. The exhaustion would be intensified by the fact that it followed a powerful emetic. He believed that 60 grains of cyanide of potassium held in the mouth three or four minutes would cause death, probably within two hours. He considered the administration of chloroform to allay the intense pain spoken of by Dr. Aldridge to be proper treatment. If a patient of his had spat out a crystal of cyanide of potassium, he should try to get rid of the effect as soon as possible, by giving an emetic and emptying the stomach. Did not think a person could live 18 hours after taking a large dose of cyanide of potassium.

At this stage, the jury retired, and returned prepared to deliver their verdict, but Mr. Bradlaugh and Mr. Riley asked the Coroner to call two other witnesses, which he decided to do.

Mr. T. C. Maggs, chemist, Yeovil, was then sworn, He deposed : I have known deceased about three months. He was a private gentleman, about 50 years of age. During the time he was in Yeovil, I saw him daily. He came to Yeovil on the Thursday preceding his death. He was at my house on that day, when I returned from Blandford. He remained to supper, and left at about eleven o'clock. He appeared to be in good health, and made no complaint. I saw him on the following day (Friday). He spent the day with my family, and again left at about eleven, after supper. He did the same on Saturday. On Sunday, I received a prescription from him. It was dispensed by one of my assistants, and I took it to deceased's room. The prescription was as follows :—"Iodide of potassium, 18 grains; carbonate of ammonia. half-drachm; spirit. ether. nitratis, one and a-half drachm ; syrup of orange, 6 drachms ; water to 6 ounces ; one ounce every four hours in water." He was under an engagement to dine with me, but said : "I don't think I shall come to dinner. I shall remain in bed and nurse myself, but shall be down in the evening." In the afternoon, between two and three, I was sent for by him and went. He then appeared to be in great pain from the left knee downward. He complained also of constipation of the bowels, and said his bowels had not been open for two or three days. If he could get relief, he felt he should get rid of the pain. He asked me to send him two pills, of one grain of calomel and four of colocynth in each pill. I left him and ordered one of my young men to prepare the pills. When the boots came for them, he asked for some chloroform, and I (thinking he wanted it for toothache) had a fluid drachm sent to him. I went to see him in the evening, and he appeared to be better. He wanted more pills, but I advised him to wait until the next day. I saw him on Monday evening. Deceased told me he had taken the pills and complained that they had not operated. He was sitting on his bed, and had some brandy. He did not like it ; he asked me to get some from Brutton and Pope's, which I did. I also sent him some salts and senna, *i.e.* black draught, at his request, as he wanted his bowels open. Between seven and eight o'clock, he sent to me again. He did not complain of great pain, but seemed low-spirited. I sat with him until about eight o'clock. When I left, he said he thought his bowels were about to act, and walked to the w.c. quite well. From the nature of his conversation with me, I thought he was worse than he appeared to be, and I decided that Dr. Aldridge should see him on that night. He spoke about his collection of agates, and the time it had taken to collect them. He said if he died, he wished it to be given to the Jermyn Street Museum. He spoke of his lathe and his optical instruments. I asked him on Sunday to see a medical man, but he said he knew his own constitution very well, and did not want one. When I went home on Monday night, I told my son that I intended Dr. Aldridge to see deceased. While I was doing so the boots came in and said : "Dr. Aldridge is at the Choughs, sir, and wants to see you." That was about nine o'clock. When I went up, Dr. Aldridge said : "I have been called in to see a friend of yours, Mr. Maggs, but he has been so rude to me that he has ordered me out of the room, and I shan't have anything more to do with him." I said, "If you don't attend him, I must call someone else in, for I am determined some one shall see him to-night." I told Dr. Aldridge what deceased had been taking, and what he complained of. Dr. Aldridge went upstairs. I went with him. Deceased was lying on the bed with his clothes on. The door was not locked, I believe. My impression is that we went in without knocking. I said : "I have brought Dr. Aldridge to see you, Mr. Turberville." I don't remember that he replied. He was then in great pain, and crying out for chloroform. He was a totally different man from what he was when I left, and appeared to be a raving lunatic. Dr. Aldridge asked me to go and get some chloroform, and I sent the boots for it. I think an ounce-and-a-half bottle was sent. I saw nothing of the drachm of chloroform after I sent it at Mr. Turberville's request. When the boots returned with the chloroform sent for at the request of Dr. Aldridge, I gave it to the doctor, who put a few drops on a handkerchief and applied it to deceased's mouth and nose. I cannot say whether it was applied a second time. Soon after using the chloroform, Dr. Aldridge left the room, saying he would get something. He asked me to sit by deceased, who continued to rave. While I sat there, I noticed deceased eject something from his mouth, and I caught it in my hand. I knew at once it was cyanide of potassium. The boots was present, and I asked him to wait there while I went to the doctor. Dr. Aldridge had left about three or four minutes when deceased spat out the cyanide. I did not know that he had ejected anything before, but I saw Dr. Aldridge hold up the chamber. I had not the slightest idea he had taken cyanide of potassium from the mouth of deceased ; but he said to me : "Does he wear false teeth?" I said I did not know. Dr. Aldridge left very hurriedly, and when I saw him at the shop and told him what had occurred, he said: "Yes, I know. I had discovered it before I left." My son weighed up some sulphate of zinc powders, and we returned to the Choughs together. When I got to the shop, the powders had not been weighed up, as Dr. Aldridge had only left two or three minutes. When we returned, Dr. Aldridge administered the emetic and tepid water, which deceased took freely. The emetic soon acted, and I left almost immediately. When I came back with Dr. Aldridge, I said : "Mr. Turberville, this is a very serious affair. It is a sad and wicked thing for you to do. I know what you have taken. Will you tell me where you got it from? Did you get it in Yeovil?" His reply was "No! I have had it for a long time ;" but he would not tell me where he got it. I did not see him alive afterwards. I heard of his death about eleven o'clock on Tuesday evening. Cyanide of potassium is not in the Pharmacopœia. It is used in photography principally. I should not like to take it, or to prescribe it. I do not prescribe ; I simply dispense. I visited deceased as a friend only.

By a Juror : I did not detect the smell of cyanide until I put it to my nose. It did not pervade the room. I do not think deceased could have put the cyanide into his mouth after the doctor left, as I sat by his side ; but might have done so.

By Mr. Bradlaugh : My shop is generally closed at seven. I live on the premises, but cannot say at what time it was closed on the Monday night. When I went back, hoping to see Dr. Aldridge, the shop was closed. I have four assistants—two of my sons (Frederick Maggs and William Adolphus Maggs), and two apprentices named Green and Driver. My son William was in when I arrived. When the shop is shut some of the gas-lights are turned down. After the shop is closed, one of the assistants remains on duty, in a room over the drug-room. He would be able to open the door in a very brief time. When Dr. Aldridge applied the chloroform and left the room, there was a kind of froth and mucus coming from the mouth of deceased. I thought it might be associated with his raving. Before Dr. Aldridge left, he put down the chamber—I suppose under the bed ; but I did not examine it. Believe that the boots remained when Dr. Aldridge left the room, but I will not swear it. I met Mrs. Sharland on the stairs as I left, and told her what I had discovered. I was very much agitated, and cannot swear who was left in the room, or what directions I gave. Dr. Aldridge did not tell me what he had discovered when he left ; and I was perfectly in the dark on the subject. When I took the crystal to him, it was moist; but cyanide does not absorb moisture very rapidly. After the emetic was given, I did not remain three hours in the room. I went down to the bar, had some brandy, and remained until Dr. Aldridge came down. When I asked him how deceased was, he said he had cleared his stomach, and believed he was getting on all right. When I introduced Dr. Aldridge to Mr. Turberville, I might have told the latter that, if he did not attend to him, I would leave, but I cannot say.

By Mr. Riley : I sent deceased a drachm of chloroform according to his own wish. I think it proper to send chloroform to a gentleman whom I know and who is acquainted with its action. I might have told Mrs. Sharland that deceased's liver was out of order. I never supplied deceased with a blue pill and a black draught. He said he wanted a warm bath to make the medicine act. I might have told Mr. Sharland that deceased was suffering from constipation. I never saw Mr. Turberville in a professional capacity, but simply as a friend, and sent him what he ordered. On Sunday, neither Mr. nor Mrs. Sharland told me that it was a serious case, and that a medical man ought to be called in. I do not know that they repeated the message on Monday. I simply thought deceased was indisposed on Sunday. He complained of constipation and sciatia. Deceased was engaged to my daughter.

Mr. Riley : Did you know the extent of his property ?

Mr. Watts objected, and there was much applause.

The Coroner then stopped the inquiry, as he did not think the question relevant to the cause of death.

The Foreman of the Jury (Mr. Pope), handed in a verdict, which was as follows :—" That death resulted from deceased having, while in an unsound state of mind, taken cyanide of potassium, thereby increasing previous exhaustion, which resulted in death.—*Condensed from the Western Gazette.*

Obituary.

DAVID RENNIE BROWN.

Our obituary this week records the death of Mr. D. R. Brown of Edinburgh, the senior partner in the well-known firm of J. F. Macfarlan and Co., Pharmaceutical and Manufacturing Chemists, and from the fact that to Mr. Brown's ability and persevering industry we are in great measure indebted for the success which has attended the manufacture of the products from opium, etc., in that city, a short tribute to his memory may not be without instruction.

Mr. Brown was born in Edinburgh in the month of December, 1808. He was the only son of his parents, and received a good education in keeping with his position in life. At a very early age he was entered as an apprentice with the late J. F. Macfarlan, and was doubtless, like many other apprentices of the period, intended for the medical profession, as he attended the various medical classes and in due time went as surgeon in a whaling ship to Davis' Straits. The season, however, turned out a bad one, and was disastrous to all concerned, so that he with others returned home bereft of all effects.

During his apprenticeship he had shown considerable aptitude for experimental chemistry, and many are the stories related of the fertility of his inventive genius, in collecting, preparing, and arranging materials in connection therewith.

The leisure enjoyed at sea induced a habit of reading and reflection to such an extent that ever since his appetite for books continued insatiable, while the pleasure he had in communicating what he knew, and the happy manner in which he did it, commanded the admiration of his friends, and he was often heard to say that this was the period of all others which had the greatest effect on his after life.

Shortly after returning he entered into arrangements with Mr. Macfarlan, and ever since has given his attention almost exclusively to the manufacture of those articles with which the name of his firm is associated. He was a warm supporter of the Pharmaceutical Society, knew the value of education, and pressed its claim on all occasions. An examiner for a time on that branch of science he knew so well, he had the happy knack of drawing out from candidates, by a series of gradually ascending questions, all they knew, and his name is cherished with gratitude by many who have undergone the ordeal of examination. To his fellow examiners his retirement from the board about four years ago was a source of very great personal regret.

Few men had a better head or a kinder heart than he of whom we write. Unassuming in manner and most unpretentious in regard to position, he led a life of deep thought, close study, and incessant work. As a thorough practical chemist, he had scarcely a superior. In reference to our own Society, the strong desire which seemed to animate him was that pharmaceutical education should not be a mere name, but a reality, and as such become the compulsory law of the land. No mere superficial knowledge was, according to his ideas, to be the gauge of fitness to practise pharmacy. Nothing short of unceasing application to practical work, and constant reading, so as to gain a thorough acquaintance with the best authors, could satisfy his ideas of what a pharmacist ought to be.

His public appearances were few. Of a retiring, sensitive, unobtrusive disposition, he rather shunned contact with his fellow-men ; but in the society of those whom he esteemed, full scope was given to his genial nature and his warm heart, while his richly-stored mind welled forth in forcible sentences those truths in science and literature on which he was ever pondering.

His great love of books was shown *theoretically* in the position he for many years assumed in connection with the formation of a library worthy of the North British Branch of the Pharmaceutical Society, and *practically*, by the number and value of the volumes which he from time to time presented to the Society in Edinburgh. With the strong feeling for practical usefulness with which his mind was ever imbued there was no member of the Society gave more liberally to the museum ; and the comparatively recent contribution of a valuable series of minerals bears evidence to his desire to enrich its cases with interesting and useful specimens.

During the last two years Mr. Brown has been almost confined to the house from feebleness of the limbs, but surrounded by his books, and carefully attended to by the members of his family, he submitted cheerfully to the dispensation, and gently breathed his last on the evening of Sunday the 12th inst. And thus another link from the chain of true friends to pharmacy has been snapped by the unsparing hand of Death.

Mr. Brown's whole course of life showed a determination of purpose of which very few men are possessed. No apparently insurmountable difficulty ever occurred in his daily career but was overcome by his ingenuity and application. In some respects he might have been considered as peculiar; but he rarely formed an opinion without having good grounds for so doing, and if not always correct in his judgment, he was so true and honest, and gave such good sound reason for the views he advocated, that one could not fail to admire the force of intellect and good sound common sense he brought to bear upon all that he expressed.

Though in private life modest and retiring, few men have ever gained more respect and esteem. To those who really knew him there was a warm under-current of affectionate and true feeling, which entirely removed any idea of apparent indifference or coldness, and it is not too much to say that the void made by his removal from among pharmacists in Edinburgh will not only be deeply felt and mourned, but will be with very great difficulty, if ever, filled up.

He leaves a son and six daughters.

Notice has also been received of the death of the following:—

On the 1st of August, 1875, Mr. John Thomas Hancock, Chemist and Druggist, of Dowlais, Glamorganshire.

On the 13th of August, 1875, Mr. James Hamilton, Chemist and Druggist, of Glasgow. Mr. Hamilton had been a member of the Pharmaceutical Society since 1871.

On the 15th of August, 1875, Mr. Barrington Garnham, Pharmaceutical Chemist, of Brighton. Mr. Garnham had been a member of the Pharmaceutical Society since 1851.

On the 16th of August, 1875, Mr. George Penn, Chemist and Druggist, of Kirton-in-Lindsey, Lincolnshire. Mr. Penn had been a member of the Pharmaceutical Society since 1869.

On the 19th of August, 1875, Mr. Thomas Hopkin Lewis, Chemist and Druggist, of York Street West, Commercial Road, E. Mr. Lewis had been a member of the Pharmaceutical Society since 1871.

On the 20th of August, 1875, Mr. James Collin, Chemist and Druggist, of Queen Street, Derby.

On the 23rd of August, 1875, Mr. William Book, Chemist and Druggist, of Middleton, near Manchester.

On the 4th of September, 1875, Mr. John Bourdas, Pharmaceutical Chemist, of Pont Street, Belgravia, aged 32 years. Mr. Bourdas had been a member of the Pharmaceutical Society since 1869.

On the 5th of September, 1875, Mr. Edward Rennels Hartnoll, Chemist and Druggist, of Tichborne Street, Haymarket, W. Aged 39 years.

On the 7th of September, 1875, Mr. Alfred William Sevin Hastings, Chemist and Druggist, of Richmond, Surrey. Aged 43 years.

On the 11th of September, 1875, Mr. William Raymond King, Chemist and Druggist, of Liverpool. Aged 44 years.

At 1, Lorne Terrace, Edinburgh, on the 12th of September, Mr. D. R. Brown, Pharmaceutical and Manufacturing Chemist, of Messrs. J. F. Macfarlan and Co., in his 67th year.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Modern Naval Hygiene. By Dr. Leroy de Mericourt. Translated from the French by John Buckley. Griffin and Co. 1875.

Posological and Therapeutical Tables, containing the Doses, Actions, and Uses of the Medicines in the British Pharmacopœia; with Poisons. By Alexander Henry, M.B. Edinburgh: Maclachlan and Stewart. 1875.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Future of Dentistry.

Sir,—Would you permit me to call the attention of those gentlemen who combine the practice of the art of dentistry with their own scientific calling to the fact that it is time something was done to put a stop to the fearful influx of uneducated and unprincipled men into the profession. The leading dentists of London and elsewhere are trying hard now, and have been doing so for some years past, to get an Act of Parliament to enforce the registration of existing dental practitioners (no matter what their antecedents are), and the compulsory education of all who enter the profession after a certain date, a modified examination being sufficient for assistants over twenty-one years of age. Chemists, as a rule, who have a liking for dentistry, practise the surgical part very well, getting the mechanical part done by trained workmen.

A chemist having the advantage of a scientific education can practise the art better than any other man that has not taken the degree of L.D.S., R.C.S.E. Where the injury to dentistry lies, is in the fact that at present any man perfectly ignorant of the least particle of chemistry and surgery can take upon himself the title of surgeon-dentist, and practise on the public to its serious detriment, as well as bringing a bad name to those men who try their utmost to make themselves competent.

The Pharmaceutical Society having done so much for your profession by way of raising its status, I earnestly solicit you for some help to improve the condition of our art.

The editor of the *British Journal of Dental Science* will be happy to receive promises of contributions however small, from chemists and dentists in the event of being able to get the Bill into Parliament.

J. J. Musgrave.

4, *Nelson Place, Mall, Clifton, Bristol.*

T. Mann.—We are unable to comply with either of your requests.

"*Enitar.*"—(1) *Inula dysenterica, Sisymbrium officinale*, and *Polygonum Persicaria*; (2) Wanklyn's Water Analysis.

A Correspondent to whom we are indebted for cuttings from the *Derbyshire Times* is recommended to communicate to the Registrar under the Pharmacy Act.

T. Hope.—*Filago germanica*; *Atriplex erecta.*

E. Nuttall.—You are recommended to apply at the College for a synopsis of the examination.

C. Chapley.—The information you ask for respecting the Paris School of Pharmacy will be found in the present series of *Pharm. Journ.*, vol. i. p. 841, and vol. ii. pp. 121, 561.

"*Medicago.*—(1) *Gnaphalium uliginosum*; (2) *Chenopodium album.*

"*Alpha.*"—The sale of methylated spirit is regulated by various Acts of Parliament and Orders of the Board of Inland Revenue too voluminous to quote here. The portions most important to chemists and druggists are given in the Calendar of the Pharmaceutical Society, copies of which may be obtained from the Secretary.

"*Student.*"—We are not in the confidence of the makers of these preparations, and are unable to say what methods they adopt.

"*Delta.*"—We are unable to say which are the particular universities in Germany that grant degrees *in absentiâ.* The chief requisite appears to be the payment of a fee, and the qualification an absence of self respect.

T. S. Robinson.—We do not know the book. Mr. Druce's address is 6, The Drapery, Northampton.

"*Chemist.*"—The question is one that can be answered by the Inland Revenue authorities only. It should therefore be submitted to them. Strictly speaking, even the smallest sale of a "patent medicine" requires a stamp.

"*A Liverpool Chemist.*"—Mist. Gentianæ Co., P.L.

Communications, Letters, etc., have been received from Mr. Thresh, Mr. Robinson, Mr. Williams, Mr. Philpots, Mr. Bray, Mr. Tame, Mr. Siebold, Mr. Huskisson, T. L., A. B. C., T. L., "Hirudo," "Student," "Chemist," "Dentist."

THE INDIA MUSEUM AT SOUTH KENSINGTON.

(*Continued from page* 182.)

The leguminous family is represented by a number of products, among which may be noticed the gum of *Acacia Arabica*, Willd., which is produced abundantly in India. As usually met with, it is dirty and inferior, but one sample here exhibited is very fine, and shows that selected qualities are scarcely inferior to genuine gum arabic (*Acacia vera*, Willd.). The bark possesses astringent properties and is used in tanning.

A remedy much esteemed by the natives for purulent ophthalmia is found in the seeds of *Cassia Absus*, L.; those of *Cassia Tora*, L., and *Cauriculata*, L., being also used for the same disease. The seeds are ground into powder, and a grain or so is introduced beneath the eyelid. The seed which seems to be preferred in China for this purpose is that of *Cassia Tora*, L. In Egypt the seeds of *C. Absus* are used in the same way under the name of *Chichm*. The extensive use of these seeds, from Northern Africa to China, seems to indicate that they must possess decided medicinal power. The leaves of *C. Tora* and some other species of Cassia are used as a cure for ringworm and various skin diseases. The fact that some species of *Cassia*, e.g. Senna, contain chrysophanic acid, suggests the inference that this substance may perhaps be found to occur in the leaves of *C. Tora*, and raises the interesting question whether this chemical body possesses a remedial power in complaints of this kind, since it is known to occur in various drugs used for skin diseases.

The curious twisted pods of *Cæsalpinia coriaria* next attract attention; under the name of "*Divi-divi*" or "*Libi-dibi*," they are well known in commerce as a tanning agent, for which purpose they are very valuable, as they contain from 60 to 65 per cent. of tannic acid. In medicine, a decoction of the pods has been used for hœmorrhoids. The tree yielding this drug is not a native of India, but was introduced from Central America.

The seeds of *Butea frondosa*, Roxb., the tree which yields Bengal Kino, seem to deserve chemical examination. They act very powerfully as an anthelmintic, especially on lumbrici, but are apt to produce disagreeable symptoms if not used with caution. One other plant, the seeds of which will be found in the food collection, is worthy of notice here, on account of the seeds producing a peculiar effect. The seeds alluded to are those of *Lathyrus sativus*, L., which are largely used in Bengal as an article of diet, under the name of Kisari dâl, but if used for any length of time produce paralysis of the lower extremities.

The products of the *Combretacæ* next deserve notice. Of these the "Myrabolans" are well represented. The kinds which are chiefly imported into this country are the "Chebulic" and "Belleric myrabolans." The Chebulic are oval oblong in shape, and are the produce of *Terminalia Chebula*, Retz.; those of *T. citrina*, Roxb., which much resemble them in appearance, but are larger and have a pleasant odour, are often mixed with them. The Belleric are round and downy, and are said to act as a narcotic poison. These two drugs are largely used by calico printers to dye a permanent black, and are ground in mills specially made for the purpose, since the powder is so excessively irritating that it is impossible to grind them in an ordinary mill. Chebulic myrabolans have a place in the materia medica list only on account of their astringency; for medicinal purposes the dried small unripe fruits, known as *black myrabolans*, are generally used. Sometimes flattened pear-shaped galls, which grow on the leaves of these trees, are met with, and, like the fruits, are used as an astringent.

The fruits of *Terminalia catappa*, L., known in India as "country almonds," have a palatable kernel, which yields half its weight of a sweet oil. This oil differs however from almond oil, in containing a quantity of stearine. *Quisqualis indica*, L., another plant of the same family which is occasionally to be met with in hot-houses in this country, has oval, sharply pentagonal fruits which contain an oily kernel, possessing decided vermifuge properties. Four or five of these kernels, bruised and mixed with honey or jam, are given for a dose to children. They are used in China, where the drug is cheap and easily obtained, for the same purpose.

The seeds of the common pumpkin (*Cucurbita pepo*), or an oil expressed from them, is used in India as well as in America, as a remedy for tapeworm, which it is said to expel in ten or twelve hours. The active principle of these seeds deserves investigation, since the dose of the crude drug is rather large, viz. 4 to 8 drachms.

Belonging to the cinchona family may be noticed the bark of *Hymenodictyon excelsum*, Hall., which has the bitterness and astringency of Peruvian bark, and is believed to possess similar properties; the fruits of *Randia dumetorium*, Lam., in appearance looking like large specimens of Belleric myrabolans, and which possess active emetic properties, a single fruit producing vomiting in a quarter of an hour; Munjeet or Indian madder, which appears to produce powerful medicinal effects, producing when taken internally temporary delirium with evident determination to the uterine system. It would probably be found useful in dysmenorrhœa.

The valerian family presents one drug of historic interest: this is the root of *Nardostachys jatamansi*, DC., which is believed to have been the spikenard of the ancients. The odour of the root closely resembles that of patchouli. In medicine it is used, as valerian is used in this country, in hysteria and epilepsy, etc., and spasmodic affections. It appears to be a drug of considerable power, while the odour is certainly more pleasant than that of valerian.

The native Indian materia medica seems to be remarkable for the large number of anthelmintics. We now come to another, which in some respects appears to be superior to others which have been enumerated, since the worms are expelled by it in a lifeless state. It is the seed of *Vernonia anthelmintica*, Willd., a plant of the natural order *Compositæ*. The dose given is from 10 to 40 grains of the powdered seed. The juice of another plant belonging to the same natural order is used by the natives as a preventive of hydrophobia. Putchuk, or Kootroot (*Aplotaxis auriculata*, DC.), which is the "Costus Arabicus" of the ancients, is now chiefly used as a perfume, the odour being likened to that of orrisroot. Its claim to a place in the materia medica rests upon the fact that it was formerly smoked as a stimulant. Another very interesting plant belonging to the same order (*Compositæ*) is *Blumea grandis*, DC., which is remarkable for yielding a camphor identical in properties with the Chinese camphor.

In Burmah it is known under the name of pury-ma-theing. It is a common weed in some of the provinces of India, and may be worthy of attention as a source of camphor if at any future time our supply from China should be stopped.

A CONVENIENT APPARATUS FOR HOT FILTRATION.*

BY H. CARRINGTON BOLTON, PH.D.

Every working chemist has experienced the need of a convenient apparatus for hot filtration. Hot saturated saline solutions which crystallize on cooling in the filter or in the neck of the funnel, and viscid liquids possessing the necessary mobility only so long as a higher temperature than the average is maintained, render the employment of some form of apparatus for *hot* filtration indispensable. While much attention has been given of late to the construction of apparatus for *rapid* filtration, as the innumerable forms of water pumps and steam injectors abundantly show, little has been done towards improving the existing forms of apparatus for hot filtration or the contrivance of new ones.

Two kinds of apparatus have come under our observation. The first of these, invented by Dr. Hare, is the well-known funnel support usually constructed of tinned iron with double walls and a conical aperture for inserting a glass funnel; the space between the walls being filled with water or other liquid, it is kept at a boiling heat by a lamp placed under a cavity shaped like an inverted funnel. A more compact form of the same apparatus was contrived by Plantamour, in which the metallic box is given the form of a cone, and heat is applied to a hollow cylindrical projection filled with the liquid employed, and communicating with the space between the double walls.

While this apparatus is well adapted to the use of pharmaceutists, or for the purposes of the manufacturer, it is not suited to the wants of the analytical chemist. The first form occupies much space, and both forms must be had in great variety of sizes to fit funnels of various dimensions. A small funnel is nearly lost to view in a large jacket, and a large funnel is not heated by a small one. Then again, only well-made funnels, whose sides are inclined at an angle of 60°, will fit the conical opening. Moreover, the fact that the apparatus is constructed of metal is in itself a disadvantage. Only extraordinary care will keep the metal clean and bright in the atmosphere of a laboratory. The disadvantage could be largely overcome by nickel-plating the metallic box, but we have not seen this luxury introduced. In the filtration of liquids, giving rise to very acid fumes, the use of a metallic jacket is hardly admissible.

The second apparatus alluded to is that contrived by Dr. A. Horvath, and described in the *Annalen der Chemie und Pharmacie*, vol. clxxi, page 135, 1874. A tube of soft lead one centimetre thick is wound around a funnel in the form of a spiral, one end being connected by a tightly-fitting cork with a flask placed at a convenient distance, and the other end of the leaden pipe communicating with a recipient for the escaping vapours. Steam being generated in the flask, it passes through the leaden tube and warms the funnel and contents. This contrivance may work well, but is not very convenient; the inventor strangely enough adds that by employing ether, alcohol, carbon bisulphide, benzol, or anilin, in place of water, filtration can be carried on at any desired temperature. The question naturally arises why select liquids having such low boiling-points as ether (35·7° C.) and carbon bisulphide (46·6° C.) to effect *hot* filtrations; surely the cases are rare where the temperature could not be moderated, if desired, by generating steam less rapidly. Then, too, the atmosphere of a laboratory, where a dozen or more solutions are warming by the uncondensed vapours of carbon bisulphide, would be anything but agreeable.

There seems to be room, then, for a simple, cleanly, portable, and inexpensive apparatus for keeping the contents of a funnel hot while filtering, and it is believed that these requirements are filled by the new apparatus described in this paper.

The materials are found in any ordinary laboratory. Select a small funnel with a long stem, and a larger funnel with a wider throat, and cut the stem of the larger funnel short; slip a piece of India-rubber tubing of the required size over the stem of the smaller funnel, and then insert it in the larger one so that it fits water-tight. The inner funnel should project about half a centimetre above the edge of the outer, and as much below the stem of the latter as it admits. We have found the three sizes named below sufficient for all operations of analytical chemistry.

Dimensions given in centimetres; the first figures give the greatest diameter of the funnel, and the second its length including stem:—

	Outer Funnel.	Inner Funnel
No. 1	7 × 6½ . .	4 ×10
„ 2	10½× 9½ . .	6½×12½
„ 3	13½×13 . .	10 ×17

Steam generated in a flask of about one litre capacity and conducted by means of a glass tube into water filling the space between the two funnels, warms the filter on the inner funnel with its contents. In one experiment the water in the outer funnel marked a temperature of 97° C., and the liquid in the inner one 76° C. The temperature in the inner funnel may be greatly increased by covering it with a convex glass, or by employing a saline solution in the outer funnel.

As a matter of course, water condenses in the outer funnel, and must be removed from time to time. In the case of funnels No. 2 it accumulates at the rate of 30 to 35 c.c. in half an hour when boiling vigorously. This seems at first sight to be an objection, but the superfluous water can be so readily removed with a pipette or a siphon that it does not have much force. Or the accumulating water may be drawn back into the steam generator through diminished pressure by simply removing the lamp beneath the flask. In this case, the end of the tube should plunge but little below the surface of the water in the outer funnel, else the latter will be completely emptied.

Actually the operator is not at all annoyed by the necessity of attending to this point, for the filtration requires his constant presence. Should the outer funnel be filled with distilled water in the outset, an overflow would not prove serious; since the inner funnel stands higher than the outer, any disturbance of the precipitate by accumulating water is out of the question.

The great compactness and cleanliness of this apparatus make it available in quantitative analysis, and we have used it for some time with great satisfaction. After washing a precipitate on the filter it may be dried very speedily by simply continuing the heat; the dried filter removes easily, and so the two funnels once arranged need not be disconnected.

Other advantages will occur to those using the apparatus, such as the transparency of the outer vessel, the total absence of metal, and the increased rate of filtration consequent upon the higher temperature. The double funnel may be connected with a Bunsen water-pump or other apparatus for rapid filtration.

In washing precipitates with hot water we have also found it feasible to direct the steam from a small generator directly into the filter itself; if care be taken to moderate the pressure, the precipitate is washed with hot distilled water without danger of loss by spattering, and this works almost automatically

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* Read before the New York Academy of Sciences, May 10, 1875 (from the *American Chemist*).

The Pharmaceutical Journal.

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Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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FATAL "SOOTHING SYRUP" CASE.

THE PRESIDENT of the Pharmaceutical Conference in his address incidentally referred to the subject of Patent Medicines as one that is well worthy of careful consideration, and from his remarks there is little question as to the opinion he holds in reference to "that monster evil, the unrestricted sale of the so-called patent medicines." Very possibly the opinion suggested by this expression may not be universally or even generally entertained by chemists and druggists; but there are at least sufficient reasons for calling attention to the subject, and the very decided way in which Mr. GROVES spoke of it in his official capacity, may be regarded as being in itself an indication that he does not stand alone in the opinion he holds.

A case that has just been reported in the Barnsley papers bears upon this question, and it seems likely to bring about a thorough investigation. The circumstances, as stated in the *Barnsley Times*, are as follow:—An inhabitant of Barnsley procured from a chemist and druggist in the town some "soothing syrup" of a particular make, and administered some of it to two children. Before many hours had elapsed the children were taken seriously ill, and though a medical man was then sent for, his efforts were unavailing in regard to the younger child, which died after a few hours. In consequence of these facts becoming known to the police, an inquest was held on the 16th inst., before Mr. TAYLOR, the Coroner of the district. The evidence of Dr. JOSEPH MORRIS, the medical man called in to attend the children, was to the effect that death was the result of an overdose of opium.

In the course of the inquiry, the Coroner gave expression to very strong opinions in reference to the case, which, seem to be, however well-intentioned, scarcely consistent with existing circumstances. Thus, for instance, during the examination of Mr. EASTWOOD, the chemist and druggist who supplied the "soothing syrup" as a patent medicine, and described himself as a vendor of patent medicines and as having a licence to sell this syrup, the Coroner is reported to have exclaimed "Well, no man has a right to. If you do it again, knowing that there is poison in it, you will be liable to a charge of murder; and if you should be brought before me I'll take care that you are not liberated on bail." Thereupon ensued a lengthy altercation between Mr. EASTWOOD and the Coroner, in which, the one insisted upon his right to sell patent medicines irrespective of any provisions of a Pharmacy Act in regard to the sale of poisons, and also by reason of his holding a special Government licence for which he had paid. There can be no question that Mr. EASTWOOD was in these respects perfectly right; but he was looking at the matter only from a practical point of view and speaking as to his legal obligations and responsibliity, whilst the Coroner, evidently unencumbered with much acquaintance with the Pharmacy Act or its provisions as to poisons or patent medicines, was concentrating his attention upon the fact of potent drugs being indiscriminately placed in the hands of persons ignorant of the use of drugs, together with assertions as to their being harmless and suitable medicine for children, which are calculated to induce unfounded confidence and perhaps even misuse of the preparation. Looking exclusively at these circumstances, and considering also the fact stated by the Coroner that he knew a shop where something like fifty pounds' worth of this "soothing Syrup" was sold weekly, we cannot altogether wonder that the opinions he expressed should have been so decided, or that he should have denounced the recommendatory book freely circulated to promote the sale of this "soothing syrup" as being "a most terrible and disgraceful thing" inasmuch as, to use the Coroner's own words, "it is written in a way which hints that it (the syrup) does not cause sleep, as other medicines, whilst at the same time the bottle contains the very things to produce stupor and sleep. The book was written in such a way as was calculated to mislead many, and ought to have a stop put to it."

Making due allowance for that want of familiarity with the Pharmacy Act which we have so often had occasion to comment upon as being inconveniently characteristic of Coroners and Magistrates, and admitting the statements made in the present instance to be correct, we cannot say that Mr. TAYLOR was wrong in his views or in expressing himself as he did. Certainly he did some injustice to Mr. EASTWOOD by the remarks that we have already quoted, but he seems afterwards to have made amends for this when the exact nature of the Pharmacy Act provisions had been explained to him, admitting that sellers of patent medicines ought, under the existing law, to be exonerated from blame. The jury also seem to have held a similar opinion.

But there was no kind of qualification of the Coroner's opinion that "somebody would have to be made answerable" if patent medicines contained hurtful things and disasters resulted from their use. Eventually it was unanimously decided that the maker of the "soothing syrup" should be summoned for examination; and as the inquest was adjourned for this purpose, we defer any further remarks for the present.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

(Concluded from page 235.)

WEDNESDAY, AUGUST 25, *(continued.)*

Upon the Conference re-assembling after luncheon,—

Mr. HORSLEY made a few remarks in the course of which he said he did not know why Mr. Allen should have called the process the Horsley-Stoddart process. It was no process of Mr. Stoddart at all; he had merely taken it up as a friend. Mr. Horsley further contended that there were essential differences between his process and that of M. Marchand, and that it was unfair to insinuate piracy by speaking of their close resemblance.

The next paper read was on—

CALCIS PHOSPHAS, B.P.

BY J. F. BROWN.

This paper records a very imperfect attempt to throw light upon the actual composition of this salt, its purity as commonly met with, and its capabilities of entering into a definite and permanent state of solution.

It was suggested to me in the course of some researches upon Parrish's Syrup of the Phosphates, the results of which I hope some day to publish.

The first point to which I would direct attention is that it commonly contains a considerable amount of water.

No mention of this is made in the Pharmacopœia, nor in any authority to which I have referred.

In the following table the loss of weight by ignition is noted respecting eight samples, for three of which I am indebted to the kindness of Mr. A. Redford, of Liverpool:—

A	24	per cent.	E	13·1	per cent.
B	15·5	"	F	17·25	"
C	17·5	"	G	14·	"
D	18·75	"	H	12·	"

Of these, A lost between 13 and 14 per cent. when dried in an air bath at a temperature below 100° Fahr., and did not further lose weight when heated on a sand bath to 300° Fahr.

F became light fawn coloured after ignition.

H was prepared by myself, following strictly the directions of the Pharmacopœia; 200 grains of bone ash left 18 grains of insoluble residue, and the yield of washed precipitate, dried in a water bath until it ceased to lose weight, was 162 grains.

This point was not reached until after fifteen hours' exposure, and ten hours later the weight had increased to 168 grains by absorption of moisture from the atmosphere.

Ten grains taken from the latter quantity left 8·8 grains residue after five minutes' ignition over a Bunsen burner, corresponding to 147·84 grains for the entire quantity.

This experiment being repeated, 148 grains only were left, but after eighteen hours a further increase in weight of 4 grains was observed.

A week after (on June 7) the weight was unchanged, the air having been warm and unusually dry. During a cold and damp season a much greater absorption would no doubt have taken place; but the experiment may be sufficient to illustrate the hygroscopic character of calcium phosphate, and the tenacity with which it retains moisture.

The formula given in the Pharmacopœia for phosphate of calcium is $Ca_3P_2O_8$, and Dr. Attfield's 'Chemistry' (p. 81) represents the tricalcic phosphate of bone ash as unaltered in composition by the process officially directed for its purification.

On the other hand, Fownes's 'Manual' (10th ed., p. 371) states that the phosphate having the formula $Ca_3P_2O_8$ is, by solution in acid and reprecipitation with ammonia, converted into $CaHPO_4$.

If the latter statement be correct, I need hardly remind you that the residues left after ignition would consist of calcium pyrophosphate, $Ca_2P_2O_7$, formed by the abstraction of a molecule of water from two molecules of calcium phosphate, thus—

$$2\,CaHPO_4 - H_2O = Ca_2P_2O_7.$$

The bone ash from which I prepared my own specimen lost 2 per cent. of its weight on being ignited; and, taking as a guide Berzelius' analysis of ox-bones, published in Fownes, p. 975, it may be assumed that it contained 84 per cent. of tricalcic phosphate.

Since 9 per cent. remained insoluble, the theoretical yield would be 150·5 grains; the actual amount, as before stated, being nearly 148 grains.

The quantity of hydrochloric acid ordered to be used falls short by 54 grains (of HCl gas) that required according to the equation—

$$Ca_3\,2\,PO_4 + 4\,HCl = CaH_4\,2\,PO_4 + 2\,CaCl_2,$$

so that a slight deficiency is here accounted for.

This, as well as the other seven samples, were tested volumetrically for the phosphoric radical by means of a solution of nitrate of lead, titrated with pure phosphate of sodium, so that each grain measure represented ·005 grain P_2O_5.

The lead solution was used in known excess, and then a solution of potassium bichromate, corresponding to it in strength, was dropped in until a drop of the clear supernatant liquid gave a red tint with a drop of solution of silver nitrate, indicating free bichromate.

The difference in the readings of the two burettes gives, on multiplying by ·005, the quantity of P_2O_5 present in the sample tested.

I may remark in passing that the solution remains turbid as long as it contains lead, but the moment the whole of that metal is thrown out of solution, a clear stratum of fluid is left by the sinking precipitate.

The samples of phosphate were dissolved, one grain in a fluid-drachm of distilled water, by the aid of one minim of B.P. nitric acid; and to this quantity forty minims of solution of acetate of sodium B.P. were added as the first step in the process, which so far covers the same ground as the Pharmacopœia tests.

It should therefore be noted that D and H were the only samples which remained clear on the addition of the sodium acetate solution; of the others, E was the most turbid, C, G, F and A stood in this respect in the order written.

The acid solutions of G, C, F and E stood for some days before testing, and deposited in the order in which they stand; E being almost clear.

The following table gives the results obtained:—

A	41·75	per cent.
B	42·969	"
C	35·5	"
D	41·85	"
E	34·5	"
F	30·0	"
G	31·5	"
H	43·25	"

The sample A was carefully tested also with solutions of uranic nitrate and ferric chloride, using, as suggested by Mr. Stoddart, sulphocyanide of potassium as an indicator with the latter.

By each method the same result was arrived at.

Boiling the solution before or after mixing, and adding the solution of sodium acetate after instead of before the volumetric lead solution, were expedients resorted to without varying, or only to a trifling degree, the constancy of the results.

Now, if the 76 per cent. of residue left by A consisted of $Ca_3P_2O_8$; the original weight should contain $76 \times 142 \div 310 = 34{\cdot}8$ per cent. P_2O_5.

But if the residue be calcium pyrophosphate $Ca_2P_2O_7$, it should contain—

$$76 \times 142 \div 254 = 42{\cdot}48 \text{ per cent.}$$

of the phosphoric radical.

Again, H, which lost 12 per cent. should, by the former calculation, yield $88 \times 142 \div 310 = 40{\cdot}3$ per cent., by the latter, $88 \times 142 \div 254 = 49{\cdot}2$.

Sample D works out 37·2 and 45·4 per cent. respectively, and these two give volumetric results, which seem to bear no relation to those calculated upon either theory.

I very much regret that the pressing calls of business have prevented my applying to each sample the uranic and ferric volumetric tests.

The lead process is recommended by good authorities, and the only defect in it of which I am aware is that the solution is slightly precipitated by the sodium acetate, so that the results appear a little too high.

Probably it answers perfectly for determining the value in soluble phosphates of manures, etc., but fails when the object is to get at the actual quantity of the radical present in a compound which, like calcium phosphate, is more or less soluble, according to the temperature to which it has been exposed.

I have found that the residues after ignition, when dissolved with excess of acid, are perfectly intractable to this method.

My next point is, that although Fownes states that the two calcium phosphates ($Ca_3\,2\,PO_4$ and $CaHPO_4$) are obtained by adding the respective sodium compounds to calcium chloride, I found that using in atomic proportions the chloride and ordinary sodium phosphate, both solutions being perfectly neutral to test paper, a strong acid reaction was developed on mixing them; and, that the weight of the precipitate, after it had been well washed, dried, and heated to redness, corresponded to the proportions expressed in the equation—

$$2\,Na_2HPO_4 + 3\,CaCl_2 = Ca_3P_2O_8 + 4\,NaCl + 2\,HCl.$$

The calcium chloride employed was assayed by the volumetric process with solution of silver nitrate, and a correction made for the moisture it contained.

In applying the volumetric test to the product, the difficulty I have before stated was evaded by taking the weights already proved to produce a certain weight of precipitate, collecting it with great care, washing and dissolving it while moist in nitric acid largely diluted with water.

So prepared, a solution containing 4·6 grains of tricalcic phosphate yielded 2·1025 grains P_2O_5, the theoretical amount being 2·107 grains.

Apparently, there was a slight loss of precipitate, although I took the precaution of neutralizing with ammonia after mixing the solutions.

The solution of this phosphate precipitated largely on the addition of sodium acetate, and the addition of glacial acetic acid was necessary in order to hold it in solution.

Glancing over my notes I find that I have omitted to mention that sample A, on being dissolved, re-precipitated with ammonia and treated with glacial acetic acid—diluted to eight or ten times its volume with water—gave a solution which at first was clear, but on standing for a night deposited strings of beautiful feathery stellate crystals, like snow, which refused to re-dissolve on adding more acid and warming.

The quantitative test of the Pharmacopœia applied to this sample gave as a result 8·2 grains, which is not surprising when you remember that it lost 14 per cent. when simply dried in the air bath.

In conclusion, I venture to suggest that the official standard of purity should be improved by fixing the percentage of moisture permitted to be present; and that the temperature at which the precipitate ought to be dried should be definitely stated, and of course made to correspond with this.

The PRESIDENT said he was afraid Mr. Brown had taken up a difficult subject. He believed chemists were by no means agreed as to the true composition of the salt derived from bone ash. The precipitates obtained by precipitating calcic salts by means of phosphate of soda were pretty definite, and Warington had made them out well; but the composition of bone ash still remained a moot point which was not by any means cleared up. He himself had made experiments in years past by analysing similar bones of animals of different ages. They differed according to their age; the lime constituent of the phosphate increased as the age increased. As this phosphate was derived from bone ash, it must vary in composition according to the nature of the bones from which it was made.

Professor ATTFIELD said that as he gathered that Mr. Brown would probably continue his examination of this phosphate of calcium, it would be as well to remind him of original researches made by others. He had referred to his predecessor Mr. Fownes and himself; but really with Wotton each might say, "I am but the gatherer and disposer of other men's stuff." If he would refer to the researches of Raewsky, Price, Bödeker, and Warington, he would find that a great deal had been done in the direction in which he was working, while there was ample room for continued research. He had scarcely taken into account the effect that temperature had on the composition of these precipitates. By precipitating in the cold with ordinary phosphate of sodium and chloride of calcium, a precipitate was obtained which contained hydrogen $CaHPO_4$. If this were boiled with the supernatant liquid, cooled, and when cold, washed, and then dried over the water bath its composition was considerably altered, and it was partially if not wholly converted into phosphate of calcium having the formula Ca_32PO_4. Bone ash contained also a large quantity of phosphate of magnesium—5 to 10 per cent. and in some cases more.

Mr. ATKINS said it had been remarked that the phosphate of lime in bones varied according to their age. There was more gelatine in the bones of the young, and more phosphate of lime in the bones of the old; hence we could stand many a tumble while we were young, which would produce a broken bone in advanced life. The previous discussion seemed to indicate a scarcity in the milk of human kindness. It would be well if gentlemen would give up dogmatic assertions on points which may have to be decided by magistrates. The disposition of fat, casein, and other matters might, he thought, vary according to the times of the year and the kinds of food on which animals were fed, just as bones, if critically examined, might be found to vary in the proportion of phosphate of lime with the colour of the owners' hair.

A paper was then read on—

JAPANESE PEPPERMINT CAMPHOR.

BY G. H. BECKETT AND C. R. ALDER WRIGHT, D.SC.

Lecturer on Chemistry in St. Mary's Hospital Medical School.

Through the kindness of Mr. John Moss (Messrs. Corbyn and Co.), we have received a liberal supply of well crystallized Japanese peppermint camphor, and also of the liquid camphor oil simultaneously imported, the crystals being, in fact, the stearoptene of the oil, separated from the liquid constituents by standing and pressure. This crystalline camphor has been already examined by Oppenheim (*Chem. Soc. Journ.* [1], xv., 24), who found that it contains more hydrogen than ordinary camphor, being indicated by the formula $C_{10}H_{20}O$—ordinary camphor being $C_{10}H_{16}O$—and that it is a kind of monatomic alcohol, *menthylic alcohol,* forming a hydrocarbon, *menthene,* $C_{10}H_{18}$, by the action of dehydrating agents, just as ordinary alcohol gives rise to ethylene.

This alcohol, being homologous with allylic alcohol, is manifestly more closely connected with the "fatty" or methylic alcohol series than with benzene derivatives; whilst the hydrocarbon menthene is just midway between the 10-carbon marsh gas homologue and cymene, thus:—

Decane	$C_{10}H_{22}$
Decylene	$C_{10}H_{20}$
Menthene	$C_{10}H_{18}$
Terpenes	$C_{10}H_{16}$
Cymene	$C_{10}H_{14}$

It is, therefore, of some interest to see whether cymene is obtainable from menthene, and hence from menthylic alcohol, by simple treatment—*i.e.*, whether these substances are not connecting links between the fatty and aromatic series.

Oppenheim found the melting point of menthylic alcohol to be 36°; the crystals sent to us were found by Mr. Moss to melt at 39°, re-solidifying at 37°·5; on dissolving them in hot dilute alcohol no crystals deposited on cooling, but an oily fluid separated; this gradually became crystalline as the traces of alcohol retained by it evaporated, and after exposure to air for several weeks, was found to melt at 42°, and to boil at 212° (corrected—Oppenheim found 210° and Mr. Moss 215°): on analysis numbers were obtained agreeing sharply with the formula $C_{10}H_{20}O$.

The crystals were heated with about their own weight of zinc chloride, the distillate (separated from the aqueous portion) being then poured back and cohobated with the zinc chloride for some hours; but little resin was thus formed, almost the whole being transformed into menthene boiling at 164·5 to 165°·5 (corrected) after cohobation with sodium (Oppenheim gives 163° as the B. P. of menthene); on analysis numbers were obtained agreeing well with the formula $C_{10}H_{18}$.

Oppenheim has already shown that by the addition of *two* equivalents of bromine to menthene a dibromide is formed which readily splits up into a terpene and hydrobromic acid, thus—

$$C_{10}H_{18}Br_2 = 2\ HBr + C_{10}H_{16}$$

and hence has established a connection between the terpene series of hydrocarbons and derivatives of ethylene homologues such as $C_{10}H_{18}Br_2$ (derived from $C_{10}H_{20}$ by substitution of H_2 by Br_2); since terpenes have been shown to be cymene derivatives, it seems probable that menthene is really connected with cymene; that this is so we have found to be the case by combining *four* equivalents of bromine with menthene, and heating the resulting oily tetra-bromide of menthene, or *tetra bromo decane,* when it breaks up into cymene and hydrobromic acid, thus—

$$C_{10}H_{18}Br_4 = 4\,HBr + C_{10}H_{14}$$

Hence it is manifest that menthene is strictly intermediate between the paraffin and the benzene homologous hydrocarbons, as it is between the ethlene series and the terpenes; and that it is possible to pass from the paraffin series to the benzene series *by one single simple reaction.*

The cymene thus obtained from menthene was found to be identical with ordinary cymene obtainable from camphor terpene, and various constituents of essential oils as described in the 'Year-Book,' 1863, pp. 518, 519; 1864, 631.

The liquid Japanese camphor oil, received from Mr. Moss, appeared to be a solution of the solid camphor $C_{10}H_{20}O$ in a permanently fluid substance containing less hydrogen, probably indicated by the formula $C_{10}H_{18}O$, and isomeric or identical with the substance of that composition contained in citronella oil. On fractional distillation, a little came over below 205°; the principal portion, however, distilled between 210° and 215°, and gave on analysis, numbers agreeing with a mixture of $C_{10}H_{20}O$ and $C_{10}H_{18}O$; a little came over at higher temperature still, whilst a small portion was not volatile even at 300°.

On heating the distillate at 210°—215° with zinc chloride, menthene was obtained boiling at 165° together with resinoid substances derived from the $C_{10}H_{18}O$ constituent by polymerization and partial removal of the elements of water. It was not found practicable to cause the separation of crystals of camphor from the liquid oil by cooling in a freezing mixture, even when a crystal of the solid was dropped in and the whole kept at a low temperature for several hours; it does not therefore follow, however, that the $C_{10}H_{20}O$ constituent present in the liquid oil is not the solid camphor melting (when pure) at 42°, as a minute quantity of some permanent liquid, *e.g.* alcohol, wholly prevents the solid camphor from crystallizing when once liquefied; it is, however, by no means impossible that the liquid oil contains an isomeric modification liquid at the ordinary temperature.

The PRESIDENT said this paper might conveniently have followed Mr. Kingzett's. It was a contribution to the same class of researches; and if Mr. Kingzett continued his researches he might possibly make use of it. It was a contribution to a very large question which was by no means exhausted and on which Dr. Wright had contributed papers before. For this he would, in the name of the Conference, tender him hearty thanks.

The next paper read was on—

THE USE OF OPTICAL ANALYSIS IN PHARMACY.

BY HENRY POCKLINGTON.

I will, with your permission, look upon my subject as an answer to the following question—In what direction is optical analysis likely to be useful in pharmacy? and will divide my answer into three divisions, corresponding to three methods of optical analysis, microscopical, polariscopical and spectroscopical. And I will for the present regard pharmacy as the art of selling drugs, including of course their purchase, and to a limited extent their preparation, but excluding all that belongs to therapeutics or to medical diagnosis, thus closing myself from those many fields in which the cultured pharmacist employs himself outside the pure business of his calling.

On the use of microscopical analysis to pharmacists I have written so much—unfortunately not so well—that I can hardly hope to say more here than by way of summary of what I have said elsewhere. The most evident field in which the microscope may be of service is in detecting adulterations of such drugs as are purchased in a powdered condition, and it may safely be said that no pharmacist who has proper regard for his safety can afford to neglect its use, personally or vicariously. At the same time it must not be understood that I mean to state that adulteration of such substances is extensively rampant. The exact contrary is, I think, the case so far as concerns high-class houses, but I presume business men will not care to give any house, or houses, of however high class, a monopoly of dealing, and will prefer to hold themselves open to deal with newer men towards whose dealings they may not improperly take the stand assumed by him who treats all men as rogues till assured of their honesty. It is just here that the pharmacist cultured in analytical methods meets the reward of his culture—he can purchase in the cheapest market not feeling the necessity of paying for skill or reputation in another.

I will confine myself to one or two examples of the use of the microscope, taking them from the writings of other workers on the subject. The first that occurs to my recollection is the examination of scammony, described very ably by Mr. Greenish at the last Conference. You will remember that two very important questions are determined, according to the author, by the microscopical examination of scammony. The first is its adulteration by the presence of foreign matter, starch, and mineral matter. The second, equally important to the pharmacist in the long run, is the aid afforded to determining the quality of the article, for, as Mr. Greenish says, "From an examination of a variety of samples of virgin scammony from different sources, I may say as a result that the *lump* was in every instance free from the starch of scammony root or any other starch, and that every sample of *powdered* virgin scammony contained more or less of the scammony starch, and some of them a little wheat starch in addition." And he concludes, "that the presence of the scammony starch indicates an admixture of inferior scammony, and more especially when it is accompanied by some of the tissue of the root." Another example is the adulteration of powdered ipecacuanha by almond cake where the sophistication was detected by other than microscopical means, but could have been done far more easily and certainly by the microscope. The cases of mustard, pepper, ground ginger, arrowroot, cayenne pepper, and other articles of like kind, will readily occur to everyone; and here the microscope affords in some cases the only, and in all the best, means of detecting sophistication.

In Bristol one will naturally remember Stoddart's use of the microscope in conjunction with chemistry in the examination of quinine, and our worthy late President (Mr. H. B. Brady) will remind us of a too completely forgotten paper in the Journal of years ago on the microscopical crystals of certain opiate tinctures. Other applications to determination of varieties of drugs and the like would present themselves to us had we time; but as it is, a few words on the essentials to microscopical analysis, and I pass on. The first thing is a microscope, which need not be expensive. The small "student's" or "hospital" microscopes now made on the French model by Swift, Baker, and other English makers, or the genuine Hartnack with an inch and a quarter objectives, answer all ordinary requirements, and may be bought of very good quality complete for about seven or eight pounds, or with inferior lenses for about five pounds. In my own ordinary work I use a Smith and Beck's Universal, and am therewith content. Those who have the money to spare may very profitably add to the cheap microscope one of larger and more elaborate construction; but for the daily work of the laboratory the small, cheap, but good instruments are far the best, and it is economical in the long run to spend surplus money in lenses before spending any on stands of more ornamental than useful character.

The pharmaceutical use of polarized light lies in two directions:—(1) In conjunction with the microscope, where it is useful in helping in the detection of the adulteration of beeswax, spermaceti, etc., and of butter, as shown by me long since in the Journal, and to a limited extent in the examination of starches; and (2) in the examination of substances possessing what is known as rotatory power, that is the power which such substances possess of twisting (so to speak) round, or rotating, the plane of polarization of any beam of plane polarized light that may be passed through them. This branch of optical analysis has as yet been little used in pharmacy, nor do I know that its application is likely to be of extensive use to pharmacists in general so far as regards the detection of adulterations. As an instrument of research it is of course valuable, and may in that way prove of service in leading to scientific discoveries, or aiding in the production of highly pure drugs. Two or three instances in which its use has already been of note may be adduced.

The first that presents itself is Dr. Vrij's employment of Wild's polaristrobometer (polarimètre) in the determination of the value of cinchona barks* and Popps' examination of castor oil.† In the examination of sugar syrups, where it is of the highest value, it will be of little use to pharmacists, who will find ordinary chemical tests quite equal to their requirements.

I have hinted that the general pharmaceutical use of polarized light is limited. There are several reasons why this is so. The first is that the substances possessing the specific rotatory power—optically active substances—are not very numerous in pharmacy, and of these certain vary in energy, and direction of energy, so widely that the application of polarized light to their examination in ignorance of their history would only lead to erroneous conclusions. Take, for example, turpentine which is said by all our text-books to possess the power of left handed rotation (so accurate a writer as Spottiswoode quotes Verdet giving it as (a) r – 29·6°). Now, if this were really the case, and the rotatory power were sensibly constant in all specimens, we should have within our reach very simple means for determining the purity of any given sample. We should merely have to put a little of it in a tube in our polariscope and read off the angular deviation of the polarized beam. But, as Pereira showed as far back as 1845,* different specimens of authentic turpentine vary much, not only in degree of rotative energy, but in direction, so that it is possible by a mixture of different specimens to produce an optically inactive one. To which other observers have borne testimony, and it probably is not far from the truth to say that no two samples of commercially pure turpentine are at all likely to give the same polariscope reading. A similar case is that of tartaric acid where we have dextro- and lævo-tartaric acid uniting, to form the inactive racemic or para-tartaric acid, and frequently present in commercial samples of tartaric acid in this form where, although I presume we cannot call it an adulterant, it very successfully vitiates any optical analysis of the acid. It is, nevertheless, highly probable that there are many directions in which good use may be made of this method of optical analysis, if only some pharmacists having that command of material which an outsider like myself cannot possess would search them out. The cost of the research to such an observer would be very trifling, since the loss of material would be infinitesimal, and the results might be extremely valuable. To an outsider the case is quite different—the expense of examining a sufficient number of samples of, say, essential oils would be very considerable, and the difficulty, in many cases, of obtaining them not inconsiderable.

The last method of optical analysis of which I propose to speak—a fourth, consisting of the observations of fluorescence, I have not worked at—is that involving the use of the spectroscope. Here I must confess that I am helpless as the thing now stands. Many attempts have been made to use the spectroscope in the examination of tinctures, Mr. Stoddart being I believe the first to turn his attention in that direction, but so far, I think no good has come of it. Nevertheless in time there is hope. I have little doubt that if some young pharmacist, in these days of short hours, were to set himself to work at the spectroscopical determination of the colouring matter of the substances forming the basis of our tinctures, carefully mapping out their spectra, as examined singly and in combination, he would soon be able to place before us means by which we could identify them, and determine their presence or absence from any given tincture with comparative ease. Whether or no the spectroscope will then supersede chemical analysis in point of speed and convenience is of course a question that the event will only answer. The attempt is worth making, and will no doubt yield collateral information that will be worth the getting. The difficulty lies at present in the isolation of the constituents sufficiently to enable us to get at them, and to this point workers at the subject must, in my opinion first direct their attention. Early workers at the subject have too completely forgotten that the spectroscope is, after all, merely an instrument for colour testing; that it enables us to discriminate between colours closely allied, by separating them into their constituents; or that it renders single colour elements visible by separating them from others by which they are overborne.

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* *Pharm. Journ.* [3], vol. ii., p. 1.

† *Arch. Pharm.* cxlv., p. 233.

* *Pharm. Journ.* [1], vol. v., p. 57.

If I have succeeded in awakening the interest of some one who will take up these branches of analysis, my writing this paper will not be in vain. In this hope lies my gratification. That a more competent man has not written it, is my regret and doubtless yours also.

The President said that Mr. Pocklington seemed rather to limit than to extend the use of the microscope, for there were some applications of it which he did not think worthy of the analyst. He, however, confirmed the view of Dr. Carpenter in a lecture before the Pharmaceutical Society on the use of the microscope in the laboratory, that for daily work a cheap students' microscope was more useful than one of more expensive character. With regard to the spectroscopic application of the microscope in pharmacy he himself had tried and found his eyes were not equal to the occasion ; he could not get the results he expected. He should like to ask Mr. Stoddart whether he now used the micro-spectroscope and derived any beneficial results from it.

Mr. Stoddart said he used it continually and found it more useful every day. His spectroscope was by no means a perfect one, but it answered his purpose very well. At the soirée on the next evening, in the spectroscopes which would be under his directions there would be side by side three examples of the same objects under the micro-spectroscope—in one case adulterated port wine and genuine port wine ; in another the juice of the lobelia and that of digitalis ; and in the third the juice of annual and biennial henbane. Under the microscope tincture of rhubarb and compound tincture of gentian were so much alike they could not be distinguished ; but in their spectra they did not match, and there were clear indications of a difference. Similarly coloured substances, that at first appeared to be identical when treated with reagents, exhibited distinct differences in the spectrum. Mr. Sorby used sulphite of sodium, and it produced difference between two apparently similar objects. Whether the coloured substance were strongly or weakly coloured was of little consequence ; but it could be stronger in a small tube three-eighths of an inch in thickness than in a half-ounce phial, because in the latter case the greater body of the liquid would hinder the passage of the light through the liquid. Of the future of the micro-spectroscope there could be no doubt. The polariscope was applied to sugar analysis with very good results, as it exhibited differences which undoubtedly indicated variations in the value of the solutions of sugar.

Mr. Allen said that the successful use of the micro-spectroscope depended on the concentration of solutions and of management in the addition of reagents. In the micro-spectroscope exactly the same result was produced with blood as with cochineal. In its ordinary condition, blood gave under the micro-spectroscope a spectrum characterized by two dark bands in the green, and ammoniacal solution of cochineal gave an exactly similar spectrum. But the difference between the two spectrums could be shown at once by the action of reducing and other reagents. The polariscope might be employed to detect the admixture of tartaric with citric acid, two varieties of the former being strongly rotatory, but the latter having no rotatory power. The polariscope was employed for that purpose by several London chemists.

Mr. Schacht said he would like to know whether it was claimed that the spectroscope was anything more than a test for colour. He understood Mr. Pocklington to say it was only a delicate test for colour, but Mr. Stoddart seemed to consider it something more.

Mr. Stoddart said that solutions of the same colour to the eye would give different bands.

The President asked whether if, to a normal solution of annual or biennial henbane, an addition was made of hyoscyamine in solution, that would alter the position of the bands.

Mr. Stoddart said he did not like to say yes or no; he had not tried.

Mr. Schacht asked whether with green solutions presenting apparently the same amount of colour, the spectroscope would reveal that one was a chlorophyll and the other a mineral colour.

Mr. Stoddart said distinctly, yes.

Mr. Schacht said, then the expressions of Mr. Pocklington would require modification, for the instrument was not simply a test for colour.

Mr. Williams said that Mr. Waddington was making a series of experiments in the extraction of dyes from a hard wood by means of castor oil, and the solution so obtained produced bands totally different from those of solutions in alcohol, water, or any other medium.

Mr. Stoddart said castor oil made an optical difference, but pure turpentine had no action in the polariscope.

Mr. Armstrong had used the polariscope for a long time, but to show how easy it would be for those inexperienced to make mistakes, he would tell them that even after a dinner at which anything strong had been eaten, say, as a striking example, onions, they would find these results many points different after than before that meal. In its use many things had to be taken into consideration. Most chemists had discarded it for a long time, except as a proof test, and had fallen back upon chemical tests.

The next paper read was on—

Note on the Preservation of Hydrocyanic Acid.

BY JOHN WILLIAMS, F.C.S.

In the communication I had the honour of making to the British Pharmaceutical Conference at its last meeting upon the preservative action of glycerine upon hydrocyanic acid, I had two objects in view: first, to prove the *fact* that glycerine *did* act as a preservative to the acid; and, this being admitted, secondly, to determine if possible what percentage of glycerine was best adapted to produce the effect. For this purpose hydrocyanic acid of strengths varying from 16 per cent. to 2 per cent., and mixed with glycerine from 50 to 14 per cent., were kept under varying conditions and tested at frequent intervals, and the results given in a tabulated form proved, first, that the glycerine has decidedly the property of preserving hydrocyanic acid, and secondly, that, although the stronger percentage acids weakened more rapidly than the weaker or Pharmacopœia strength, still the percentage of glycerine did not sensibly alter the ratio, and the conclusion arrived at was that the hydrocyanic acids of various strengths, but containing 14 per cent. of glycerine, were as perfectly preserved as those containing 50 per cent., and a general result was arrived at, that probably 20 per cent. of glycerine would be found in practice to be a good proportion for use. To settle this question it was desirable that further experiments should be made, the result of which I now submit to the Conference. On July 31st, 1874, two samples were most carefully prepared, one containing 4·5 per cent. of real hydrocyanic acid (to represent Scheele's strength), the other exactly 2 per cent., representing, therefore, B.P. Each contained an addition of 20 per cent. of Price's pure glycerine. These samples were each about ten fluid ounces, and contained in pint white glass-stoppered bottles, not tied over or inverted, but kept in a cool dark closet; the conditions were purposely arranged to represent as nearly as possible the ordinary ones of the dispensing counter—of course the bottles were kept tightly stoppered and only opened twice during the period of trial.

These samples of acid were tested on December 23rd, and found not to have changed in any way; again, on July 30th of this year, or at the end of one twelvemonth, they were again carefully tested, and no appreciable diminution in strength could be detected in either sample. I have them still and shall continue to have them tested at intervals, and it will be interesting to know when, if ever, a diminution of strength will take place. I have also had another experiment tried, which has proved, I think, of great interest. I thought it important to know how long very strong hydrocyanic acid could be preserved by 20 per cent. glycerine; for this purpose a sample was made with 20 per cent. glycerine and concentrated acid, and when tested gave 26·8 per cent. of real acid. This was on July 31st, 1874. Unfortunately, Price's pure glycerine was not employed in this experiment, but some of German origin (said to be distilled and pure); it was at the end of one day observed that the liquid had assumed a light yellow colour, but as this colour did not appear to deepen it was supposed to be of no consequence, and I may mention that I have since tried the effect of hydrocyanic acid upon several samples of German glycerine, and find that a yellow colour is always produced, even when the acid is only 2 or 4 per cent. in strength, Price's pure glycerine remaining always perfectly colourless.

This sample of strong hydrocyanic acid was tested on December 23rd; it was still of the same colour and proved to be of 24 per cent. strength. Thus in five months it had lost only 2·8 per cent. The bottle was again placed in the dark cupboard (I may mention that this bottle of very strong acid was kept tied over, in other respects the conditions were the same as with the experiments with the weaker acids, and was not looked at until February 22nd, 1875, when it was found that it had entirely decomposed, and was now a solid black mass, smelling faintly of ammonia, and quite free from all traces of hydrocyanic acid). It would have been very interesting to have known exactly when this change occurred and to have watched it, but this unfortunately, was missed the opportunity of doing; some cause of disturbance must have upset the equilibrium of the constituents of the acid, probably when the bottle was opened in December, and the decomposition occurred very shortly afterwards. If possible, to throw light on this point, I have lately had a fresh experiment set on, taking the precaution, however, to use 20 per cent. of Price's glycerine, not German, and the acid contains 32 per cent. of anhydrous acid at this moment. No discoloration has as yet occurred, the bottle is kept tied over on a shelf exposed to diffused daylight, and not in a cupboard, for I wish to observe, if possible, the change whenever it may occur. If the Conference will permit me I shall be happy to report to the next meeting the result of this experiment. My friend, Mr. Miles Smith, is trying an experiment with salicylic acid; as a preservative it appears to keep the hydrocyanic acid colourless, but I am not in a position to give any further particulars of the experiment at present. He has also tried the experiment of preserving pure aldehyde by means of glycerine; it appears to answer; probably many easily decomposed organic substances can be preserved by this means.

One more point, and I have done. The use of glycerine has been objected to for internal administration, and I am quite willing to admit that the advisability of the internal administration of glycerine is open to question; but when it is considered that an ordinary dose of hydrocyanic acid is about five drops, and that such a dose would contain but one drop of glycerine, I think it must be admitted that the effect of the glycerine would be quite insignificant, medically speaking, and need not be taken into account in determining whether glycerine shall be authoritatively used in the preservation of hydrocyanic acid or not.

The PRESIDENT said that this was a second contribution to the conference on the subject, and it exhibited a great amount of careful research.

Mr. SIEBOLD said he supposed the result of the influence of glycerine could only be explained in this way; pontaneous decomposition was prevented or retarded. It seemed to him it could have no influence on volatilization. But the deterioration of the officinal hydrocyanic acid was due mainly to loss by evaporation and not to spontaneous decomposition. In the samples of the stronger acid decomposition might be the main cause of deterioration. He should like to ask whether experiments showed that volatilization of the acid was also prevented by the addition of glycerine. He believed if the bottle produced had been opened frequently, as they had to open bottles in dispensing, the preservative effect of the glycerine would have been reduced.

Mr. WILLIAMS said he had simply recorded facts. The bottles had been opened only once at the end of six months, to test the contents, which were then as strong as when first put in. It was simply a fact that they were preserved under these conditions. No special means were adopted to preserve them; they were not kept tight specially to prevent evaporation. His own theory of the matter was, that as in essential oil of almonds, and in cherry laurel water, which contain prussic acid, the acid remains permanent and unchanged, so he thought the glycerine acted mechanically, not only in preserving the acid from decomposition, but also in retarding its volatilization.

Professor ATTFIELD then gave a short *résumé* of the following paper on—

NEW DERIVATIVES FROM THE OPIUM ALKALOIDS.

BY C. R. ALDER WRIGHT, D.SC., LOND.,

Lecturer on Chemistry in St. Mary's Hospital Medical School.

During the last twelvemonth the following results have been obtained (mostly conjointly with Mr. G. H. Beckett):—

In continuation of the experiments communicated last year on the action of acetic acid and anhydride on morphine and codeine, the actions of benzoic and butyric acids and anhydrides have been examined, with this general result, that compounds are formed expressible by the general formulæ—

$$(\overline{M}+2\,X\,.\,OH-2\,H_2O) \text{ or } C_{34}H_{36}N_2O_4(O\,.\,X)_2$$
$$(\overline{M}+4\,X\,.\,OH-4\,H_2O) \text{ or } C_{34}H_{34}N_2O_2(O\,.\,X)_4$$
$$(\overline{C}\;2\,X\,.\,OH-2\,H_2O) \text{ or } C_{36}H_{40}N_2O_4(O\,.\,X)_2$$

$\overline{M}$ and $\overline{C}$ standing for morphine ($C_{34}H_{38}N_2O_6$) and codeine ($C_{36}H_{42}N_2O_6$) respectively, and $X\,.\,OH$ standing for either acetic, butyric, or benzoic acid. In this way have been formed *dibutyryl codeine*, *dibenzoyl codeine*, *dibutyryl morphine*, *tetrabutyryl morphine*, *dibenzoyl morphine*, *tetrabenzoyl morphine*, and a mixed acid derivative, *acetyl-butyryl morphine*, intermediate between a diacetyl morphine and dibutyryl morphine, and forming another proof that the ordinary formulæ of morphine and codeine must be doubled. Moreover, it has been found that three different isomeric diacetyl morphines can be obtained, whilst *mono-acetyl morphine*, *tetra-acetyl morphine*, and *diacetyl codeine* have also been examined. Most of these bodies are crystallizable, and form crystallizable salts; with iodide of ethyl the free bases readily combine (on heating to 100° for a few minutes in a sealed tube) forming ethiodides, for the most part crystallizable with one proportion of water of crystallization, and containing as many equivalents of ethyl iodide as there are N symbols in their formulæ. For example, *dibenzoyl codeine ethiodide* is represented by the formula

$$(\overline{C}+2\,C_7H_5O\,.\,OH-2\,H_2O)2\,C_2H_5I,\ H_2O, \text{ or}$$
$$C_{36}H_{40}N_2O_4\,(O\,.\,C_7H_5O)_2,\ 2\,C_2H_5I,\ H_2O\,;$$

and similarly for all the others.

Physiological experiments on the acetyl derivatives of morphine and codeine have been made by Dr. F. Pierce, without, however, the discovery of any new action or valuable therapeutic or other properties; for the most part these derivatives resemble deoxy-morphine and deoxy-codeine in their action, differing somewhat from morphine and codeine in these respects.

The polymerides of morphine and codeine also yield acetyl derivatives by the action of acetic anhydride, polymeric with the corresponding derivatives of ordinary morphine and codeine; *tetra-acetyl-idcodeine* forms a readily crystallizable hydrochloride, but differs in several respects from the sub-polymeric diacetyl codeine, whilst the higher polymeride, *octacetyl tetra-codeine*, is much less basic in its character than tetra-codeine; it will not thoroughly neutralize hydrochloric acid so as to form a normal hydrochloride, nor does it form a normal platinum salt; and on treatment with ethyl iodide it only partially combines with it, not to the extent of one equivalent of ethyl iodide for every N symbol in the formula. This character seems general in the tetra series of derivatives of this class, being also exhibited by acetyl tetra morphine derivatives.

Attempts to synthesize higher homologues of codeine and morphine by acting on their acetyl derivatives with sodium ethylate and analogous bodies led to no result; instead of acetyl being replaced by ethyl forming ethyl-codeine, ordinary codeine was simply reproduced and partially polymerized to tetra-codeine; in the course of these experiments it was found that the simplest way of preparing tetra-codeine is to boil a solution of codeine in benzene with a little ethylate of sodium (caustic soda will answer but gives a less pure product); the tetra-codeine thus formed is purer than that produced by the action of acids as described in former papers.

The action of polybasic acids on codeine and morphine is not that which might be anticipated from the results obtained with monobasic organic acids; *à priori*, the production of the bodies—

$$\begin{array}{l} \bar{M} + Y(OH)_2 - 2\,H_2O \\ \bar{M} + 2\,Y(OH)_2 - 4\,H_2O \\ \bar{C} + Y(OH)_2 - 2\,H_2O \end{array}$$

by the action of bibasic acids might be anticipated, $Y(OH)_2$ standing for any bibasic acid; but on trying the experiment with succinic and camphoric acids bodies are formed of compositions—

$$\bar{M} + 2\,Y(OH)_2 - 2\,H_2O \text{ or } C_{34}H_{36}N_2O_4 \left\{ \begin{array}{l} O.Y.\,OH \\ O.Y.\,OH \end{array} \right.$$

$$\bar{C} + 2\,Y(OH)_2 - 2\,H_2O \text{ or } C_{36}H_{40}N_2O_4 \left\{ \begin{array}{l} O.Y.\,OH \\ O.Y.\,OH \end{array} \right.$$

thus succinic acid gives the derivatives—

$$C_{36}H_{40}N_2O_4 \left\{ \begin{array}{l} O.\,C_4H_4O_2.\,OH \\ O.\,C_4H_4O_2.\,OH \end{array} \right.$$

and

$$C_{34}H_{36}N_2O_4 \left\{ \begin{array}{l} O.\,C_4H_4O_2.\,OH \\ O.\,C_4H_4O_2.\,OH \end{array} \right.$$

with codeine and morphine respectively. These derivatives are peculiar in character; from one point of view they are acids, half of the acid radicals CO_2H contained in the succinic acid being present unchanged; from another point of view they are bases, being derivatives of alkaloids where the extra combining power of the nitrogen is still retained. Accordingly, they appear to be capable of forming two classes of salts, one with alkalies, the other with acids; the latter are, however, more readily isolated and crystallized, whence it would seem that the basic tendencies predominate over the acid characters. Analogous bodies result when camphoric acid is used. Tartaric acid, however, does not form derivatives of that kind; it polymerizes codeine and forms a tartaric derivative somewhat resembling octacetyl tetra-codeine, and, like it, deficient in acid combining power. Oxalic acid on the other hand, produces neither kind of derivative, or if it does, the bodies thus formed immediately break up into carbon oxide and dioxide, codeine or morphine being reproduced and immediately polymerizing whilst in the nascent state, so that the polymerides thus formed are the sole products that can be recognized.

With the alkaloid narceine it has been found that the sulphate is, like the hydrochloride, decomposed by the action of water, forming basic compounds; the action of acetic anhydride removes the elements of water, forming a new crystallizable base $C_{23}H_{25}NO_7$ (*i.e.*, containing 2 H_2O less than narceine); ethyl iodide combines with narceine, forming an ethiodide converted by silver hydrate into a caustic alkaline liquor consisting of the ethylhydrate; this somewhat readily breaks up into alcohol and ordinary narceine; and in fact all the addition-derivatives of narceine, including its salts, are characterized by a tendency to break up into their proximate constituents, viz., narceine and the added substance. By the action of nascent hydrogen narceine loses oxygen, forming an uncrystallizable new base. According to experiments not yet published, narceine by treatment with caustic potash yields *protocatechuic acid*; and as this acid is also obtainable from narcotine, it results that probably there is some community of constitution between these two alkaloids, a circumstance *à priori* probable for all the opium alkaloids, but hitherto not proved saving in the case of morphine and codeine, which have been shown by former experiments to be closely connected together as regards constitution.

By acting on *cotarnine* with nascent hydrogen, a base is produced by the reaction

$$C_{12}H_{13}NO_3 + H_2 = C_{12}H_{15}NO_3$$

this substance is identical with the *hydrocotarnine* described recently by Hesse as extracted by him from the waste liquor of morphine extraction from opium. Pursuing this subject, it has been shown that when narcotine is acted upon by water *it breaks up into opianic acid and hydrocotarnine* thus—

$$C_{22}H_{23}NO_7 + H_2O = C_{12}H_{15}NO_3 + C_{10}H_{10}O_5$$

the opianic acid becoming reduced to *meconin* ($C_{10}H_{10}O_4$) by secondary reactions, due to the partial decomposition of the hydrocotarnine; if oxidizing agents be present (as in the ordinary processes for preparing opianic acid from narcotine), *the hydrocotarnine is oxidized to cotarnine* thus:—

$$2\,C_{12}H_{15}NO_3 + O_2 = 2\,H_2O + C_{12}H_{13}NO_3$$

Hence in these processes opianic acid and cotarnine are the end results, whilst with water alone hydrocotarnine and meconin are formed. (Some years ago the production of meconin in this way was shown to take place by the late A. Matthiessen and the writer, but the complementary product was not then recognized as different from cotarnine.) In this way the occurrence of meconin and hydrocotarnine in the opium liquors is readily accounted for by the decomposition of the narcotine during the various processes; and it seems not unreasonable to suppose that the formation of many other substances isolated from such liquors, and usually regarded as proximate constituents of opium, may hereafter be similarly accounted for, so that the proximate constituents of opium may not be so numerous as is generally supposed.

Dr. F. Pierce has established a well-marked difference in physiological action between cotarnine and hydrocotarnine; whilst the former produced no perceptible effect when subcutaneously injected into kittens, rabbits, and guinea-pigs in doses up to 5 decigrammes, similar doses of the latter produced epileptiform convulsions, and usually death in a few minutes; the addition of hydrogen has therefore greatly augmented the physiological activity of cotarnine (when hydrocyanic acid is converted into methylamine by the action, $CNH + 2\,H_2 = CH_3{\cdot}NH_2$ the physiological activity is greatly diminished).

A number of further experiments on the derivatives of narcotine, cotarnine, hydrocotarnine, narceine, and papaverine, are now in progress, and will in due course be brought before the Conference; the materials for these prolonged researches have been most liberally furnished by Messrs. Macfarlan and Co., of Edinburgh, whose kindness the writer desires again to acknowledge.

The PRESIDENT, in thanking Dr. Wright for the paper, said he was afraid he could not quite appreciate it. The immense variety of new matters described made it very desirable that work of this sort should be repeated by others.

Mr. BENGER then read a paper on—

ROYER DE LA BASTIE'S TOUGHENED GLASS.

BY HENRY POCKLINGTON.

Royer de la Bastie's "tempered," "toughened" or "hardened" glass (for we have a choice of terms), is simply glass that has been heated to softness and plunged into an oil bath of a "certain temperature," and thereby suddenly cooled. The process is extremely simple, but for its performance on a manufacturing scale will require, the patentee claims, the machinery described in his specification. This document has attained the rare honour of a second edition, showing that considerable public interest has been taken in the invention, and having regard to this, and the wide publicity given to the general features of the invention, it is not, I think, necessary to occupy the time of the Conference with details respecting either the process or the machinery for its application. The essentials are, heating the glass to a high temperature and plunging it into a bath of a certain temperature and composed of certain materials. The specification does not state the temperature to which the glass must be heated, except somewhat vaguely, and leaves us in entire doubt as to the temperature of the bath. The materials claimed, in the specification, of which the bath is to be, or may be, composed are oils, fats, resins and tars, and other like substances boiling at a higher degree than water. From this it has been inferred that the process of hardening is a chemical one, and that "the glass takes up some of the constituents of the bath," but I do not see that this conclusion is supported by the specification in which the patentee expressly, and I think in part correctly, explains the process on the hypothesis that the molecules of the glass are compressed in the act of sudden cooling, and his use of oleaginous substances has been chosen on account of their high boiling points, without reference to any chemical property or affinity they may have.

My work on the glass may fall under two heads—I first endeavoured to ascertain its structure by means of polarized light, and then experimented upon its manufacture on a laboratory scale.

As regards the first of these points, the structure of the glass, the thought immediately presented itself that this was a particular case of Rupert's drops, or in other words, of molecular instability in temporary restraint, and this view is much supported by the phenomena attendant upon the disruption of the glass, which, as you all know, flies into a thousand pieces when its continuity is broken in the least. But this view is repelled with some indignation by the apologists of the process, and does not appear to be wholly consistent with the phenomena, unless as is probable, De Luynes' theory of the nature of Rupert's drops be the correct one, and we look upon the toughened glass as an extreme modification of them.

If we examine a strip of glass prepared strictly in accordance with Bastie's process, between Nicol prisms, we shall find that it behaves in all essential respects as unannealed glass, excepting that the "permanent bands" seen when the prisms are not crossed do not occur so irregularly as in unannealed glass, and that the "brushes" are remarkably strongly defined. In other words, the toughened glass manifests the phenomena of a well formed and evenly balanced crystal in a more marked degree than ordinary unannealed glass. This is brought into striking prominence if we contrast with Bastie's glass a strip of glass of similar dimensions prepared by cooling between a thick and a thin metal plate, or between a thick metal plate and the bottom of a thin vessel containing water. In the latter case we shall notice that the "isochromatic" lines or "permanent bands" are irregularly localized and very differently defined various portions of the plate. In these experiments we transmit the light from back to front of a thin strip, and consequently have to do with but a thin stratum of the glass, and can gain little knowledge of the state of the internal layer save as that may differ over superficial extension, and we learn so little hereby that I have not thought it desirable to trouble you with details respecting the phenomena observed. We gain much better results when we send the polarized light through a strip parallel with its face; we can thus explore the whole interior without serious interference by the superficial layers. The method pursued is this. I take a strip of toughened glass about three-quarters of an inch wide and of any convenient length. The opposing surfaces through which the light has to be transmitted must be ground plane and parallel. If not the one polished surface should be cemented to a glass slide with Canada balsam, the slip of toughened glass standing upright, and the other surface covered with a piece of microscopical thin glass cemented on with balsam. The front and back of the glass may be blackened, or screened to exclude extraneous light, and the carrier should also be blackened so that no light shall enter the analysing prism save such as has passed through the strip of toughened glass. If this be now placed on the stage of the polariscope we shall be able to examine it with ease. The phenomena are briefly these:—If we use the monochromatic sodium light, we observe that the centre of that strip is dark when the prisms are crossed, and that it is surrounded by alternating lines of light and dark gradually becoming narrower as they approach the surface. By polychromatic light, daylight for example, the centres of the strips I have examined have usually been red or green (crossed or not crossed prisms), the lines in this case resembling the chromatic rings of Newton's series seen in transverse sections of crystals in the field of the polariscope. These lines are really portions of extremely elongated ellipses, as may be seen if they be traced to the end of the strip, and round it. The centre is evenly coloured in well-tempered specimens, and the "lines" remain sensibly parallel for considerable distances, but in ill-prepared specimens, as prepared by the method indicated, the colour of the centre varies much, the lines are less well defined, often not so numerous on one side of the central (eccentric then) portion as on the other, and are not sensibly parallel for any appreciable distance; in fact, it is quite easy to tell by polariscope analysis whether the glass is really well toughened or whether only "unannealed." Now, in the difference between these kinds of glass, may, I think, be found the secret of the phenomenon of "hardening." We have, in a few words, in the case of tempered glass, a strip of glass consisting of exconcentric layers of very different density, in a state of different stress, encircling a central portion which is almost sensibly common glass; it may, in fact, be regarded as a trussed girder composed of thin plates, considerably elastic but with weak trusses. When these give way the girder flies asunder, but till they do, it is remarkable for its strength. This, according to De Luynes, is essentially the structure of Rupert's drops. But there appears to me to be this difference between them. According to De Luynes the interior layers of Rupert's drops are the contracted layers, the exterior the dilated; whereas in toughened glass, I have, I think, abundant reason for supposing that the contrary is the case. The polariscope phenomena indicate increasing compression towards the exterior, microscopical examination of fractured portions, especially when ill-tempered, shows curves indicating compression by the exterior and the disruption of such specimens frequently assumes a character only explicable on the theory, which is further supported by Bauer's determination of the sp. gr. of specimens prepared by him (in paraffin) where the sp. gr. increased from 2·424 before hardening to 2·438 after, and from 2·460 to 2·468 in another specimen. I may remind the Conference that De Luynes has recently shown that

Rupert's drops of fused boracic acid are distinctly foliate in structure, and has quite confirmed his previous opinion that such was the character of the glass Rupert's drops, and that their stability, when entire and complete, and disintegration when injured, is due to the gathering up and centralization of the various lines of stress and strain in a portion of the drop near the neck (not in the thin part of the tail, as generally supposed).

The foliate character of Bastie's glass is quite supported by the appearance under dissection, but I have made no personal observation on this point which I can consider sufficiently valuable to be worth communication in any detail.

To sum up this part of the subject, we find that Bastie's glass is glass in a state of mechanical compression; that it may be regarded as a stressed or trussed girder, that it is the outside which compresses the inside, and that the outside is much harder than the inside; and, finally, that it differs from unannealed glass and from Rupert's drops in the even distribution of its lines of stress and in their regular and concentric compression of the interior.

My account of the result of my experiments under the second point, the manufacture of the glass, must not occupy much time. I have simply attempted to discover the essentials necessary to success. I very soon found that it is absolutely necessary to raise the glass to a high temperature, that it must be made quite soft, but that a wide range of temperature may be allowed in the bath. I found, for instance, that good specimens could be prepared with oil at 50° C. when the glass was thin (common window glass) and very hot, and I found little difference between one kind of oil and another. I then turned my attention to other fluids than oil (excluding fats and tars) and found that neither water nor aqueous solutions, alcohol or similar mobile fluids will at all answer, whatever be the temperature to which they be raised; but I found—and this may be of importance if the manufacture of glass prove to be profitable—that very good tempering can be done without the use of a bath at all. A brass plate one-eighth of an inch thick, supported on brass legs, is heated to 100° C., or thereabouts, the hot glass placed upon it and immediately covered with a similar piece of metal. This glass is not so hard as the Bastie's, but on the other hand it does not fly into such minute fragments when disintegrated, and it is vastly harder than common glass. Still better results are obtained by placing the glass between thin metal vessels containing heated oil or even water. From this I draw the conclusion that the essential to the process is this, that the glass shall be very rapidly cooled for a *very* short space of time and that the cooling shall thenceforward be gradual. If we watch the process in oil placed in a glass vessel we shall see that although rapid convection currents set in and cooler masses of oil are rapidly brought into contact with the glass, yet these are incomparably less rapid and far more regular than what occur when water is employed. In this case, the water in immediate contact with the glass is raised into steam absorbing an enormous amount of heat, and escapes rapidly, bringing fresh and irregular portions of cold water into contact when the same again occurs. The comparatively low specific heat of oil is also probably an important factor in the case.

It would be out of place here to offer any remarks on the probability of the practical advantages of Bastie's discovery, and I will conclude by expressing my regret that I have not been able to place the subject before the Conference with the completeness I wish. I must also express my regret that the results of De Luynes' investigation of the subject have not yet been made public, and that I am in entire ignorance of either his methods of research or the results he has gained.

The **President** said that pharmacists, of all men, were interested in this subject, because they used glass vessels so largely. He did not know whether this invention was applicable in the case of hollow goods. He should be happy to have some specimens and to experiment upon them. Great credit was due to Mr. Pocklington for being the first to examine the glass optically and investigate its structure. It was curious to remark that instead of being like Rupert's drops it was exactly the opposite.

Mr. **Brady** said that he had had an opportunity a little while ago of talking over the subject with a director of a public company that proposed to take in hand the manufacture of M. de la Bastie's glass on a large scale. He was surprised to learn that the company had originally taken the matter up on the ground of the relative cheapness of the new method of annealing. Plate glass had already been experimented upon, and it was found to be quite easy to apply the toughening process to it. The difficulty began after that; when the glass was toughened it was impossible to cut it with a diamond in the ordinary way, it was necessary to use a lapidary's wheel and diamond dust to reduce the plate to the required size. There were many mechanical difficulties still to be overcome. In the case of hollow vessels, for example, the question had still to be solved how to present both sides of the glass (inside and out) to the action of the oil bath simultaneously, which appeared to be a condition essential to success—a tumbler, for instance, could be managed, but a decanter was not so readily treated. He described the extent of rough usage the toughened glass would bear, and stated that, notwithstanding the limitations which seemed at present imposed by mechanical difficulties, there could be no doubt that it would be largely used for pharmaceutical appliances.

Mr. **Mackay** quite agreed with all that had been said by Mr. Brady in connection with hardened glass. He might, however, further state that while the surface was so hard that no diamond could cut the surface, he had seen specimens which had been engraved by the sand blast. Another peculiarity which had been omitted might also be referred to, namely, that the process seemed to destroy its power of conducting heat. Thus, a good thick rod of the prepared glass might be made red-hot at one extremity, and remain quite cool an inch or two beyond the redness. He had also seen printing types made of this glass, which promised to interfere very much with the use of the ordinary metal in printing. Indeed it was almost endless to think of the variety of uses to which the new material might be put, if the few difficulties still in the way were overcome.

Mr. **Brady** said there was also a difficulty in preservin the shape of glass vessels while transferring them from the furnace to the oil, but this doubtless would be eventually overcome by mechanical means.

The last paper read was on—

COMPOUND COLOCYNTH PILL (COMMERCIAL).

BY WILLIAM LAIRD.

In the list of subjects for research issued by the British Pharmaceutical Conference I find the following:—

"The Pills of Commerce: Are they according to the P.B.?" As a contribution to the elucidation of the question I beg to contribute the following report on the composition of some samples of pil. colocynth. co.

Two or three years ago my attention was called to the low price at which some colocynth pills were being offered to medical men, namely, one shilling per gross and the question arose, Can we find out the explanation of this business? Never having seen any account of the analysis of colocynth pills, I could not put into practice any known process of examination, though sure that the pills in question could not be properly compounded. I therefore devised the following method. Taking advantage of the different solubilities of scammony and aloes in ether and proof spirit, I took a weighed portion of the official pill mass, dried and ground it, packed it in a Dobereiner's percolator, exhausted first with ether, then with proof spirit, weighing each product after drying. The product by ether I take to represent approximately the scammony, that by proof spirit the aloes and a portion of colocynth, the insoluble residue the colocynth and inert matters natural to the materials used. I have tabulated the results of the analyses of these pills and of some other samples as follows :—

	Soluble in Ether.	Soluble in Proof Spirit.	Insoluble Residue.
P.B.	38·8	49·2	12·
No. 2	12·6	58·3	29·
„ 3	13·5	63·5	27·5
„ 4	12·5	72·5	15·
„ 5	19·	31·5	49·5
„ 6	13·	64·5	16·5
„ 7	6·5	69·0	24·5
„ 8		(very bad.)	

No. 5 contained a notable quantity of calomel. No. 8 was so evidently a sophistication I did not examine the pills as I did the others. They consisted mainly of gamboge, cape aloes, colocynth and starch. The latter I was at a loss to account for but since then have fallen in with a low priced sample of colocynth which contains a very large proportion of starch of same kind as I saw in these pills.

The others had, I presume, been made, of course most unjustifiably, with the so-called Aleppo scammony.

After a short conversation the President said it would be useless to discuss the paper in the absence of Mr. Laird, as there were no means of determining whether his remarks applied to compound extract of colocynth or to compound colocynth pill.

This concluded the list of papers to be read.

CONCLUDING BUSINESS.

The **PRESIDENT** said they had now to determine the place of meeting for 1876, and to elect the list of officers for the year. Ballot papers containing the list of officers recommended by the committee would be distributed, and members could of course alter them by substituting other names if they wished. The paper could be filled up while other business was proceeded with.

Mr. Bostock and Mr. Walter Hills were appointed scrutineers to collect the ballot papers, retire, and report the result.

Professor **ATTFIELD** read a letter from Mr. William Greig, president, and Mr. J. M. Fairlie, hon. sec. of the Glasgow Chemists and Druggists' Association, inviting the Conference to meet at Glasgow next year. Professor Attfield said if the Conference had no other inducement than this courteous invitation, they would feel bound to give the communication the very utmost consideration, and accept if possible. But the British Association would meet at Glasgow next year, and that fact gave additional value to the invitation. He was certain the Conference would experience a cordial welcome similar to that which it had experienced in Bristol and elsewhere ; and he would move :—

> "That the courteous invitation of the Glasgow Chemists and Druggists' Association be accepted, and the meeting of the Conference for 1876 be held on the days immediately preceding that of the meeting of the British Association for the Advancement of Science."

Mr. **CARTEIGHE** seconded the motion, and said he was sure the Conference would receive such a welcome as it had already received at Dundee and Edinburgh. It was a source of satisfaction to see present on that occasion so large a number of gentlemen from Edinburgh ; it was an indication that the brethren in Scotland would receive the Conference most cordially.

The motion was put and agreed to.

Mr. **MACKAY** said he had been asked to move a vote of thanks to the local committee of Bristol, and he felt it both a privilege and an honour to have been requested so to do. Not long ago great interest had been excited throughout the country by the picture now known as the "Roll Call in the Crimea." Nations, societies, and individuals have, however, their roll call too, and we find from the roll call of the British Pharmaceutical Conference that this was its twelfth meeting. Looking to the past and in some respects to the future, he felt quite confident that as time moved on and the history of this Association was looked at, that the year 1875 would be prominent in the foreground of the picture. So far as the meetings had gone they had been a great success. He felt therefore, as he was certain the other members felt, great indebtedness to the local committee who had received the conference so well. As time pressed he would content himself by moving—

> "That the most cordial thanks of the non-resident members of the Conference be given to the Bristol members of the Conference generally, and especially to Mr. Boorne, Mr. Schacht, Mr. Stoddart, Mr. Pitman, and other members of the local committee, for their untiring and most successful efforts in organizing the present meeting ; and for the kind and thoughtful way in which all arrangements have been made."

Mr. **ATKINS** seconded the motion, and said that his doing so was no matter of form. He regretted that his duties as Mayor of Salisbury had prevented him from hearing the presidential address ; and he expressed a hope that some members of the Conference, as members of the British Association, would join the excursion to Salisbury and Stonehenge, where he would give them a hearty welcome. The Conference had been a thorough success, the papers and discussions had been most practical, and they would be highly appreciated by a large constituency outside.

Professor **ATTFIELD** said he should like to support the resolution before the meeting, as the officer of the Conference who had corresponded most with the gentlemen named in the resolution and with the local committee. In his opinion the Conference had been much benefited by its visit to Bristol. He was not surprised to find it had been so benefited, because he knew well the great interest in pharmacy and in the British Pharmaceutical Conference which had always been taken by Mr. Stoddart and Mr. Schacht ; and he had heard of the power of organization of Mr. Pitman, though he had no idea he possessed it to the extent which had been so apparent to all present. Again, he was not surprised, because he knew how well the local association and committee had been supported by Mr. Boorne and Mr. Townsend. In recognizing the efforts of those gentlemen to promote the well-being of the Conference—efforts which had been most successful—their extreme thoughtfulness in obtaining the use of the Volunteer Club next door, and the liberality exercised there and elsewhere should be remembered ; together with the great convenience of the room in which the Conference had assembled. It must be obvious that the Conference had seldom met in a room better fitted for the purpose. He cordially supported the resolution.

Mr. **BENGER** said he would ask for the opportunity of expressing his personal thanks to the local committee, and especially to Mr. Pitman, for the kind way in which the Conference had been treated. He hoped the local committee would have some satisfaction in remembering what a successful meeting had been held in Bristol.

The resolution was put and carried with acclamation.

Mr. **BOORNE** responded for the local committee, and said they were amply repaid for their efforts by the success of the Conference. If the members had gained anything by coming to Bristol, the local Pharmaceutical Association had gained much by the visit. It would encourage them greatly for the future, and stimulate them, he hoped, to future efforts in scientific research.

The scrutineers now reported that they had examined 49 papers, and 48 were identical. One member had proposed Mr. Schacht as president for next year. With that exception the following list of officers was elected unanimously:—

Election of Officers.

President.

Professor Redwood, London.

Vice-Presidents.

T. H. Hills, F.C.S., London.
R. Reynolds, F.C.S., Leeds.
E. C. C. Stanford, F.C.S., Glasgow.
D. Frazer, Glasgow.

Treasurer.

G. F. Schacht, F.C.S., Clifton.

General Secretaries.

Professor Attfield, F.C.S., London.
F. Baden Benger, F.C.S., Manchester.

Local Secretary.

A. Kinninmont, Glasgow.

Other Members of Executive Committee.

M. Carteighe, F.C.S., London.
C. Ekin, F.C.S., Bath.
J. R. Young, Edinburgh.
C. Boorne, Bristol.
J. Williams, F.C.S., London.
W. A. Tilden, D.Sc., F.C.S., Clifton.
C. Umney, F.C.S., London.
T. Davison, Glasgow.
J. M. Fairlie, Glasgow.

Auditors.

J. Pitman, Bristol.
J. Macmillan, Glasgow.

Mr. Williams said he moved with great pleasure—

> "That the thanks of this Conference be given to the Committee of the Volunteer Club for their kindness in placing their rooms at the service of the members."

Mr. Bourdas seconded the motion, which was cordially assented to, and Mr. Schacht asked that he might be authorized to convey it to the Committee of the club who had immediately assented to his request to place the club at the disposal of the Conference.

Mr. Brady moved —

> "That the thanks of the Conference be offered to the Committee of the Museum and Library, for the use of their room for the meeting."

Mr. Shaw seconded the resolution, which was unanimously agreed to.

Mr. Hills, who was loudly cheered, said it was his privilege to propose the next resolution, which was a vote of thanks to the President, for the ability and courtesy with which he had discharged the duties of that office, and conducted the business of the Association.

Mr. Ekin said he seconded the motion with great pleasure, observing that they knew before that Mr. Groves was a pattern pharmacist, and he had proved himself to be as well a pattern president, by his addresses from the chair, his conduct of their meetings, and the aptitude with which he had directed their attention to points raised for discussion by the papers that had been read.

Mr. Stoddart supported the motion, which was carried by acclamation.

Mr. Groves, in responding said he was pleased the meeting had come to a satisfactory termination. If he might judge from the plaudits and from what had been said, the Conference had been satisfied with the conduct of the meeting, but for that very little was due to him. He had endeavoured to do his best, and if the members were satisfied, he was pleased. If he could persuade himself that he had been of any material benefit, he should be indeed proud. He had not been the motive power, but owed everything to the active secretary on his right (Professor Attfield), and to Mr. Benger. They had really organized everything, and nineteen-twentieths of the work had fallen on the shoulders of Professor Attfield. The little he himself had done, he had done *con amore*. He was pleased the meeting had been a success, and that he had in any way contributed to that success.

Mr. Brady said there remained at least one duty which seemed to have been forgotten. He should not like the Conference to separate without saying how much it owed to its secretaries, Professor Attfield and Mr. Benger, and especially, partly owing to his position in London, and his long connection with the Pharmaceutical Society, to Professor Attfield. He was sure the Conference would not like to break up without expressing in the most outspoken way its sense of obligation to the secretaries, particularly to Professor Attfield, for the services they had rendered for so many years.

Mr. Stoddart heartily seconded the vote of thanks.

Professor Attfield briefly acknowledged the warm and cordial recognition of his services.

Mr. Benger also responded, and the proceedings then terminated.

Parliamentary and Law Proceedings.

Text of the Pharmacy Act (Ireland), 1875.

An Act to institute a Pharmaceutical Society, and to regulate the Qualifications of Pharmaceutical Chemists and of Chemists and Druggists, in Ireland. [11th August, 1875].

Whereas by an Act passed by the Parliament of Ireland in the thirty-first year of the reign of his Majesty George the Third, intituled "An Act for the more effectually preserving the health of his Majesty's subjects, for erecting an Apothecaries' Hall in the city of Dublin, and regulating the profession of an apothecary throughout the kingdom of Ireland" (in this Act referred to as "the Act of 1791") it is enacted that no person shall open shop or practise the art and mystery of an apothecary within the kingdom of Ireland until he shall have been examined as to his qualification and knowledge of the business by the persons and in the manner by the said Act prescribed, and shall have received a certificate to open shop or follow the art and mystery of an apothecary within the kingdom of Ireland from the Governor and Directors of the Apothecaries' Hall, of the city of Dublin:

And whereas, a great deficiency exists throughout Ireland, of establishments and shops for the sale of medicines and compounding of prescriptions, and great inconvenience thereby arises to the public in many parts of the country:

And whereas to remedy such inconvenience it is expedient to amend the Act of 1791, and to enable persons who, although they do not desire to practise the art and mystery of an apothecary, desire and are qualified to open shop for the retailing, dispensing, and compounding of poisons and medical prescriptions, to keep open shop for the purposes aforesaid:

And whereas, for the purposes aforesaid it is expedient that provisions such as are in this Act contained should be made for the formation of a Pharmaceutical Society in Ireland, and for the examination of persons desiring to keep open shop for the purposes aforesaid, and for the registration of such of the said persons as may be found, on examination, to possess a competent practical knowledge of pharmaceutical and general chemistry and other branches of useful knowledge, as fit persons to keep open shop for the dispensing and compounding of prescriptions of duly qualified medical practitioners:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. *Short Title.*—This Act may be cited as "The Pharmacy Act (Ireland), 1875."

2. *Limit of Act.*—This Act shall apply to Ireland only.

3. *Interpretation of Terms.*—In this Act,—

The term "Lord Lieutenant" shall mean the Lord Lieutenant or other chief governor or governors of Ireland for the time being:

The term "Privy Council" shall mean Her Majesty's Privy Council in Ireland:

The term "licentiate of Apothecaries' Hall" shall mean a person who has a certificate to open shop or to follow the art and mystery of an apothecary under the provisions of the Act of 1791.

Constitution and Incorporation of the Pharmaceutical Society of Ireland.

4. *Pharmaceutical Society of Ireland constituted and incorporated.*—A society to be called "the Pharmaceutical Society of Ireland," shall be constituted as hereinafter mentioned, and such society shall by such name be a body corporate, and have perpetual succession and a common seal, and sue and be sued, and have power and authority to take, purchase, and hold land for the purposes of this Act.

5. *Members of Pharmaceutical Society of Ireland.*—The following persons, that is to say, William Allen, of Henry Street, Dublin; Miles Vernon Bourke, M.D., of Limerick; Thomas Collins, M.R.C.S.E., of Harcourt Street, Dublin; Sir Dominic Corrigan, Baronet, Physician in ordinary to the Queen in Ireland; William Frazer, F.R.C.S.I., of Harcourt Street, Dublin; John Goodwin, of Merrion Row, Dublin; William Goulding, of Summer Hill House, Cork; William Harrington, Licentiate of Apothecaries' Hall, of Cork; William Hayes, of Grafton Street, Dublin; John Frederick Hodges, M.D., of Belfast; Edward M. Hodgson, of Capel Street, Dublin; John Thomas Holmes, of Upper Baggot Street, Dublin; Charles Henry Leet, M.D., of Rathmines, near Dublin; Rawdon Macnamara, F.R.C.S.I., of Stephen's Green, Dublin; George B. Owens, M.D., of Lower Baggot Street, Dublin; Richard Ward Pring, of Belfast; James Emerson Reynolds, M.D., of Upper Leeson Street, Dublin; John Ryan, M.D., of Francis Street, Dublin; Aquilla Smith, M.D., of Lower Baggot Street, Dublin; Charles R. C. Tichborne, of Waltham Terrace, Blackrock, near Dublin; Henry Whitaker, M.R.C.S.E., of Belfast, and all other persons who shall be qualified and elected in the manner prescribed by this Act, shall be members of the Pharmaceutical Society of Ireland, and the said persons in this section specifically named as such members as aforesaid shall constitute and be the first council of the Pharmaceutical Society of Ireland.

There shall be a president and vice-president of the said Society, and the said Sir Dominic Corrigan, Baronet, shall be the first president, and the said Aquilla Smith, M.D., the first vice-president of the said council.

6. *Persons who may be elected Members of Pharmaceutical Society and of the Council.*—Every person who shall be registered under this Act as a pharmaceutical chemist shall be qualified to be elected as a member of the said Pharmaceutical Society; and every person so registered and elected a member of the said Pharmaceutical Society shall be qualified to be elected, and when elected to act as a member of the council of the said Pharmaceutical Society.

7. *Term of office of President and Vice-President.*—The persons by this Act named as president and vice-president of the said council, and their successors in such offices respectively, shall hold the office of president, and vice-president respectively during one year, but shall be eligible for re-election, and in case of any vacancy in the office of president or vice-president of the said council caused by such president or vice-president ceasing to be a member of the said council, or by the resignation or incapacity of any such president or vice-president, such vacancy shall be filled by the election of some member of the said council to fill such vacancy.

8. *Council to go out of office by rotation.*—The members of the said council shall go out of office by rotation in the following manner; viz., on the first Monday of October in the year one thousand eight hundred and seventy-six one third of the members of such council shall go out of office, and on the first Monday of October in the following year another third of the members of such council shall go out of office, and on the first Monday of October in the following year the remainder of the members of such council shall go out of office; and on the first Monday of October in every subsequent year one third of the members of such council (being those who have been longest in office) shall go out of office; and in each instance the places of the retiring members of such council shall be supplied by the election by the members of the said Pharmaceutical Society on the first Monday of October in each year of a like number of their body to act as members of the said council in the place of the retiring members.

9. *Manner of making the rotation list.*—In order to determine the rotation by which the first members of the said council shall go out of office, the said council shall at their first meeting under this Act form a rotation list, and at such meeting the chairman shall write the names of all the members on separate slips of paper, all as nearly as may be of equal size, and having folded them up in the same manner, he shall put them into a ballot box, and shall in the presence of the meeting draw out such slips of paper in succession, and the names upon the slips so drawn shall be written by the chairman in a list in the order in which they are drawn; and every such list shall be kept among the papers of the said council, and the names therein shall be numbered consecutively, and the members of the said council shall retire from office in the order in which their names appear on such list, in the proportions in this Act mentioned.

10. *Retiring Members eligible to be re-elected.*—Every member of the said council going out of office by rotation may be re-elected, and after such re-election he shall, with reference to going out by rotation, be considered as a new member.

11. *As to filling up of occasional vacancies.*—If any extraordinary vacancy shall be occasioned in the said council, the said council shall, on a day to be fixed by the president of the said society (such day not to be later than ten days after such vacancy has been signified to the said president), elect another person to supply such vacancy, and every person so elected shall continue a member of the said council until the time at which the person in the room of whom he was chosen would regularly have gone out of office, and he shall then go out of office, but shall be capable of immediate re-election.

12. *Elections.*—Elections of members of the said council, and of president and vice-president thereof, under this Act, shall be held and the voting and other proceedings in the case of a contest shall be conducted in the manner prescribed by regulations made in pursuance of this Act.

13. *Proceedings at meetings of council.*—At a meeting of the said council the president, or in his absence the vice-president, shall act as chairman, and in case the president and vice-president shall both be absent, one of the members present shall be elected chairman by the majority present.

At all meetings of the said council the questions there considered shall be decided by a majority. In case of an equal division, the chairman shall, in addition to his own vote, have a casting vote.

No business shall be transacted at any meeting of the said Council unless seven members of the council be present, and all the powers under this Act vested in the council may be exercised by any seven or more of the council present at any meeting of the council.

14. *First meeting.*—The council of the said Pharmaceutical Society shall hold their first meeting within six months after the passing of this Act, at such place in the

city of Dublin, at such hour, and on such day as the Chief Secretary to the Lord Lieutenant may respectively order and appoint, and they may adjourn such meeting from time to time as shall seem fit.

15. *Council may allow certain persons to acquire title of chemist and druggist.*—The said council may at their first or any subsequent meeting by resolution determine upon allowing certain persons to acquire the title of chemist and druggist, subject to such terms and conditions as the said council shall think proper.

16. *Regulations for execution of Act.*—At the first meeting of the said council, or some adjournment of the same, they may, subject to the provisions of this Act, make regulations with respect to the matters following:

(1.) The meetings and other proceedings of the said council;

(2.) The examinations of persons desirous of being registered as pharmaceutical chemists under this Act;

(3.) The examinations of persons desirous of being registered as chemists and druggists under this Act, in case the said council shall think proper to allow persons to acquire the title of chemist and druggist;

(4.) The times at which and the mode in which elections of members and associates of the said Pharmaceutical Society are to be held and conducted;

(5.) The mode in which elections of members of the council, and of president and vice-president thereof, are to be held and conducted;

(6.) The fees to be charged for examination, licence, and registration under this Act, and the entrance fees and annual subscriptions to be paid by members of the said Pharmaceutical Society, and the application of the same, and of all moneys received by the treasurer under this act;

(7.) The duties of the registrar, treasurer, clerks, and other subordinate officers, and the manner in which the same shall be discharged, and the salaries to be paid to such officers respectively; and

(8.) Generally for all such other matters as may be necessary for the due execution of this Act.

The said council may from time to time, at any meeting of the council held at any time after the expiration of six months after such first meeting, revoke or alter any such regulation, and make new regulations instead thereof or in addition thereto.

17. *Resolution and regulation to be approved by Lord Lieutenant and Privy Council.*—Any resolution made under the authority of this Act with respect to the title of chemist and druggist, and every regulation made under the authority of this Act, shall be subject to the approval of the Lord Lieutenant and Privy Council, and shall be of no force or effect until the same shall respectively be so approved, and notice of such approval shall be published in the *Dublin Gazette.*

Any resolution and all regulations made under the authority of this Act and approved as aforesaid shall be laid before both Houses of Parliament within twenty-one days after the same shall be made, if Parliament be sitting at such time, or if Parliament be not sitting, within twenty-one days after the commencement of the next session of Parliament after the making thereof.

Any such resolution and all such regulations when so approved shall be of the like force and effect as if they had been enacted in this Act.

18. *Persons who may be elected associates of the Pharmaceutical Society.*—Every person who shall be registered under this Act as a chemist and druggist shall be qualified to be elected an associate of the said Pharmaceutical Society, subject to the regulations made in pursuance of this Act; and every person so elected and continuing as such associate, being in business on his own account, shall have the privilege of attending all meetings of the said society, and of voting thereat, and otherwise taking part in the proceedings of such meetings in the same manner as members of the said society: Provided always, that such associates contribute to the funds of the said society the same fees or subscriptions as members contribute for the time being under the regulations thereof.

General Provisions.

19. *Following provisions not to take effect until approval of regulations.*—The following provisions of this Act shall not take effect until after the publication in the *Dublin Gazette* of the notice of the approval of the regulations made at the first meeting of the said council, and so far as the said provisions relate to chemists and druggists under this Act they shall only take effect after the publication in the *Dublin Gazette* of the notice of the approval of a resolution with the respect to the title of chemist and druggist.

20. *Appointment of Registrar and Treasurer.*—The said council may from time to time appoint a fit and proper person as a registrar under this Act, and shall have power to remove any such registrar from the said office, and may also appoint and remove from time to time a treasurer, and such clerks and other subordinate officers as may be requisite for carrying out the purposes of this Act, and also to pay suitable salaries to the said registrar, treasurer, clerks, and officers.

21. *Examination.*—For the purpose of ascertaining the qualification of persons desirous of keeping open shop for the retailing, dispensing, or compounding poisons or medical prescriptions and being registered as pharmaceutical chemists or as chemists and druggists under this Act, the said council shall cause examinations to be held at such times and in such manner as may be prescribed by regulations made in pursuance of this Act, and the said council shall appoint examiners to conduct the same: Provided always, that no person shall conduct any examination for the purposes of this Act until his appointment has been approved by the Lord Lieutenant and Privy Council, and such appointment shall not in any case be in force more than five years; and that it shall be the duty of the said Pharmaceutical Society to allow any officer appointed by the Lord Lieutenant and Privy Council for that purpose to be present during the progress of any examination held for the purposes of this Act.

All persons desirous of being registered as pharmaceutical chemists under this Act may at any such examination present themselves for examination, and they shall be examined with respect to their knowledge of the Latin and English languages, of arithmetic, of botany, of materia medica, of pharmaceutical and general chemistry, of practical pharmacy, of the British Pharmacopœia, and of such other subjects as may from time to time be prescribed by any regulations made in pursuance of this Act; and all persons desirous of being registered as chemists and druggists under this Act may at any such examination present themselves for examination, and they shall be subjected to such a modified examination with respect to their knowledge of the subjects aforesaid as may from time to time be prescribed by any regulations made in pursuance of this Act: Provided always, that such examinations shall not include the theory and practice of medicine, surgery, or midwifery, or any branch of medicine or surgery; and the examiners appointed by the council are hereby empowered, after such examinations respectively to grant or refuse to such persons, as in their discretion may seem fit, certificates of competent knowledge and qualification and skill to be registered as pharmaceutical chemists or as chemists and druggists under this Act: Provided always, that in case of rejection a rejected candidate shall not present himself for re-examination until after six months after such rejection.

22. *Persons entitled to be Registered under this Act.*—Every person by this Act nominated as a member of the council of the Pharmaceutical Society of Ireland shall be entitled to be registered as a pharmaceutical chemist

without payment of any fees or charges; and every person who shall be duly examined in accordance with the provisions of this Act, and who shall be certified by the examiners to be qualified to act as a pharmaceutical chemist, and every licentiate of Apothecaries' Hall shall, upon giving to the registrar such reasonable proof thereof as may be required under any regulations made by the council of the said Pharmaceutical Society in that behalf, and upon payment of the proper fees and charges, be entitled to be registered under this Act as a pharmaceutical chemist.

Every person who shall be duly examined in accordance with the provisions of this Act, and who shall be certified by the examiners to be qualified to act as a chemist and druggist, shall, upon giving to the registrar such reasonable proof thereof as may be required under any regulations made by the council of the said Pharmaceutical Society in that behalf, and upon payment of the proper fees and charges, be entitled to be registered under this Act as a chemist and druggist.

23. *Fees for examination, licence, and registration.*—For every examination, licence, and registration such reasonable fees or charges shall be paid as shall from time to time be fixed and determined by any regulation or regulations to be made by the said council in pursuance of this Act, and such fees shall be paid to the treasurer, and shall by him be applied to the purposes of this Act in manner prescribed by such regulations.

24. *Register of pharmaceutical chemists and of chemists and druggists.*—The registrar to be appointed under or by virtue of this Act shall from time to time make out and maintain a complete list (to be called the "Register of Pharmaceutical Chemists for Ireland") and also a complete list (to be called the "Register of Chemists and Druggists in Ireland") of all persons registered as pharmaceutical chemists or as chemists and druggists respectively under this Act, and in such registers the names shall be in alphabetical order according to their surnames with the respective residences, in the form set forth in the schedule annexed, or to the like effect, and shall keep proper indexes of such registers, and all such other lists and books as may be required by the said council and as may be necessary for giving effect to the regulations of the said council and to the provisions of this Act.

25. *Duty of registrar to make and keep registers.*—It shall be the duty of the registrar to keep the said registers corrected, and to erase the names of all registered persons as and when they shall die, and from time to time to make the necessary alterations in the addresses of the persons registered under this Act; and to enable the registrar duly to fulfil such duties, it shall be lawful for him to write a letter to any registered person, addressed to such person according to his address on the register, to inquire whether he has ceased to carry on business or has changed his residence, such letter to be forwarded by post as a registered letter, according to the post office regulations for the time being, and if no answer shall be returned to such letter within the period of six months from the sending of the letter, a second of similar purport shall be sent in like manner, and if no answer be given thereto within three months from date thereof it shall be lawful to erase the name of such person from the register; provided always, that the same may be restored by direction of the said council, should they think fit to make an order to that effect.

26. *Evidence of qualification to be given before registration.*—No name shall be entered in the said registers except of persons authorized by this Act to be registered, nor unless the registrar be satisfied by the proper evidence that the person claiming is entitled to be registered; and any appeal from the decision of the registrar may be decided by the said council; and any entry which shall be proved to the satisfaction of the said council to have been fraudulently or incorrectly made may be erased from or amended in the register under an order in writing of the said council.

27. *Annual registers to be published, and to be evidence.*—The registrar shall, in the month of January in every year, cause to be printed, published, and sold correct copies of the register of pharmaceutical chemists and of the register of chemists and druggists, in alphabetical order according to their surnames; and printed copies of such registers for the time being in force, purporting to be so printed and published as aforesaid, or any extract therefrom, or from the original registers, certified under the hand of the said registrar, and countersigned by the president or two members of the said council, shall be evidence in all courts and in all proceedings that the persons therein specified are registered according to the provisions of this Act, and the absence of the name of any person from any such copy of either of the said registers shall be evidence, until the contrary shall be made to appear, that such person is not registered in such register according to the provisions of this Act.

28. *Penalty on wilful falsification of registers or for obtaining registration by false representation.*—Any registrar who shall wilfully make or cause to be made any falsification in any matter relating to the said registers, or either of them, and any person who shall wilfully procure or attempt to procure himself to be registered under this Act, by making or producing, or causing to be made or produced, any false or fraudulent representation or declaration, either verbally or in writing, and any person aiding or assisting him therein, shall be deemed guilty of a misdemeanor, punishable by fine or imprisonment, and shall on conviction thereof be sentenced to be imprisoned for any term not exceeding twelve months.

29. *Notice of death of pharmaceutical chemist, or chemist and druggist, to be given by registrars of deaths.*—Every registrar of deaths in Ireland, on receiving notice of the death of any person registered under this Act as a pharmaceutical chemist or as a chemist and druggist, shall forthwith transmit by post to the registrar under this Act a certificate, under his own hand, of such death, with the particulars of the time and place of death, and on receipt of such certificate the said registrar under this Act shall erase the name of such deceased pharmaceutical chemist or chemist and druggist from the proper register, and shall transmit to the said registrar of deaths the cost of such certificate and transmission, and may charge the cost thereof as an expense of his office.

30. *Persons selling or compounding poisons or assuming the title of pharmaceutical chemist to be qualified.*—So much of the Act of 1791 as prohibits the keeping of open shop within the meaning of the said Act by any person other than a licentiate of Apothecaries' Hall shall be repealed; provided always, that it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons within the meaning of the Act of the session of the thirty-third and thirty-fourth years of the reign of Her present Majesty, chapter twenty-six, or medical prescriptions, unless such person be registered as a pharmaceutical chemist or a chemist and druggist under this Act, or to assume or use the title of Pharmaceutical Chemist, or Pharmaceutist, or Pharmacist, or Dispensing Chemist, or the title of Chemist and Druggist in any part of Ireland, unless such person shall be registered as a pharmaceutical chemist or as a chemist and druggist respectively under this Act; and any person acting in contravention of this enactment or compounding any medicines of the British Pharmacopœia, except according to the formularies of the said Pharmacopœia, shall for every such offence be liable to pay a penalty of five pounds; but no such penalty shall exempt any person from being liable to any other penalty, damage, or punishment to which he would have been subject if this Act had not passed: Provided always, that nothing in this section contained shall affect any licentiate of Apothecaries' Hall, or any person who shall have been registered as a legally qualified medical practitioner before the passing of this Act, or who shall be registered as a legally qualifind practitioner after the passing of this Act, and who,

in order to obtain his diploma, shall have passed an examination in pharmacy.

31. *Reserving rights of certain persons.*—Nothing in this Act contained shall extend to or interfere with the making or dealing in patent medicines, or with the business of wholesale dealers in supplying poisons in the ordinary course of wholesale dealing, or of chemists or druggists who are practising as such in Ireland upon their own account at the time of the passing of this Act, save and except the provisions against the compounding of poisons or medical prescriptions, and against the preparing of any medicines of the British Pharmacopœia except according to the formularies of the said Pharmacopœia; and nothing in this Act contained shall prevent any person who is a member of the Royal College of Veterinary Surgeons of Great Britain, or holds a certificate in veterinary surgery from the Highland and Agricultural Society of Scotland, from dispensing medicines for animals under his care.

32. *Provision for continuation of business in case of death.*—Upon the decease of any person registered under this Act as a pharmaceutical chemist or as a chemist and druggist, actually in business at the time of his death, it shall be lawful for any executor, administrator, or trustee of the estate of such pharmaceutical chemist or chemist and druggist to continue such business, if and so long only as such business shall be bonâ fide conducted by a duly qualified assistant, and a duly qualified assistant within the meaning of this section shall be a pharmaceutical chemist or a chemist and druggist registered as such under this Act.

33. *Registration not to entitle to practice of medicine, etc.*—Registration under this Act shall not entitle any person so registered to practice medicine or surgery, or any branch of medicine or surgery.

34. *Pharmaceutical chemist may be apothecary in lunatic asylum, etc.*—Any person registered as a pharmaceutical chemist under this Act shall be qualified to be appointed to and to hold the office of apothecary in any district lunatic asylum or county gaol or prison in Ireland, but shall not be entitled to prescribe for patients.

35. *Power to erase names from register.*—The Lord Lieutenant and Privy Council may direct the name of any person who is convicted of any offence against this Act which in their opinion renders him unfit to be on any register under this Act to be erased from such register, and it shall be the duty of the registrar to erase the same accordingly.

36. *Recovery and application of penalties.*—Every penalty recoverable under the provisions of this Act shall be recoverable in a summary way, with respect to the police district of Dublin metropolis, subject and according to the provisions of any Act regulating the powers and duties of justices of the peace for such district or of the police of such district, and with respect to other parts of Ireland, before a justice or justices of the peace sitting in petty sessions, subject and according to the provisions of the Petty Sessions (Ireland) Act, 1851, and any Act amending the same.

One third of every sum of money recovered as a penalty under this Act shall be paid to the person who shall be the means of bringing to justice any person committing any offence against any of the provisions of this Act, and the remainder of such sum shall be paid to the treasurer, and shall by him be applied to the purposes of this Act in the manner prescribed by any regulation made in pursuance of this Act.

SCHEDULE.

Name.	Residence.	Date of Registration.
A.B.	Grafton Street, Dublin.	January 10, 187 .
C.D.	Patrick Street, Cork.	March 4, 187 .
E.F.	Corn Market, Belfast.	June 15, 187 .

EXCISE PROSECUTION.

On Tuesday, Jane Greig, widow of the late Mr. Greig, chemist and druggist, Dunbar, and still carrying on the business there, was prosecuted at the instance of the Board of Inland Revenue before the justices in Haddington for selling a quantity of methylated spirits without a licence. Mr. Smith, supervisor, conducted the case for the Board, and Mr. C. Notman, writer, Dunbar, appeared for the defender. The charge was that on the 12th June last the defender had sold a pint or thereby of methylated spirits without a licence, having thereby incurred a penalty of £50.

Mr. Notman, before the proof was gone into, craved leave to make an explanatory statement of the circumstances under which the transaction took place. Since the death of her husband, the defender had got the help of John A. Bell, a young and registered assistant, who attended solely to the shop. Some time ago a young exciseman named Parsey came to Dunbar, and got to be friendly with the shopman, coming frequently about the shop. On the representation of the exciseman that he wished a little methylated spirits to varnish a walking-stick, Bell sent into Edinburgh for some, and sold it to Parsey, on the mutual understanding between them both that it was to be considered as mixed with gum, in which state alone it was competent to dispose of it without a licence. No sooner, however, had Parsey got it into his possession, than he lodged information, and the result was a prosecution on the part of the excise. Mr. Notman expressed an opinion that a trap had been set for the assistant—a mode of proceeding on the part of the excise that he considered most unfair.

Mr. Smith intimated to the court that his witness would give an entirely different version of the business.

Parsey, the young exciseman referred to, was then examined on the part of the prosecution. He stated that he was instructed to make a purchase of methylated spirits at the shop of the defender, and did so. He got a pint. When getting it, Bell told him that there was a little gum in it, and then he wrote on the bottle "finish." Witness kept the bottle till Mr. Smith, the supervisor came to Dunbar, when it was sealed up.

Cross-examined—Thought it was on the 28th of May when he first went into the shop to ask for the spirit. It was not till the 12th of June that he got it. On first asking for it, he told Bell he was in the habit of doing a little in wood carving, and that he wanted the spirit for the purpose of polishing. He denied that he was on friendly terms with Bell, or that he had been oftener in his shop than twice from the time he asked for the spirit till he got it. He might talk to him in the street the same as to any other casual acquaintance, but he certainly was not intimate with him.

Re-examined—When witness first asked for methylated spirits, Bell said he had none at present in stock, but that he expected some from Edinburgh. Bell at the same time offered to sell him some pure spirit if he would not tell the exciseman.

Mr. Smith, the supervisor, proved the receipt of the bottle of spirit from Parsey, and the sealing of it up in two separate samples, one of which was sent to London for chemical analysis.

Henry James Helm, chemist, London, deponed that he had received the sample, and tested it. It contained pure methylated spirit, without any gum in solution.

This closed the case for the prosecution.

Bell, the assistant, who is a registered chemist and druggist, was then examined for the defence. He said that he superintended the practical details of the business for Mrs. Greig, whom, however, he had never seen. In the month of May last he became acquainted with the witness Parsey. The first time he came into the shop he asked for cigars, or something of that sort. Afterwards he asked if witness could sell him some methylated spirit for polishing a walking stick. Witness told him that there was none in stock, but that he would send to Edinburgh and get some. He was asked if medicated spirit would do, but he said it would not. It would be about three weeks before a supply came out. In the interval Parsey was frequently in the shop, and spent a good deal of his time there. He appeared to be most friendly, and it was only on the footing of being on friendly terms with him that he supplied him with the methylated spirit. Witness knew all along that he was an excise officer.

In cross-examination by Mr. Smith, witness said he told Parsey there was a little gum in the spirit, but he knew that there was none—that it was pure spirit.

Mr. Notman then addressed the court in mitigation of penalty. He could not deny that there had been a sale; but he craved the consideration of the justices to the whole circumstances of the case. He thonght it extremely cruel on the part of the excise to lay a trap, as they had done here; and he hoped the justices would take the opportunity of expressing their dissatisfaction at the manner in which the officers of Her Majesty's Inland Revenue had acted in the case. If they could not remit the penalty altogether, he hoped they would reduce it to the smallest amount within their power, with a further recommendation to the Commissioners of Inland Revenue to mitigate it still further.

Mr. Smith said he would not have taken the slightest notice of Mr. Notman's remarks if they had been made with regard to an aged officer, but it was his duty to protect the character of a young and very efficient officer, who had, he knew, met with a good deal of abuse in Dunbar in connection with this case. Mr. Parsey had simply obeyed instructions in this matter, and if he had not, it would not have been to his advantage. All the officers of the Inland Revenue were under authority, and were bound by their oath to carry out the instructions they received, irrespective altogether of the circumstance whether poor or rich were involved. He knew that by so doing they were frequently abused by the ignorant, and even by those whose superior intelligence ought to enable them to know better. He felt it his duty to say this much in vindication of a young officer.

Sheriff Shirreff said there could be no doubt that Parsey was only acting in the discharge of his duty. It was painful when such things happened, but it was necessary that the revenue should be protected. At the same time it was a case that did not call for the extreme penalty.

In reply to an inquiry by the Bench whether there was any suspicion of the shop?

Mr. Smith said he had not particularly; but thought it strange that none of the druggists in Dunbar should have a licence for the sale of methylated spirit, when he knew perfectly well that it was sold there. The licence was only 10s. yearly.

The modified penalty of £12 10s. was then imposed, with a recommendation that the Commissioners of Inland Revenue should still further mitigate it.

Review.

Daniel Hanbury. Nekrolog. Separat-Abdruck aus Buchner's Repertorium für Pharmacie. 1875. F. A. Flückiger.

Professor Flückiger has published the memoir of his late distinguished friend in a separate form.

The notice is interesting as it presents a summary of the life and scientific labours of Daniel Hanbury from a German point of view; the Professor describes the time-honoured establishment in Plough Court, existing as an island in the ocean, and there in comparative seclusion pursuing its quiet course, and, without show or parade of any kind, offering its services to the busy world around. He remarks upon the large tracts of land which here and there, though close to the giant city, have been kept in the charms of natural growth. "Passing many years between the traditional pharmacy in Lombard Street, and the retirement of Clapham Common, and dividing his time between the two poles of practical and scientific pharmaceutical occupation, Hanbury's life was spent outwardly and inwardly in undisturbed harmony."

His career has been so recently and so well depicted in these columns, that its principal events need not be recapitulated. The whole circumstances are here carefully stated by his Strasburg associate, and there are some new points brought forward in the narrative. "When a knightly hero is described, one says with feeling, every inch a man! It is just as exact an expression, when of our friend we say, every inch truth"! And it is to the truthfulness of his character that Flückiger bears especial witness. How he went to the source of everything for his information, and how he was never content to accept statements or conclusions second-hand is demonstrated throughout. The rare union of personal acquaintance with his subject, and an enviable command of foreign languages stood Hanbury in great stead; joined to which advantages was an unwearied spirit of investigation. Help poured in from St. Petersburg and from Pekin; from New York and from the Red Sea; from Singapore and from further India; indeed his English home became the centre of pharmacological intelligence drawn from the four quarters of the globe.

Daniel Hanbury's various honours are well known, yet his German distinctions have hitherto remained unnoticed. The Leopold-Caroline Academy and the Munich University both recognized his merits, and the latter, at its Jubilee Fête on August 2, 1872, named him honorary Doctor of Medicine; this title, we need hardly say, was never assumed by its possessor.

We learn further from the memoir, that while Hanbury obtained assistance from numerous quarters, to Richard Spruce in particular he was largely indebted. This explorer of the Amazon and Rio Negro was highly valued as a friend, and became a frequent correspondent.

The most striking portion of Professor Flückiger's memorial is the comparison instituted in the following paragraph between the four famous pharmacologists, Hanbury, Clusius, Pereira, and Guibourt:—

"No one was in equal measure fitted for the investigation of materia medica by education, by inner bent of mind, or by a favourable social position, than were the two first, if it be allowable to compare together scientific labours separated from each other by two centuries and a-half. Pereira grasped his task much more fully as a physician; while Hanbury worked out in part the same subjects, but from a pharmaceutical point of view, and was able to develop this one side the more efficiently and entirely; Guibourt, considered rightly by the French as indisputably the first authority of his day, was essentially different from the two Englishmen. He was a very fine observer, and rich in practical experience, and also skilled as a teacher. But his horizon was much less extensive, he was more limited in his foreign relations, and brought to his task less of that treasure of geographical, historical, linguistic knowledge, and business readiness which belonged to the object of the present eulogium."

Hanbury's separate researches continued during about a quarter of a century, culminating in "a work of recapitulation" (ein zusammenfassendes Werk), called the Pharmacographia. In 1864, he became acquainted with Professor Flückiger, and this acquaintance ripened into an intimate friendship. As English literature did not boast of any work which answered to the views of the two friends, the design of the well-known volume was arranged, and Hanbury, being in 1870 relieved from business cares, was able to devote his entire attention to the work. "The collections and libraries of London, Kew, and Paris, the warehouses of the London docks, and whatever the auctions of the drug-brokers in the city brought to view," were mutually examined. "If Hanbury was already well versed in his long-gained London experience, he now summoned to the utmost all his acuteness in order ever to draw together the most utterly trustworthy information, in a practical as well as in a literary view, which was anywhere to be found in the inexhaustible riches of the metropolis."

The pamphlet ends with the list of Daniel Hanbury's scientific papers, seventy in number. Many readers will be glad to learn that Messrs. Macmillan are about to republish the whole series in a connected shape, with such illustrations as may be requisite; and that materials are in hand for a fuller biographical account.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

ACTION OF SULPHURIC ACID ON DOLOMITE.

Sir,—Referring to the discussion on Mr. Stoddart's paper at the British Pharmaceutical Conference, 'Pharmaceutical Experiments on the Bristol Rocks,' I think the non-effervescence of dolomite in sulphuric acid is not a solitary instance of a mineral body resisting strong acids when the same body artificially formed is readily acted upon. I have always thought the anhydrous state of the mineral was the reason.

Having worked on dolomite and magnesite some years—for the production of carbonic acid gas for the bicarbonating potash and soda—I can fully endorse Mr. Stoddart that they are not acted upon by sulphuric acid in any appreciable quantity in the cold, even when powdered. The slight action of sulphuric acid on powdered magnesite being due to the elevation of temperature caused by mixing the acid with water. I find the best way to liberate the gas is to place a charge of magnesite, broken up in pieces about the size of walnuts, in the generator, add the sulphuric acid, and then heat the vessel to about the boiling point of water; in a few minutes the gauge glass will show you a pressure of gas of 10 to 15 lbs. After the sulphuric acid is saturated I run the liquor off and add fresh acid. The liquor, sulphate of magnesium, I purify by filtration and crystallization.

Magnesite and dolomite are terms used in the trade to express the amount of carbonate of lime and magnesia present in the mineral. If over 50 per cent. of carbonate of magnesia, it is magnesite, if under that it is dolomite. The best magnesite comes from Athens, but it is very uncertain in its arrival, as it only pays to bring over as ballast; what is in the market now is Prussian.

HENRY OWEN HUSKISSON.

Swinton St., Gray's Inn Road.

NOTE ON THE SEMIPONDEROUS CARBONATE OF MAGNESIA.

Sir,—Since the meeting of the Conference at Bristol, Mr. Brady of Newcastle has kindly furnished me with a supply of the above variety of Magnesium Carbonate, and the following particulars regarding it will probably be of interest to those who are unacquainted with the article. Under the microscope it has the appearance of a mixture of light and heavy carbonates, the latter in larger proportion, but from its density it would seem to be more nearly allied to the former variety. A box which held 89 grains of the semiponderous, held 57 grains of the light, and 170 grains of the heavy carbonate.

The relative densities are therefore,—

1 : 1·5 : 3 nearly.

Its chemical constitution appears to be identical with the formula given in the B. P. for the other varieties.

The samples examined were remarkably pure, containing only very slight traces of lime, iron, and soluble salts.

Mr. Brady says that on many accounts he prefers this variety to either of the others, and I think it probable that it might with advantage be substituted for the light carbonate in a future pharmacopœia, especially if it continues to be so carefully prepared.

J. C. THRESH.

Buxton, September 9, 1875.

PROPERTY IN PRESCRIPTIONS.

Sir,—Those writers who advocate the keeping of prescriptions by chemists, seem to me to lose sight of two important considerations, viz. the views the prescribers and patients would take of the matter, both of whom I imagine would be adverse to it. A physician would not take kindly to the tax on his already overtaxed time, which keeping a copy of all his prescriptions would demand, as the first result of chemist's filing prescriptions, and I opine our good physic-taking friends the public would relish the change even less than the doctors. Up to now they have regarded prescriptions as their property, and I would ask anyone who has had ever so slight an experience behind a chemist's counter, where he will find a class of property more jealously guarded.

If reform be needed, it can only be effected by the cooperation of prescribers, and even then it would be a thankless task, and one of some difficulty, to convince a patient that he was not entitled to what he had paid for.

Perhaps an evening meeting to which physicians should be invited, might not be wasted in discussing the subject, the professors being for that occasion bound over to keep the peace. At any rate we might expect an intellectual treat in hearing the opinions of the bright particular stars of the medical and pharmaceutical worlds, "and tallised out in the poetic language of gifted men."

AN EMBRYO PHARMACIST.

London, Aug. 30, 1875.

PRESERVATION OF LEECHES.

Sir,—Salicylic acid appears to be a favourite in the hands of some for preserving leeches, others are not so satisfied with its actions; a prolonged trial is the only reliable way of coming to a conclusion; meantime have any tried the use of iron in the water?—an old bit of chain, or any iron article or articles will do. I have for these four or five years been indebted to this means for keeping my leeches in a state of health and condition perfectly surprising; the water and glass jar remaining at times untouched for six weeks without a casualty. My sale is very small and intermittent; the conditions I observe are—

1st Rain water,
2nd A glass jar,
3rd Plenty of light,

and as little disturbance as possible.

HIRUDO.

A DISPENSING QUERY.

Sir,—Will you permit me to ask opinions on the two following recipes—both from the same London practitioner, and for the same patient. The decompositions taking place will be patent to the "merest schoolboy," and the result, if dispensed accurately, unsatisfactory to all parties; but being remote from the physician, what is the chemist to do?

No. 1.

℞ Ext. Papaveris . . . . ʒij
Liq. Plumbi Subacet. . . . . ℥vj

A large tablespoonful in a pint of tepid water for a lotion, etc., etc.

No. 2.

℞ Zinci Sulph.,
Alum. Sulph. Exsic. . . . . . : . . āā ℥j
Acid. Tannic. . . . . ℥j
Aquæ . . . . ℥j

A teaspoonful with a pint of tepid water, etc., etc., for a lotion.

"SUBURBAN,"

A. B. C.—Cannabis sativa.

T. L.—It is not lawful for a person who has simply passed the Modified examination, and who is in business on his own account, to style himself "pharmaceutical chemist" under any circumstances.

Audax.—(1) Apply to the Secretary for the printed hints to apprentices and students. (2) We cannot advise you on this subject.

John E. Lord.—We do not know of any lectures having been given under the title you mention. A volume on the 'Forces of Nature' is published by Chatto and Windus.

C. B. C.—Extract the sulphate of quinine by solution in boiling water or alcohol; filter and crystallize.

COMMUNICATIONS, LETTERS, etc., have been received from M. J. P. (Chester), Iota, J. M. C., D. Jenkins, Dentist, J. G., Henry Hatton, A. W. Blyth.

ON TEA.

BY G. W. WIGNER.

There are so many varieties of tea imported into this country, that in order to ascertain their distinguishing chemical characteristics it is necessary to analyse a large number of samples.

I have therefore determined to supplement a paper I published some months ago, by the results of a large number of analyses made since.

The samples I have examined comprise, as well as the ordinary teas of commerce, certain rarer kinds, the characteristics of which will perhaps possess some interest for my brother analysts.

The moisture of teas is generally considered a matter of little moment, and consequently is seldom determined.

It would appear, however, that it bears a certain relation to the individual kind of tea, and that its limits of variation are wider than is generally supposed; as I have found the proportion as low as 4·20 per cent., and as high as 10·80 per cent.

Tea is hygroscopic, and when exposed to the air after having been dried at a temperature of 212° F., will gain weight with considerable rapidity.

The following table shows the results of some teas so dried and then exposed to the atmosphere of my laboratory during parts of the months of February and March in this year:—

Moisture and Hygroscopic Properties of Tea.

No.	Description.	Weight of 100 grains dried at 212° F.	Water.	Weight after exposure to air in open vessels for				Total gain of weight after exposure to air.
				Four days.	Six days.	Eight days.	Eleven days.	
1	Indian Young Hyson.	94·32	5·68	97·57	99·80	100·54	100·88	6·56
2	Moyune Young Hyson.	95·16	4·84	98·92	101·25	101·25	101·25	6·09
3	Gunpowder.	95·06	4·94	100·68	101·01	101·17	101·10	6·04
4	Moyune Gunpowder.	94·84	5·16	98·54	100·63	101·07	101·31	6·47
5	do.	94·30	5·70	98·22	100·35	100·50	100·50	6·20
6	do.	93·82	6·18	97·83	100·09	100·52	100·77	6·95
7	do.	93·45	6·55	97·42	99·67	100·44	100·43	6·98
8	Medium Oolong, 1874.	93·70	6·30	99·85	100·02	100·26	100·22	6·52
9	Oolong.	93·23	6·77	97·88	99·99	100·45	100·89	7·66
10	Mannuna Fine.	92·91	7·09	98·32	98·61	98·88	98·90	5·99
11	Broken Indian.	92·70	7·30	97·43	99·87	100·41	100·24	7·54
12	Fine Kaisow.	91·40	8·60	98·48	98·36	98·76	98·59	7·19
13	Kaisow, 1870.	89·48	10·52	96·26	96·49	96·73	96·66	7·18
14	do.	89·20	10·80	96·79	96·82	96·89	96·67	7·47
15	Orange Pekoe.	94·42	5·58	98·45	100·64	101·00	101·22	6·80
16	Indian Pekoe.	93·13	6·87	99·49	99·70	99·91	99·93	6·80
17	Scented Orange Pekoe.	92·21	7·79	98·12	98·25	98·39	98·32	6·11
18	So Pekoe, 1869.	90·61	9·39	96·64	97·06	97·31	97·29	6·68
19	Pekoe Siftings.	90·55	9·45	96·81	96·86	96·92	96·80	6·25
20	Consolidated.	91·89	8·11	96·58	98·65	98·95	99·14	7·25
21	Indian Souchong.	91·84	8·16	98·14	98·35	98·58	98·46	6·62
22	Caper.	93·20	6·80	98·30	98·00	98·60	99·00	5·80
23	do.	93·00	7·00	98·90	98·20	99·00	99·00	6·00
24	do.	92·00	8·00	98·60	98·20	98·30	98·90	6·90
25	do.	92·00	8·00	99·00	98·20	98·80	98·90	6·90
26	do., 1872.	91·48	8·52	98·26	98·47	98·63	98·47	6·99
27	Indian Congou.	93·44	6·56	98·41	100·93	101·58	101·75	8·31
28	Congou.	92·72	7·28	97·25	99·57	100·00	100·08	7·36
29	do.	91·94	8·06	96·41	99·39	99·54	99·68	7·74
30	Moning Congou.	91·51	8·49	99·00	99·00	99·33	99·09	7·58
31	do.	91·36	8·64	96·71	99·62	99·78	99·78	8·42
32	New District.	90·92	9·08	98·76	97·84	98·08	97·97	7·05
33	Moning.	90·83	9·17	98·56	98·32	98·40	98·21	7·38
34	Congou, 1869.	89·96	10·04	96·67	96·72	97·04	96·87	6·91
35	Congou.	89·67	10·33	96·65	96·80	96·85	96·62	6·95

It will be seen that the hysons and gunpowders—both of which are high-dried teas—contain the smallest amount of moisture, the two hysons yielding respectively 5·68 per cent. and 4·84 per cent., and the highest percentage yielded by a gunpowder being 6·55 per cent., and the lowest 4·94 per cent.; while the congous (which have always been dried at a lower temperature) give an average of 8·50 per cent. The average of the entire table is 7·67 per cent. The average weight of water re-absorbed after eleven days' exposure to the air is 6·93 per cent., deducting which from 7·67 per cent., shows that, taking the average, the samples regained by exposure to the air all their original weight of moisture, less ·74 per cent. The different classes of tea showed, however, strikingly different results. For instance, one sample of congou originally rather dry gained moisture to the extent of 1·75 per cent. in excess of its original moisture. Every other sample of congou except one failed to reach its original weight, the average loss being about 1·7 per cent. Similarly, the pekoes in every case but one show an ultimate loss to nearly the same extent.

On the other hand, the high-dried teas—hysons and gunpowders—show an increase in every case, averaging more than 1 per cent. The general tendency of this exposure to the air serves to bring the moisture of the whole to an average of about 7 per cent., but the limit of difference after exposure is very much narrower than before, the range of moisture before drying being 5·96 per cent., and after drying and exposure to the air, 2·62 per cent. In my previous paper I gave the results of the partial analysis of the ash of twenty-four samples of genuine tea of ordinary character, and also of four samples of special growths of tea. The list of ordinary teas may with advantage be increased, and for the information of those who may not be familiar with the *appearance* of the rarer teas it is yet more important to record the chemical results of such samples.

I therefore subjoin a tabulated statement, showing the results of the analyses of seventeen more samples of ordinary teas, and of eighteen samples of, what I may term, uncommon or special teas. The number attached to each remains constant to the respective sample in the other tables which I give. The special teas were all taken from original packages, and had, therefore, undergone no manipulation in this country. They were mostly of high price, and being only imported for the purpose of "mixing," would not, by themselves, yield a pleasant infusion.

These analyses have all been made on a uniform plan—viz., igniting 100 grs. of tea, boiling the ash in five ounces of water, and washing on the filter with cold water. The alkali is estimated by adding excess of normal acid and titrating back.

ORDINARY TEAS FROM ORIGINAL CHESTS.—PARTIAL ANALYSIS OF ASH.

No.	Description.	Total Ash per cent.	Ash soluble in Water per cent.	Ash Soluble in Acid per cent.	Silica.	Potash.
36	Indian.	5·58	3·06	2·20	·32	1·45
27	do.	5·82	2·75	2·87	·20	1·36
38	Congou.	5·96	3·12	2·68	·16	1·65
39	do.	5·63	3·25	2·08	·30	1·41
40	do.	5·89	3·10	2·04	·75	1·27
41	do.	5·83	3·03	2·04	·76	1·32
42	do.	5·65	3·07	2·27	·31	1·37
43	do.	5·61	2·75	2·33	·53	1·27
44	do.	5·71	2·75	2·33	·63	1·17
45	do.	5·76	2·82	2·50	·44	1·26
46	do.	5·92	3·25	2·08	·59	1·41
47	do.	5·78	3·08	2·04	·66	1·17
48	do.	6·03	3·35	1·99	·69	1·17
49	Gunpowder.	5·75	3·10	2·34	·31	1·32
50	do.	5·64	3·11	2·14	·39	1·36
51	Hyson.	5·69	3·35	2·18	·16	1·88
52	Congou.	5·53	3·32	2·06	·15	1·60
	Average.	5·75	3·07	2·25	·43	1·38
	Maximum.	6·03	3·35	2·87	·76	1·88
	Minimum.	5·53	2·75	1·99	·15	1·17
	Putting these results with those of the 24 Samples previously published, we find					
	Average.	5·69	3·03	2·22	·44	1·49
	Maximum.	6·03	3·35	2·87	·78	1·88
	Minimum.	5·46	2·67	1·97	·15	1·17

These results from 41 different pure samples may certainly be assumed to represent fairly the ordinary Teas of Commerce as imported.

I pass now to the special Samples, which vary in price, but are generally high, numbers 1, 2, 4, 6, 7, and 53 ranging between 3*s.* and 3*s.* 6*d.* per pound in bond.

SPECIAL TEAS FROM ORIGINAL CHESTS.

No.	Description.	Total Ash per cent.	Soluble in Water per cent.	Soluble in Acid per cent.	Silica per cent.	Potash per cent.
1	Indian Young Hyson.	5·32	3·27	1·94	·11	1·69
2	Moyune Young Hyson.	5·75	3·72	1·74	·29	1·83
4	Moyune Gunpowder.	5·83	3·67	1·83	·33	1·51
5	do.	5·61	3·22	2·11	·28	1·56
6	do.	5·63	3·44	1·81	·38	1·51
7	do.	5·50	3·51	1·80	·19	1·51
8	Medium Oolong 1874.	6·34	3·59	2·23	·51	
9	Oolong.	5·27	3·15	1·83	·29	1·51
10	Mannuna Fine.	6·80	3·80	2·60	·40	1·32
11	Broken Indian.	5·17	2·92	2·21	·04	1·96
12	Fine Kaisow 1874.	6·46	3·43	2·46	·57	1·41
17	Scented Orange Pekoe.	6·84	3·30	2·68	·86	1·26
21	Indian Souchong.	5·60	3·49	1·86	·25	
53	Oolong.	5·49	3·88	1·33	·28	1·46
54	do.	5·54	3·78	1·63	·13	1·51
55	Assam.	5·55	3·36	1·97	·21	1·60
56	Java.	5·54	3·26	2·24	·04	1·36
57	Moyune Siftings.	6·16	3·20	2·38	·58	1·74
	Average.	5·80	3·44	2·04	·32	1·39
	Maximum.	6·80	3·88	2·68	·86	1·96
	Minimum.	5·17	2·92	1·33	·04	1·26

I have kept the Capers in a separate list, because, although this class of tea is the one most frequently adulterated, yet it is perfectly possible to procure pure samples. The following table fairly shows the character of pure Caper teas:—

GENUINE CAPERS.

No.	Description.	Total Ash.	Ash Soluble in Water.	Ash Soluble in Acid.	Silica.	Potash.
23	Caper.	5·90	3·16	1·86	·88	1·32
74	do.	6·94	2·66	2·61	1·67	1·50
75	do.	7·02	3·66	1·96	1·40	1·32
76	do.	5·75	3·00	1·88	·87	1·32
77	do.	5·75	2·64	2·41	·70	1·41
78	do.	6·22	3·10	2·20	·92	
79	do.	6·23	3·10	2·37	·76	1·53
80	do.	6·33	3·44	2·10	·79	1·32
81	do.	6·11	2·85	2·36	·90	1·08
	Average.	6·25	3·07	2·19	·99	1·35
	Maximum.	7·02	3·66	2·61	1·67	1·53
	Minimum.	5·75	2·64	1·86	·70	1·08
Putting these results in the same average with the other Special Teas, the figures are— Average of 25 Special Teas:						
	Average.	5·95	3·33	2·09	·53	1·38
	Maximum.	7·02	3·88	2·68	1·67	1·96
	Minimum.	5·17	2·64	1·33	·04	1·08

These results are sufficient in number to give not merely a fair average, but a very good basis for assuming what are the maximum deviations likely to be met with in genuine tea.

It is possible to find samples of dried tea leaves which would show slightly greater deviations from the average than even the special teas enumerated here; but such samples are not commercially met with.

For instance, I believe, from certain old samples which I have examined, that some teas which have been in bond for many years, and were probably of very inferior quality originally, may occasionally be found which deviate a few hundredths more or less from these figures, but such tea is practically unsaleable, and may be left out of consideration.

And, on the other hand, it may be possible that some kinds of tea, such as Russian overland, may show even more soluble ash.

Still, as my samples would in many cases be retailed as high as 6*s.* per pound, I think we may safely exclude all higher priced teas.

NOTE ON THE SOLUBILITY OF OIL OF BITTER ALMONDS IN WATER.*

BY F. A. FLÜCKIGER.

In most chemical handbooks it is stated that one part of oil of bitter almonds can be dissolved in thirty parts of water. The author finds this not to be correct either for the ordinary oil containing prussic acid or the oil which contains none. Neither is it the case with oil (also free from prussic acid) which has been separated from the crystalline bisulphite combination (2 (C_7H_6O, $NaHSO_3$)+OH_2) by means of carbonate of sodium in a current of carbolic acid, in order to remove any benzoic acid it might contain. The oil drops first begin to disappear with 250 times their weight of water, *i.e.*, they divide up very finely in the water, and impart to it a turbid appearance. With 300 parts of water the mixture becomes clearer, but even with much more water it is not completely clear. The exact disappearance of the turbidity is not very easy to note, as it only takes place very gradually. In practice the solubility is yet further influenced by the formation of benzoic acid and hydrobenzamide, which are both less soluble in cold water.

The solubility of the oil in water does not appear to be much increased by heat. A turbid solution, containing 1 part in 300, does not become clear in a water-bath.

These experiments induce the author to think that the statement that 1 part of oil of bitter almonds is soluble in 30 parts of water may have had its origin in a printer's error, and that probably it should have been 1 in 300. At any rate the latter is nearer the truth.

SOLUBILITY OF SALICYLIC ACID.*

BY F. TOUSSAINT.

I have made several experiments for the purpose of finding a method for dispensing salicylic acid in a form easily soluble in water.

1. Dr. Squibb has recommended phosphate of soda in the proportion of three parts to one of salicylic acid.

By dissolving it in water I found that phosphate of ammonia is more powerful than the soda salt. Twelve parts of salicylic acid require only eleven parts of phosphate of ammonia, or one drachm of the acid to one drachm of the phosphate.

2. Salicylic acid is very soluble in a small quantity of diluted ammonia-water, and a solution of carbonate of ammonia. Neutralized by it and evaporated by means of a water-bath, it crystallizes in fine needles.

The salicylate of ammonia is probably more easily decomposed in the system than salicylate of soda or potash. So I think it more practical for medical use.

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* *Archiv der Pharmacie*, vol. vii., 10 -

* From the *American Chemist.*

Further experiments have shown—

1. 30 grains of salicylic acid are soluble in one ounce of glycerine, heated in a water-bath at 180° F. The specific gravity of the glycerine is 1·261 (30° B.). Cooled to about 70°, the greater part of the salicylic acid crystallizes again.
2. 15 grains of salicylic acid, 5 grains of phosphate of ammonia, and half an ounce of glycerine, dissolved by heat, and then cooled to about 70° F., becomes a crystalline mass.
3. 10 grains of salicylic acid and 10 grains of phosphate of ammonia dissolved in 2 drachms of water, and mixed with 2 drachms of glycerine, form a clear liquid.
4. 15 grains of salicylic acid, 15 grains of phosphate of ammonia, dissolved in 2 drachms of water and mixed with 4 drachms of glycerine, and afterwards heated in a water-bath, remains very clear and without sediment.

THE SALTPETRE DEPOSITS OF PERU.*

By George Fitzroy Cole,

Assoc. Inst. C.E.

(Late District Engineer Iqique and La Noria Railway.)

The country wherein lies the industry described in this paper, is situated on the West Coast of South America, and belongs to that part known as the Costa Seca or Dry Coast, being the slip of land comprised between the 4th and 40th degrees S. latitude, and, when measured from the River Tumbez, the Southern boundary of the Republic of Equador, to Valdivia in Chile, embracing, within a length of over 2,400 miles, the entire seaboard of Peru, Bolivia, and part of Chile. Over this considerable extent of seacoast no rain falls to modify the parched appearance of the soil, and no humidity is obtained from the heavens beyond that acquired from the condensation of the fogs which envelop the coast during the winter months. With the rare exception of a shower of rain occurring once or twice in the year, the cultivator is dependent upon the scanty supply of water afforded by the rivers which derive their origin from the rains and snows which fall but moderately on the western slopes of the lofty Cordilleras. Thus the coast can be briefly described as consisting of a succession of valleys of great fertility, separated by arid wastes of high ground of immense extent.

The section specially dealt with lies at the southern extremity of Peru, for though saltpetre exists in small quantities in Bolivia, up to now it has only been worked in the former country, in the province of Tarapacca, perhaps more familiarly known as the district lying inland of the ports of Patillos, Iquique, Mexillones, and Pisagua. The coast between these ports presents seawards a precipitous front, with its cliffs rising to a height of from 1,000 to 3,000 feet from the water. These cliffs have but little slope; therefore, all road approaches are traced in a diagonal direction upon their face, or ascended by a series of reversing inclined planes, of exceeding steepness, and perilous to the mules performing the transport service.

From the summit of the coast-cliffs the land rises with nearly an uniform ascent, proving to be, by the construction of the Iquique and La Noria Railway, after deducting for the deviations of the latter, a general inclination of 50′ until it reaches an elevated plateau known by the name of Pampa de Tamarugal. This pampa, or extensive plain, is situated at an elevation of 3,440 feet on its western side, and, extending southwards and northwards, measures about 300 miles in length, and from 30 to 60 miles in breadth. The surface is perfectly smooth, and appears level to the eye, but in reality it rises slightly in an easterly direction, towards the Cordillera. Its surface is covered in some places by a cap of alluvial soil, but more generally consists of a finely granulated sand, which is raised by the slightest breath, and by a heavy wind is carried over the plains in broad thick clouds. On still days curious conical shaped clouds, resembling waterspouts, may be seen rising up in all parts of the plain, produced no doubt by the rotary motion which must occur at the meeting of two opposing currents of air. A tremulous motion is also observed, caused by the ascent and descent at one and the same time of layers of air at different temperatures. At different points the horizon is broken by patches of trees; these trees are called "algarovas," and their wood is hard and brown, not unlike English oak. They seldom grow in this locality to any considerable height. The deposit of roots belonging to this tree, to be found nearly all over the pampa, indicate the existence in former days of an immense forest, and the traditions of the place explain that formerly wood was the only fuel used in the reduction of the saltpetre and other minerals in which the province abounds. The algarova requires but little moisture, and subsists on the humidity which it absorbs from the atmosphere.

The mineral containing saltpetre is called "caliche." Caliche generally lies at depths of from one to ten yards below the surface, and sometimes resembles in appearance loaf sugar, and at others rock sulphur; and again it appears white, crossed with bluish veins. Its gravity varies from that of common salt to sandstone (2·41 average), according to the amount and nature of earthy matters it may be allied with. The nitrate portion dissolves freely in boiling water, leaving behind as a residuum the earthy substances. The custom is to boil it at a temperature of from 220° to 240° F. This mineral is found beneath a covering of calcareous earth, generally assuming the appearance of half-formed sandstone, when it is serviceable for building purposes. A shaft, or hole, sufficiently wide to permit of the passage of a man is sunk through this cap as far as the under side of the caliche, at which point the underlying earth is dug out in a circle for several feet. The chamber thus formed is charged with gunpowder (manufactured in the district), which on being fired disengages and throws up to the surface the subterranean caliche. This is then picked out by hand and stacked up in heaps at some convenient point, whence it is conveyed in carts, capable of holding about a couple of tons, to the "officina," or manufactory. Considerable skill is required in selecting the points where to begin mining operations, and it frequently occurs that large sums of money are paid for lands which on being worked proved to be worthless, either on account of the scarcity of the caliche, its bad quality, or its great depth beneath the surface.

At the manufactory the caliche is broken up, either by hand labour or by steam crushers, into cubes capable of passing through a 1½ inch ring.

In the old method of extracting the nitrate from the caliche, the broken caliche was shovelled into the boiling-pan, which was placed over a fire. After from six to eight hours' boiling in a liquid composed of fresh water and the liquid remainder of a former boil—called *aqua vieja*, or "old water"—the nitrate of the caliche was dissolved and formed part of the solution, which by means of a ladle was transferred to a pan, where it deposited its nitrate. In this process the caliche was boiled at a low temperature, and the salt was supposed to remain in the refuse. But great waste attends the operation of dissolving at a low temperature, which cannot well be avoided by using the direct fire employed at the *paradas*, and it is estimated that in some cases some 30 per cent. of nitrate was thrown away with the refuse, or, as it is called, *ripia*. The water was lifted up from wells in buckets attached to ropes working round a drum, which is placed on a vertical shaft and made to revolve by a mule drawing round its circumference, and thus no steam power was employed in this process. But the increasing demand for nitrate caused the introduction of improved plant for its elaboration, and all the important manufactories are worked by steam-power.

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* Abstract of paper in the *Journal of the Society of Arts*; Sept. 10, 1875.

The improved form of *cachucha*, or boiling-tank, is either opened or closed, and the heating agency is steam, introduced at the bottom of the tank by means of a steam-coil. The coil is usually placed beneath a perforated false bottom, thereby allowing the heated vapour to circulate through the caliche lying immediately above. Sometimes an additional coil is run directly through the caliche.

Great diversity of opinion exists among saltpetre manufacturers upon the most economical form of cachucha. Some advocate the closed cachucha, which in every respect may be compared to a steam chest, because they maintain that, the steam being enclosed, there is no waste of heat, and consequently an economy is effected in coal. Their opponents assert that the steam in the cachucha condenses, and thereby weakens the solution, and that it prevents a most important operation—the stirring up of the matter during the boiling. On the other hand, the open cachucha allows the steam which has passed through the caliche, and done its duty, to escape into the air, and enables the attendants, during the entire boiling, to constantly turn over the caliche, thereby enabling the heat to penetrate into every crevice of the mass. The result is to extract more nitrate from the caliche, and less is thrown away in the "ripia"; hence, by this latter system, an economy is effected in caliche which more than balances the extra consumption of fuel.

In the closed cachucha the caliche is first placed in boxes made of perforated iron plating, which are mounted on wheels, and are pushed along a tramway into the cachucha. To overcome the difficulty of stirring up the mass, boxes have been made of a circular shape, and capable of revolving on their standards when locked to an axle, worked by a wheel on the outside. This plan, however, proved a failure, on account of the accumulation of insoluble matter at the bottom of the cachucha, which completely wedged in the boxes, and the attempt to give the latter a rotary motion could only have been done at the risk of breaking the couplings and damaging the boxes themselves. This plan might be carried out by making the plant stronger, and by allowing adequate space for the insoluble matter which escapes from the boxes; but then that would be objectionable, on account of the large steam space it would afford in the cachucha, and the consequent impoverishment of the solution through the condensation of the steam.

There are other forms, known as egg-shaped cachuchas, owing to their similarity in form to an egg placed on its smaller end. These offer great facilities in the operation of charging and discharging the material. The caliche is conducted over a road to their upper part, and shot down. After being boiled, the solution is tapped, and the refuse allowed to fall into trucks placed beneath, which convey it to the spoil bank. The chief disadvantage of these cachuchas consists in the necessity of having at command considerable height for the approach-road, and consequently they are chiefly used at those places where an adjoining hill affords that height, the manufactory being built at its base. Where no hill is available, the trucks may be raised on an inclined plane.

Chemists interested in the trade have of late been engaged in searching for a method of extracting iodine from caliche, but as the operation is known but to a few, and is kept a secret, the author does not touch further upon this subject.

The labour required for the different operations attendant on the production of nitrate is chiefly supplied by Bolivians. Great numbers of these people annually cross the Cordilleras, taking with them their wives and children, and offer themselves for hire at the saltpetre establishments. They earn from one to two dollars per day, and perform their work well, and they are much esteemed by the manufacturer for their docile disposition and readiness to obey orders. Their migratory habits never allow them to remain long in one locality; they remain perhaps six or twelve months, then leave in a tribe, to go to some adjacent establishment. Chinese coolies are employed at some places, but their feeble strength, and lack of *physique*, render them incapable of performing the hard work of mining, and the rough duties attendant upon this manufacture.

Mechanics, bricklayers, carpenters, and skilled artisans of any description command high wages in this district; and the manufacturers can well afford to pay them highly, as they calculate upon at least 50 per cent. of the wages returning to their pockets, by the sale of provisions and commodities of every description, of which they are the sole purveyors (the truck system).

Below is a copy of the balance-sheet of the working of an officina, which may be taken to show a fair average of the profits made in prosperous times by careful management:—

Disbursements.

	Soles.
Elaboration	7680
Coal, 2300 quintals, at 1·5 soles	3450
Mules	800
Provisions	3000
House and office	1200
Repairs and loss	600
Gross profit	3670
	20,400

Entries.

	Soles.
Sale of 14,000 quintals of nitrate, at 1·10 soles per quintal	15,400
Item provisions	5000
	20,400

In this case the nitrate was delivered at the manufactory, from whence it had to be conveyed to the port by the purchaser, either by rail or by mules.

The cost of conveyance by mule service is fixed according to the distance of the manufactory from the port. Thus from La Noria to Iquique the price is from 5 to 6 reals (Peruvian), and from other officinas half the distance from the port the price is only half that amount. A good mule will carry three quintals, the usual load is two down to the port, and one-and-a-half up, loaded with coal or provisions. Frequently the mules have to perform the journey there and back, some 28 miles each way, without touching water, owing to the total absence of that element in its natural state. For the use of the inhabitants sea water is condensed, but when the machines fail, and there is a scarcity, the price is too high to give drink to the mules; two cents per gallon is the price paid at Iquique for condensed water, and sometimes as much as four is paid.

The construction of the Iquique and La Noria Railway did much to take the transport away from the mules, but it did not entirely succeed in doing so, owing to its inability to convey the enormous quantity of saltpetre daily brought down. The line starts in a northerly direction from the port, making towards the coast-cliffs, which it reaches at a distance of three miles, and at an elevation of some 300 feet. From that point it reverses its direction to the north, and creeps up the hill side on an incline of three per cent. until it attains the summit of the coast-cliffs at the station called Molle, which is situated at an elevation of 1630 feet above the sea, and at a distance of ten miles from Iquique. From thence it follows a generally direct course on to La Noria, winding itself round the hill sides in curves of from 300 to 500 feet radius, sometimes raising itself high above the surrounding country where the latter dips and assumes the shape of a bowl, over the extreme edge of which the railway must necessarily pass, and at other times penetrating through deep cuttings of irregular porphyritic rocks, clearly indicating the volcanic agency that must have occurred to have caused their displacement, until it reaches the district known as La Noria. Throughout, the railway is of the 4 8½ gauge. Where there were cuttings near, their *débris* supplied the fillings, and at other places trenches were dug at each side of the line. The chief want experienced was soft earth or sand to pack in the permanent way with, which was very scarce, owing to the hard nature of the surface of the ground.

For working the first section, to Molle, the water is obtained from sea-water cleansed at Iquique, and for working the remainder of the line it is brought from a well in the interior in tanks to Molle, at an enormous cost. Until a proposed scheme for obtaining water from the interior, to be conveyed to the railway stations at Iquique through piping, is carried out, the railway company must continue to work under great disadvantages.

An unsuccessful endeavour was made by a company to convey the nitrate in a liquid state through iron piping. The caliche was dissolved in vertical pans by passing cold water through it, resembling the process of filtration. The solution drawn from the bottom of the pan was pumped up to high ground (for the mines lay in a hollow), whence it ran down by gravitation through piping to the works at the port. At the latter place the solution was boiled in large circular pans, heated by a fire placed so as to spread over the entire bottom of the pan. But a thick cake of nitrate and salt collected at the bottom of the boilers, which were in consequence burnt, and rendered useless.

(*To be continued.*)

INFLUENCE OF COMPRESSED AIR ON FERMENTATION.*

BY M. BERT.

The author has investigated the effects of compressed air upon fermentation and has come to the conclusion that putrefaction and the oxidation which accompanies it is retarded or arrested in proportion to the atmospheric pressure to which the substance is subjected. In support of this proposition, he cites the following experiments :—

A piece of muscle (95 grams) was submitted, from the 29th of July to the 3rd of August, to a tension of oxygen corresponding to twenty-three atmospheres of air. At the end of that time it had no odour, and had only consumed 380 cubic centimetres of oxygen. A similar piece suspended at the top of a bell glass full of air, at the normal pressure, gave off a tainted odour and had consumed all the oxygen in the glass, equal to 1,185 cubic centimetres. By increasing the pressure the oxidation was stopped completely. The meat so submitted to compressed air preserved its appearance, firmness, and histological structure. Only the cut edge became of an amber yellow colour. It was possible to eat cutlets of mutton that had been thus preserved during a month.

M. Bert concludes from these facts that oxygen, under a sufficient tension, kills the vibrios capable of engendering putrefaction, without causing the meat to lose its putrescibility.

The alteration of eggs, urine, milk, wine, wet bread, strawberries, cherries, etc., is arrested by compressed air, these substances remaining perfectly sound. Meat and eggs acquire a clearly acid reaction which appears to be due to lactic acid.

Saliva, pancreatic sugar, vegetable diastase, pepsin, myrosin, emulsin, and the inversive ferment of beer yeast, continue to act during compression, and after removal from compressed air retain all their power. Indeed, if the vessels containing them be then closed they will remain without alteration during an unlimited time. The compressed air appears to kill the moulds and thus to protect the soluble ferment.

TO MAKE GOLD AND SILVER INKS.*

BY C. H. VIEDT.

Good bright gold, silver, and bronze inks are seldom met in the market; they are almost always of a dull colour, do not flow easily from the pen, and the writing remains sticky. Hence architects and artists mostly prefer to use shell gold and shell silver (*Muschel-silber*), instead of the corresponding ink. The latter, however, is so much easier and safer to use, that I will describe its preparation.

For gold ink it is best to employ genuine gold leaf, but owing to the expense this is seldom used; sometimes mosaic gold (sulphide of tin) or iodide of lead is employed, but almost always Dutch leaf.

Owing to the relatively low price of silver, genuine silver foil is used for silver ink; false silver foil is seldom used, and is not so good. For other metallic inks, commercial bronze powders are employed. The genuine and false foils are also sold in a finely pulverized state; they are made from the waste of the goldbeaters, by rubbing it, in metallic sieves, to an impalpable powder.

In consequence of the beating between goldbeaters' skin, it has particles of grease and other impurities attached to it, which must be removed before it can be used for ink. For this purpose the whole sheets, or the commercial bronze powder, are triturated with a little honey to a thin magma on a glass or porphyry plate with a pestle, as carefully as possible, as the beauty of the ink depends essentially on this. The finely rubbed paste is rinsed into a thin glass beaker, boiled for a long time with water containing a little alkali, frequently stirred, decanted, well washed with hot water, and dried at a gentle heat. By boiling this powder with water containing sulphuric, nitric, or hydrochloric acid, different shades can be imparted to it.

Next, a solution of 1 part of white gum arabic in 4 parts of distilled water is mixed with 1 part of potash water glass, and triturated with the requisite quantity of purified metallic powder. Gold ink will bear more liquid than silver ink, since gold covers much better; on rough paper more metal is necessary than on sized paper; on light paper more than on dark, to make the colour of the ink appear equally intense.

In general, 1 part of foil is enough for 3 or 4 parts of the above liquid. In preparing large quantities of ink, a low porcelain measure is used for transferring it to the small glass vessels where it is to be kept, and it must be continually and thoroughly stirred, so that it will always keep well mixed. It requires frequent stirring also when in use. It is best to mix the dry powder with the liquid immediately before using. The ink can be used with a common steel pen, and flows very well when writing slowly, but it is better to use a pencil.

I consider the use of potash water glass of great importance. It greatly increases the metallic lustre on paper, prevents its looking dead, protects the writing from being discoloured by the action of the atmosphere, and also prevents its penetrating too far into the pores of the paper, without rendering it very viscid. Although the writing of itself possesses a high metallic lustre, it may be increased by gently polishing with a polishing steel. Inks made with mosaic gold, mosaic silver, iodide of lead, etc., are not nearly so beautiful.

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* *Journal de Pharmacie et de Chimie*, for September.

* From the *American Chemist*.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 2, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

POISONING BY A SOOTHING SYRUP.

OUR present issue is unusually replete with reports of cases in which poisoning has resulted from mistake or misuse of powerful drugs. The Wrexham case is most characteristic, and, although we cannot dissent from the opinion expressed by the jury in their verdict that the liniment was given purely in mistake, and that no blame attached to any one, we cannot but suggest that the practice of placing such poisonous preparations as aconite or belladonna liniments together with bottles of medicine for internal administration is, to say the least of it, extremely hazardous. The possibility of one bottle being taken for the other by a nurse roused suddenly from sleep, as in the case now referred to, and the improbability that under such circumstances a "Poison" label would be read even if one were upon the bottle, are each sufficient to indicate the necessity of keeping such preparations carefully apart from other medicines, and of adopting means to guard against their being too easy of access.

The inquiry into the Barnsley case, some details of which we placed before our readers last week, was resumed last Tuesday, and again adjourned in order to have an analysis made of the soothing syrup. On this occasion Mr. HARROP was present with his solicitor, but his evidence did not amount to more than the declaration that the syrup did not contain paregoric, and as Dr. MORRIS contended that it contained a narcotic the Coroner ordered that it should be analysed.

A fact of some importance was elicited as to the dose of syrup that was administered. The mother of the children stated that she tore off the wrapper of the bottle, and without shaking the contents or reading the directions on the label, she gave the children a large sized tea-spoonful. On measuring the quantity contained in the tea-spoon used, it was found to be ninety-three drops, or, as Mr. HARROP stated, four times the dose directed to be given. This fact, however, demonstrates the necessity of taking every means to impress upon people that caution must be exercised in administering medicine, and to warn them of the potency of preparations containing narcotics, as well as of the danger of disregarding directions given for their use. Even legitimate recommendations of the virtues of a preparation should be limited by the regard to this essential consideration, in order that no ground may be afforded for the suspicion that people's confidence in the harmlessness of a preparation is improperly obtained. In regard to medicine generally the character of harmlessness must be considered as belonging to it only when properly administered, and in many instances where the potency of a remedy is its chief virtue, what is beneficial within certain limits, is dangerously pernicious when those limits are exceeded by negligenc or by accident.

We have had to report more than one case in which the misuse of a preparation sold under a fanciful name has been attended with fatal results, and this week we have again to report another case in which death has been caused by a preparation called "neuraline," and said to contain aconite which was taken no doubt with a knowledge of its properties and with suicidal intent.

In reference to this case, a medical contemporary pertinently asks what use it is to pass a very stringent Act for regulating the sale of poisons as such, when any one can obtain possession of the most powerful poisons without difficulty in the form of patent or homœopathic medicines, and it urges that the sale of such medicines should not be permitted unless their composition be stated on the bottle or package; the public would then have the means of knowing what they were dealing with, and there would be less opportunity in cases of accident for blaming the retail vendors of these preparations.

Under existing conditions, it is no part of the retail dealers' business to be cognizant of the composition of patent medicines. They merely sell packets that are protected from examination by a government stamp fastening the wrapper, and if this stamp is broken the value of that packet is destroyed. The large sale of such preparations may fairly be regarded as indicating appreciation on the part of the public and the existence of a demand which can be legitimately satisfied only under the conditions we have specified. Whatever need there may be for exercising control over the sale of such preparations containing powerful drugs, there is no ground for complaining of the chemist and druggist for selling these articles in the same way as any other trader may do.

At the late meeting of the American Pharmaceutical Association, Professor MAISCH spoke on the trade in patent medicines, and in reference to the question how the public should be warned of the dangerous nature of many patent medicines he expressed the opinion that the efforts of pharmacists in opposing their sale would amount to nothing so long as they were called for by the public. It appears, however, that the Association is about to take some steps in reference to this subject, and, perhaps, to publish analyses.

The whole subject of the sale of proprietary preparations has lately been much discussed in America as a point of pharmaceutical ethics, and we purpose shortly giving our readers a *résumé* of what has been said about it by our American cousins.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Scarcely have we finished chronicling the proceedings at the recent meeting of the British Pharmaceutical Conference, ere the papers reach us containing reports of the meeting of the American sister Association at Boston. From these papers we have been able to glean an account sufficient to show the character of the meeting, and this is printed in another part of this Journal.

Although America is asserted to be the land of big things, it seems rather ambitious to devote the larger part of four days annually to the discussion of purely technical pharmaceutical subjects, and to expect to obtain a sufficiency of good materials for the discussion, or to retain a good audience to listen to it. And yet, *finis coronat opus.* The Boston meeting appears to have been an important and successful one. The audience is stated at one time to have exceeded four hundred; the papers were sufficiently numerous to necessitate the reading of some of them by title only; whilst so far as can be gathered from the brief abstracts given, the subjects presented interest and variety. Nor is it without interest to note a prolific source of this almost *embarras des richesses.* It will be remembered that the President of the Chemical Section of the British Association at Bristol spoke in terms of warm commendation and regretful envy of the list of subjects issued by the British Pharmaceutical Conference, and advocated that such a list should be drawn up for chemical workers generally. If any further testimony were required as to the value of such a plan it might be found in the number of papers supplied to the Boston meeting in response to the American Association's list of queries.

There is one point that will strike the English reader in the account of the Boston meeting, namely, that the American Pharmaceutical Association assumes a much more decided position in the regulation of pharmaceutical politics than the British Pharmaceutical Conference does. This may be due to the fact that in the United States there is no body answering exactly to the Pharmaceutical Society of Great Britain. Indeed, the preciseness which raised an objection to the election of a Professor of Chemistry to membership because he was not actually a pharmacist is more suggestive of the qualifications required for admission to the latter body than of the widely inclusive portals of the British Pharmaceutical Conference. The inquiry into the practice of granting degrees by a pharmaceutical college, and the sanctioning of unofficial formulæ, illustrate this pseudo-political position, as also does the discussion of nearly the only question of this kind that has yet come before the Conference, namely, the necessity for the adoption of a sign for indicating cognizance of unusual doses.

Amongst the numerous reports of committees that are characteristic of the meeting of this Association was one as to the constitutionality of the pharmacy laws that have now been enacted in various States. It would appear to be the opinion of the Committee that the freedom granted to each citizen of the United States by the Constitution does not extend to allowing him to deal in poisons and drugs of the properties of which he knows nothing. But to judge from another report his freedom in the practice of adulteration is pretty extensive.

REPORTED DISCOVERY OF A NEW ELEMENT.

In the sitting of the French Academy of Sciences, on the 20th September, a communication from M. Lecocq de Boisbaudran was read, announcing the discovery of a new element, during the examination of a specimen of blende from the Pierrefitte mine, Argelès Valley, in the Pyrenees. The extremely small quantity of this substance at M. Boisbaudran's disposal has not permitted him to isolate it from the excess of zinc accompanying it; but he states that some drops of chloride of zinc in which he had concentrated the new substance gave with the electric spark a spectrum composed principally of a rather brilliant narrow violet ray, situated near where the wave length is 417, and another very feeble ray about 404. The discoverer proposes to name this new substance "Gallium."

RETENTION OF COPPER IN THE SYSTEM.

An epileptic female who had been unsuccessfully treated with ammoniacal sulphate of copper having died three months after the cessation of the treatment, it was thought desirable to ascertain what proportion of the metal, if any, was retained in the system after that lapse of time. M. Yvon was entrusted with the investigation, and reports that he found 295 milligrams in the liver of the deceased, a quantity much beyond that reported in some criminal prosecutions.

The *Madras Mail* reports an extraordinary increase this year in the export of ground nuts (*Arachis hypogœa*) from Pondicherry as compared with previous years. In 1874 the total quantity amounted only to 30,000 bags of 100 lbs., but during the first seven months of the present year it reached 180,000 bags. About two-thirds of this quantity went to France, and the remainder came to this country.

The writer of a paper recently published in the *Revista Balear*, which gives much interesting information respecting olive cultivation in the Spanish Peninsula and the Balearic Islands, quotes official statistics to prove that one-thirtieth part of the whole of the cultivated land of Spain is employed in the growth of olives.

Provincial Transactions.

PHARMACEUTICAL SOCIETY OF IRELAND.

The Pharmaceutical Society of Ireland held its second meeting on Wednesday the 22nd, and adjourned from day to day during Thursday and Friday, for the consideration of the bye-laws. Sir Dominic Corrigan, Bart., presided.

On the motion of Mr. Tichborne, and seconded by Dr. Frazer, it was decided that four examiners should be appointed at once in the following subjects :—

One Examiner in Latin, English and Arithmetic.
,, ,, ,, Materia Medica and Botany.
,, ,, ,, Pharmaceutical and General Chemistry.
,, ,, ,, Practical Pharmacy.

The election to take place on the 6th October, and the Examiners to be appointed for one year. No member of the Council to be eligible.

The remainder of the business consisted in passing bye-laws, chiefly confirmatory of the clauses of the Pharmacy Act, Ireland.

Proceedings of Scientific Societies.

PARIS SOCIÉTÉ DE PHARMACIE.

A meeting of this Society was held on Wednesday, August 4, under the presidency of M. Planchon. A note by M. Pichon on the oxidation of sulphur was read, in which he claimed priority in the explanation respecting the presence of sulphuric acid in the waters of Aix-en-Savoie recently put forth by Professor Polacci. M. Pichon quoted from a catalogue of the Exposition in Turin in 1868 a paragraph in which he stated that the sulphur of those waters was always impregnated with acid vapours, and possessed the property of acidifying in contact with air, etc., and that a bottleful of dilute sulphuric acid exhibited was obtained by washing the acid sublimed sulphur.

M. Poggiale presented a note from Professor Polacci, upon the action of sulphur upon the vine oidium. The author had found by experiments that when vines are treated with sulphur, sulphydric acid is promptly produced in considerable quantity and that this acid has the property of killing the oidium.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The twenty-third annual meeting of the American Pharmaceutical Association, commenced in the afternoon of Tuesday, September 7, in Covenant Hall, Odd Fellows Buildings, Boston. The President, Mr. Lewis Diehl, of Louisville, Ky., took the chair at three o'clock. The hall was crowded, more than four hundred members being in attendance. The first business transacted was the appointment of a committee on credentials; each local pharmaceutical organization being entitled to five delegates. While this committee was examining the credentials, the president read the annual address.

The President's Address.

After expressing a hope that the present meeting of the Association would be one of the most fruitful yet held by the Association, he remarked that the deliberations and discussions might not at the time strike the listener very forcibly, but when what is said and done appeared finally in print, it was apparent that the little collected now and then, when united, formed a harmonious whole. Among scientific experimentalists, the speaker continued, the past has shown none that have contributed more to science than have the pharmacists. It has been alleged that pharmacy is no longer a contributor to science to its former extent and that its claims to professional rank are lessening rather than increasing. That a change has taken place in the relation of pharmacy to general science is undeniable. But a comparatively short time ago the pharmacist was dependent upon his own resources for his chemicals. The rapid strides of chemistry, however, have developed methods for their preparation which make their production on a large scale remunerative and enable the manufacturer to furnish them in a purer condition and at a less cost than they can be produced in the pharmaceutic laboratory. Hence the pharmacist depends upon commerce for many of the products that were formerly prepared by him, and as a consequence confines his attention mainly to the determination of the purity of his purchases and to the production of galenicals. The duties involved in connection with these various operations necessitate a very thorough comprehension of the science of chemistry, and it is in their execution that the pharmacist discovers new and interesting veins of information. No better refutation of the charge of retrogression in pharmacy need be adduced than the annually increasing activity among pharmaceutical writers, whose writings, while they often do not possess high scientific value, nevertheless give abundant evidence of improvement in the standard of the profession.

It is customary in the annual address to call the attention of the Association to the most important events that have transpired during the year, relating to the pharmaceutical profession. Following this practice, President Diehl read lengthy notes in relation to three articles which have recently attracted much attention, namely, jaborandi, digitalin, and salicylic acid.

The address closed by recommending certain alterations in the constitution defining the duties of the president; that a committee be formed to whom the question of publishing papers should be referred, such committee to have power to refer an objectionable article back to the author with suggestions for its modification; and that the committees on adulterations and sophistications and on the drug market be united.

At the conclusion of President Diehl's address, which was listened to with close attention and greeted with loud applause, the committee on credentials presented their report, showing that delegations were present from twenty-four associations.

Election of Members.—The executive committee reported the names of one hundred and three persons who, having complied with the requirements of the constitution, were recommended for membership.

Question of Eligibility.—Among the candidates for membership was Professor Stephen P. Sharples, consulting chemist and State assayer, Boston, and a question being raised as to his eligibility, considerable discussion ensued. The constitution prescribes that "every pharmacist and druggist of good moral and professional standing, whether in business on his own account, retired from business, or employed by another, and those teachers of pharmacy, chemistry, and botany who may be specially interested in pharmacy and materia medica, who, after duly considering the objects of the association and the obligations of its constitution and bye-laws, are willing to subscribe to them, are eligible to membership." The question under discussion was whether Professor Sharples came within the definition of a teacher of chemistry specially interested in pharmacy.

Mr. P. W. Bedford, of New York, while disclaiming any personal objection to Professor Sharples, insisted that the article quoted above referred only to professors of pharmacy, chemistry and botany in colleges of pharmacy, and not to such persons generally. Such was the understanding of the association, when the article was adopted in New York, in 1867. Its object was to permit teachers in colleges of pharmacy who were not pharmacists, but were necessarily interested in pharmacy from their connection with such colleges, to join the association, but not to open the doors to other persons not pharmacists

He hoped the name of Professor Sharples would be withdrawn, and a ballot would be taken upon the admission of the other candidates.

This course, after discussion, was adopted. The ballot having been taken and the candidates elected—

Mr. Doliber, of Boston, claimed that the question of the election of members was still before the meeting, and that no business was in order until the name of Professor Sharples was acted upon.

Mr. Babcock, of Boston, urged that a vote be taken upon the question upon its merits. He was well acquainted with the candidate and believed him to be eligible to membership under the constitution. He was professor of chemistry in the Boston Dental College, and had been assistant professor in the Lawrence Scientific School, and had held positions as teacher of chemistry in various other universities. In his practice as professor of analytical chemistry he was called upon to examine and report upon pharmaceutical articles, and there was no good ground upon which it could be claimed that he was ineligible.

Mr. Kennedy read the certificate accompanying the application of Professor Sharples, testifying to his fitness for membership, and after further discussion the president decided him to be eligible to membership under the constitution. A ballot was taken, resulting in 74 affirmative and 26 negative votes, and Professor Sharples was declared elected.

A committee to nominate officers for the ensuing year was then appointed, consisting of one representative from each delegation accredited to the meeting and five members at large.

After some other business, the Association adjourned to nine o'clock, Wednesday.

Entertainment to Visitors.—The members of the Association residing in Boston and vicinity, with invited guests, met at the St. James Hotel at eight o'clock to welcome the visiting members. Including those from abroad several hundred ladies and gentlemen were present, and the evening was pleasantly spent in promenading and social intercourse.

The second session of the American Pharmaceutical Association began at ten o'clock on Wednesday morning. There was a large attendance of members.

Election of Officers.—The committee on nominations, reported the following names for officers for the ensuing year:—

President—Professor George F. H. Markoe of Boston.

Vice-presidents—Fred. Hoffman of New York, T. Roberts Baker of Richmond, C. F. G. Meyer of St. Louis.

Treasurer—Charles A. Tufts of Dover, N.H.

Permanent Secretary—Professor John M. Maisch of Philadelphia.

Reporter on Progress of Pharmacy—C. Lewis Diehl of Louisville, Ky.

Executive Committee—George W. Kennedy, Pottsville, Pa.; Joseph L. Lemberger, Lebanon, Pa.; William M. McIntyre, Philadelphia; Charles A. Heinitsh, Lancaster, Pa.; John M. Maisch, permanent secretary, *ex-officio*.

Committee on papers and queries—William Saunders, Ontario, Can.; Emil Schaffer, Louisville, Ky.; James H. Taylor, New York.

Business Committee—Jacob D. Wells, Cincinnati; Paul Balluff, New York city; William C. Baker, Philadelphia.

A ballot having been ordered for president, the result was as follows:—

Whole number of ballots	91
Necessary to a choice	46
Professor George F. H. Mackoe had . . .	86

And was elected.

The president was directed to deposit an affirmative ballot for the remaining nominees, and those gentlemen were declared duly elected.

In the absence of Mr. Markoe, the chair was assumed by the first vice-president, Dr. F. Hoffman of New York.

The Report of the Executive Committee was read, and stated that the twenty-second volume of the annual proceedings was issued in January, 1875. The committee having been instructed to publish a portrait of one of the distinguished deceased members in each volume, had procured an engraving of the late Professor William Procter, jun., of Philadelphia, which was to be found in the proceedings of 1874, and steps had been taken to embellish the next volume with a portrait of the late Professor E. W. Parrish. Since the organization of the society there had been a total membership of 1697; lost by death, 136; dropped for various causes, 477; resigned, 101; leaving a balance of 983. The total number of honorary members was thirty, of whom ten had died. The report closed with brief obituary notices of members who had deceased during the year.

The committee appointed to conduct the president-elect to the chair then appeared with Mr. Markoe, and formally presented him to the Association. On assuming the chair Mr. Markoe was greeted with prolonged applause, and returned his thanks for the honour conferred upon him.

The report of the permanent secretary was then read by that officer, Professor John M. Maisch of Philadelphia.

Report of the Committee on Unofficinal Formulas.—The report of the committee on unofficinal formulas was next read by the chairman, R. V. Mattison, of Philadelphia. The duty of this committee is to collect such formulas as are found to be in use in different parts of the country in the preparation of extracts, elixirs, etc., which have not become officinal by being admitted to the United States' Pharmacopœia. The report included twenty-two such formulas. Some discussion ensued as to whether the acceptance of the report adopted the formulas and gave them the sanction of the Association. No vote was taken upon the subject, it being generally understood that they were gathered and printed for convenience of reference only, and that the Association does not in any way indorse or recommend them.

The report of the treasurer was then read, showing receipts, 5389 dols. 24 cents.; disbursements, 4516 dols. 08 cents.; balance on hand, 873 dols. 16 cents.

Report of the Committee on Adulterations.—The report of the Committee on Adulterations and Sophistications was read by the chairman, A. W. Miller, of Philadelphia. To give the subject of the report the widest publicity, advertisements were inserted in the pharmaceutical journals requesting information of adulterations and sophistications of drugs, chemicals, and kindred articles, and a large number of communications had been received from various sources. Some of the important adulterations had been brought to the notice of the pharmaceutical meetings of the Philadelphia College of Pharmacy, and in several instances their fraudulent character exposed and their further sale materially affected. The report called special attention to the frauds constantly practised in the sale of essential oils. These oils were frequently largely and clumsily adulterated, although it was not always possible to prove the admixture by positive chemical tests. A New Jersey distiller had frankly admitted to Mr. Miller that all the commercial oils of cedar, hemlock, and spruce made by him and his acquaintances were prepared by putting the branches of the respective trees into the still, with an amount of turpentine proportioned to the price they expected to realize; and he prided himself not a little on the superiority of these *distilled* oils over those made by mere admixture with turpentine. When it was considered that the major portion of the more expensive oils are consumed by bakers, confectioners, soap-makers, and bottlers of mineral or soda water, who have no means for testing them, and thus become easy victims to such swindles, the necessity of some better means for the protection of honest merchants and the punishment of the guilty was apparent. The writer had on two occasions purchased four cans of oil of lemon, one of which contained but 75 per cent. of oil, and the others scarcely 33 per cent. These adulterations were becoming common in Europe as well as in the United States. A gentleman, who claimed to have formerly held responsible positions in two of the largest German houses, had shown to Mr. Miller a full line of receipts for mixing and cheapening all the more prominent oils, which he was anxious to compound in that country. Mr. Miller had also been informed by the official representative of an extensive French firm in Grasse that all the cheap grades of lavender, rosemary, and red thyme, sent to this country by his firm and other manufacturers, contained at least 75 per cent. of turpentine. Leaving this general subject, the report proceeded at great length to a *seriatim* description of the adulterations and sophistications which had been brought to the notice of the committee, both by direct communication and through the American and foreign scientific journals. Some of the adulterations which are of public interest were musk, a caddy of which, weighing 19½ ounces, was proved in an English court to contain only 6½ ounces; French oil of almond, stated on undoubted authority to be obtained exclusively from peach kernels; honey, made by melting cane or other sugar in a decoction of slippery elm bark or a solution of gum and starch; linseed oil, adulterated with hemp, fish, rosin, and mineral oils; beeswax, consisting almost entirely of black earthy matter neatly coated with handsome yellow wax by repeatedly dipping it into the melted wax, and also adulterated with paraffin; castor oil, composed of lard and croton oils, etc.

After the reception of this report, the Association adjourned to the dinner, which was served in the banqueting hall. Seats were provided for three hundred persons, and were all occupied.

The Exhibition.—The Association then proceeded to to the exhibition room to examine the specimens officially. The amount and value of the goods exhibited largely exceeded that of any previous meeting, and is considered to have been without question the finest display of pharmaceutical and allied products ever brought together in the country.

Constitutionality of the Pharmacy Laws.—Professor John M. Maisch presented the report of the Committee on Legislation. There had been a question raised whether the Supreme Court of the United States would sustain the pharmacy laws passed by the several States, or declare them unconstitutional. There was no way to obtain the decision of the Supreme Court but by making up a test case for that purpose, but the committee had taken legal advice, which was in favour of the constitutionality of the laws. Beyond this, the question of the unconstitutionality had not been raised before the legislative Committees, although other objections were made to their passage. The laws had been sustained in the lower courts, and in the opinion of the Committee there was no reason to question their constitutionality. The pharmacy laws of the several States were generally carried out in a proper spirit, that being shown by the number of rejections, which frequently were more than 25 per cent. of the number examined. A pharmacy law had been passed in New Hampshire and in the province of Quebec. In the Province of Ontario a bill had been presented to the legislature but withdrawn on account of the opposition of the medical profession. The matter of the stamp tax under the internal revenue laws of the United States, which had given much trouble to the pharmacists and druggists, had been satisfactorily settled by section 22 of the so-called "little tariff bill," providing that nothing contained in the internal revenue laws should be so construed as to authorize the imposition of any stamp tax upon any medicinal articles prepared by any manufacturing chemist, pharmacist or druggist, in accordance with a formula published in any standard dispensatory or pharmacopœia in common use by physicians and apothecaries, or in any pharmaceutical journal issued by any incorporated college of pharmacy; when such formula and where found shall be distinctly referred to on the printed label attached to such article, and no proprietary interest is claimed therein; and that no stamp should be required when the formula of any medicinal preparation was printed on the label attached to such article and no proprietorship was claimed.

These requirements, although a departure from the custom hitherto followed, the Committee thought would entail no hardship upon the pharmacist and druggist, and would enable him to keep on hand ready for delivery any legitimate medicine, without being ranked with the manufacturer of patent medicines.

The Ebert Prize.—The report of the Committee on the Ebert prize was then read, recommending that the prize for 1874 be awarded to Charles L. Mitchell, of Philadelphia, for an essay "On the Active Principles of the Officinal Veratrums."

Elixirs.—The report of the Committee on Elixirs was read. The Committee was of the opinion that there was but little necessity for any alteration of the formulas adopted at the last meeting; that such a nomenclature should be adhered to as would express the remedial composition of the preparation, and thus make available such as possessed therapeutic merit. A uniform simple elixir that would answer general purposes would meet all ordinary requirements, and serve as a guide by which the physician might determine what suited the taste of his patient. The tendency of the pharmacopœia was to present simple preparations more thoroughly representing the drugs from which they were prepared. More attention was demanded, therefore, in the construction of extemporaneous formulas, and a thorough knowledge of the various spirits, syrups, and aromatic waters would give a wide field for the choice of auxiliaries, correctives and vehicles. This information acquired, the preparation of mixtures which would conform to the standard alcoholic strength of elixirs and yet be possessed of medical virtue from chemicals and galenical preparations would become an easy task. The report then presented a revised list of formulas containing such alterations of those in use as a more extended experience had suggested.

After considerable discussion, in which it was asked how far the formulas were to be endorsed by the Association, and an opinion was expressed that the general sense of the Association was against elixirs, it was voted to adopt the formulas.

The Publication of Papers.—The report of the Committee on Publication of Papers in advance of the proceedings was presented. There had been a division of opinion in the Association as to the propriety of permitting authors of papers read at the meetings to publish them in the pharmaceutical journals previous to their publication in the Association volume. The Committee recommended the following resolutions, which, after discussion, were adopted:—

> "That the various pharmaceutical and medical journals are cordially invited to publish whatever notes they may desire to make of our proceedings and of the scientific papers which are read before our meetings."
>
> "That when authors of scientific papers have prepared copies or abstracts of their essays previous to the meeting of the Association, they shall be at liberty to distribute such copies or abstracts at any time subsequent to the official reading of their respective papers, provided that the paper is always headed in publication by the statement that it has been read at our meeting."

Reading of Papers.—The following papers were then read:—

A paper on "The Ready-made Pills of Our Day," by Joseph K. Remington, of Philadelphia. Throwing aside the question of the material of the pill, the writer addressed himself to the query, Can the form of the pill, the character of the coating, or injury during the coating by heating, interfere with their solubility? Experiments were made with fair samples of the best pills that the market offered, showing as a result that a plain, uncoated pill was to be preferred in point of solubility; next in order came the sugar-coated pill, then the compressed, and lastly the gelatine coated.

An essay on paraffin was read by Mr. B. F. Staccy of Charlestown, Mass., giving its history, its method of manufacture, its employment in pharmacy and in the useful arts, its importance as an article of commerce, and its peculiar properties.

Professor Babcock spoke in regard to the use of paraffin as a substitute for wax in ointments. This substance had been too much neglected. A mixture of three parts of paraffin and one of wax was a good substitute for wax and spermaceti. The wax prevented the crystallization of the paraffin. Professor Babcock also described a substitute for lard, called oleo-paraffin, composed of lard oil and the wax substitute described above. The remarks of Professor Babcock were well received, and were listened to with much attention.

An essay on the preparation of paraffin oil was read by Joseph Lemburger of Lebanon, Pa., relating mainly to its use for producing a permanent base for ointments. The writer found that an ointment could be made from that substance having very little odour, and that by making a cerate with pure beeswax the odour is entirely or very nearly masked.

Mr. T. P. Baker, chairman of the Richmond delegation, presented an extract from the minutes of the Richmond Pharmaceutical Association, November 20, 1874, embracing a series of resolutions to be presented to the Richmond Academy of Medicine, urging the importance of writing prescriptions in a legible hand, without erasures or interlineations; of using the technical language and abbreviations of the Pharmacopœia and the United States Dispensatory; of writing directions for use and dose as a guide to the dispenser in case of error in quantity of any active ingredient; also that when an unusual dose or quantity of an active and potent medicine is prescribed that the prescriber should affix a caution mark or sign to inform the dispenser that he is aware that the dose is unusual; also that the words "not renewable" should be written on prescriptions which they did not desire to be renewed; also the importance of using every possible means to stop the sale of opium, morphia and chloral, except upon competent medical authority. Mr. Baker requested, in behalf of his delegation, that these resolutions be referred a committee to consider and report upon during the present meeting. A communication upon similar subjects was also received from the delegation from the Philadelphia College of Pharmacy, and both papers were referred to a committee to be appointed by the chair.

The Association then adjourned to Thursday morning at 9 o'clock.

The fourth session of the twenty-third annual meeting of the American Pharmaceutical Association began on Thursday Morning at ten o'clock, the first vice-president, T. R. Baker, of Richmond, in the chair.

Mr. Miller presented a sample of ground rice used to adulterate granulated sugar. It was stated that 25 per cent. of this was added to sugar, which was sold to confectioners in the West, who were led to believe it was purer than ordinary powdered sugar.

An essay on the drug mills now furnished by the manufacturers, giving the practical advantages of the various kinds, and the result of experiments to prove their ability to produce powders fine enough for pharmaceutical purposes, written by Andrew Blair of Philadelphia, was read by the secretary, Professor Maisch. The writer alluded to the different mills used in the business, and stated that the principal points in selecting a mill were compactness, ability to produce fine powder with as little labour as possible, and in the shortest time, convenience and ease with which the mill can be cleaned, a receptacle for preventing dust, and lastly, simplicity and cheapness. After specifying the various points of the different mills and stating experiments with them, he said the most satisfactory for general uses of the apothecary was the Enterprise mill; where used for heavy work, the Hance mill was next in order; for small quantities, when fine grinding was desired, the Froemmer was next to the Enterprise. The old Swift mill also answered an admirable purpose.

An essay on mesquité gum and its uses in pharmacy was read by A. W. Miller of Philadelphia. He stated that this gum, as adhesive as gum arabic, made a mucilage as useful, but not as sightly. For forming emulsions it could be used in the same proportions as that of acacia. It was obtained from Texas and New Mexico, where it was very abundant and was collected in the latter part of the summer. It had been used largely in Philadelphia and Baltimore for confectionery, and found to be equally satisfactory. It was not, however, to be preferred, as the reasonable price of the lower grades of gum could successfully compete with mezquité gum, owing to the cost of transportation.

Maximum Doses.—The report of the committee on maximum doses was presented by the chairman, Dr. Wilson H. Pile, of Philadelphia. The committee reported that in view of the wide difference in the statements of different authorities in regard to the quantities of potent remedies which could safely be administered, they had come to the conclusion that an arbitrary list of maximum doses made from such conflicting authorites would be of no practical utility. They, therefore, suggested that a committee be appointed to confer with the National Medical Association on the subject of maximum doses, as well as proper signs to be adopted to designate the correctness of larger doses when intended by the physician, as an understanding might thus be arrived at which would prove of practical value to the physician as well as the pharmacist. The report was accepted and the recommendaion adopted.

Mr. J. D. Wells of Cincinnati, in behalf of the business committee, submitted a resolution that the executive committee, with the secretary, be authorized to have a neat and appropriate badge of membership prepared for the Association, said badge to be struck in metal and to remain the permament badge of the Association. The resolution was adopted.

An essay in answer to the query, "Phosphoretted Rosin, by A. W. Gerrard, has been introduced as an eligible mode of administering phosphorus in pilular form; can an agreeable emulsion be prepared from it, or a desirable liquid preparation?" was read by Mr. George W. Sloan, of Indianapolis. He stated that he had made the preparation according to the process mentioned, and that glycerine was an admirable vehicle for its administration, and sustained it, while gum arabic did not answer. He prepared a stronger preparation of phosphoric rosin, containing 10 per cent. of phosphorus, by melting the phosphorus under water and then adding the rosin. This could afterwards be incorporated with sugar of milk and made into pill masses or mixtures and administered with perfect safety.

A volunteer paper on the same subject, by Mr. W. H. Walling of Philadelphia, was read. His formula was to dissolve 6 grains of phosphorus in 200 grains of cacao butter. After the solution was cool it was placed in a bottle, and to it was added 100 grains of castile soap, melted, and when the preparation was thoroughly incorporated, it was cooled and made into 100 pills, which were afterwards coated.

Dr. Pile stated that the four per cent. preparation was generally used; that he prepared emulsions from this by rubbing it with oil of almonds, in which it is soluble, and afterwards making it into an emulsion with gum arabic.

Mr. Maisch alluded to papers which had been written in which it had been stated that when phosphorus is in so large proportion in resin it is not a perfect solution, except when fused, and that on cooling it separated. A better method was the solution in oils.

Mr. Saunders stated that by long keeping the odour of phosphorus disappeared.

An answer to the query, "Can the contamination of pyrophosphoric acid be prevented in dilute phosphoric acid when the latter is prepared from the glacial phosphoric acid of different manufacturers?" was read by Mr. Lewis Dohme, of Baltimore. The paper proved that the acid, when prepared from glacial phosphoric acid of commerce, must necessarily be deficient in free phosphoric acid. The writer found, by careful analysis of several varieties of commercial glacial phosphoric acid, that it was contaminated with over 14 per cent. of soda, the presence of which prevented the conversion of the meta- and pyrophosphoric acid into tribasic acid. The presence of the pyrophosphoric acid was found to be the cause of the precipitate produced when dilute phosphoric acid is mixed with tincture of chloride of iron. The writer recommended the adoption of the first officinal process for making dilute phosphoric acid, but suggested some modifications of the process to guard against the presence of arsenic, which he found in commercial phosphorus.

A volunteer essay on a new method of manufacturing phosphoric acid was read by the president, Professor Markoe. Having had occasion during the past ten years to prepare about 1000 pounds of dilute phosphoric acid, he had been led to devise a plan simpler, safer, and more satisfactory than those heretofore published. The following proportions of materials were used:—

Phosphorus, one part.

Nitric acid, specific gravity 1·42, six parts.

Water, one part.

Bromine, or hydrobromic acid, a sufficient quantity.

The phosphorus and nitric acid were put into a flask, holding at least double the amount of the materials used, placing to the neck of the flask a close funnel, and inverting a smaller funnel over the first one. He put into the flask a few drops of bromine or some hydrobromic acid, and when the reaction had begun placed the flask into a pan of water and let the reaction continue, taking care that the funnel should not get heated. The addition of a few grains of iodine to the materials was a practical advantage. The novelty of this process was the employment of iodine or bromine, or both, in connection with the phosphorus or nitric acid, and the reactions which followed. The bromine first combined with the phosphorus, forming pentabromide of phosphorus, which was decomposed by the water into phosphoric acid and hydrobromic acid. The hydrobromic acid produced was decomposed by the nitric acid, giving free bromine, nitric oxide and water. The free bromine again formed pentabromide of phosphorus, and the same reaction again occurred. But a very small quantity of bromine was necessary, as it was used over and over again, transforming a large quantity of phosphorus into phosphoric acid. The process was quite practical, and the writer had during the last six weeks made about ten pounds of phosphorus into phosphoric acid, and submitted a specimen of some thirty pounds of a solution containing fifty per cent. of phosphoric acid, and having a specific gravityof 1·350. Professor Markoe was in the habit of keeping in stock a solution containing 50 per cent. of ordinary tribasic acid, one part of which with four parts (by weight) of water gave an acid corresponding with the officinal dilute phosphoric acid. The use of iodine in connection with bromine facilitates the process by forming bromide of iodine, which was readily soluble in water. The small portions of bromine and iodine remaining at the end of the first part of the process are both driven off by the heat in evaporating the excess of nitric acid.

A volunteer paper on the same subject, by Mr. Joseph P. Remington of Philadelphia, was read by Mr. C. L. Eberle. The conclusions of this paper were substantially the same as those arrived at by Mr. Dohme, a synopsis of whose essay on the same subject is given above.

A paper on hydrobromic acid was read by Professor Markoe. He gave a modified formula by which large quantities could be readily prepared without danger. It consisted in uniting phosphorus and bromine in the presence of ice or ice-water. The reaction formed phosphoric acid and hydrobromic acid, which were then separated by distillation. The phosphoric acid could be obtained by evaporating the contents of the still. From hydrobromic acid it was very easy to produce all the bromides by neutralizing the acid with the oxides, carbonates, or hydrates of the metallic bases, or of any of the alkaloids which might be desired.

An essay on chloral hydrate was read by Mr. T. Roberts Baker, Richmond. The writer stated it possessed powerful antiseptic properties, and numerous experiments showed it could be used to preserve anatomical preparations much better than any of the liquids heretofore used for that purpose.

The Association then adjourned.

The Association met again at three o'clock, the president, Professor Markoe, in the chair.

Mr. Saunders read a paper by C. Rutter of New York, on Tasteless Iron Combinations. His experiments were undertaken to show that the tasteless iron combinations were really only admixtures instead of definite saline compounds. The experiments detailed, however, were not considered as satisfactorily explaining the arguments put forth by the writer.

Mr. Creuse of New York said one could not judge by the results obtained by analysis, or by evaporation or the use of different menstrua what the original composition of complex bodies was, and the results obtained by Mr. Rutter were not conclusive. They did not take into consideration the change of colour from red to green, which change is always taken as a proof of chemical action.

Mr. William McIntire of Philadelphia read an article in answer to the following query: "What are the causes of the difficulties (precipitation) which some pharmacists complain of in the preparation of Spiritus Ammoniæ Aromaticus, U. S. P.," showing the cause of the precipitation to be the use of too strong alcohol. When made with alcohol of a specific gravity of ·835, no precipitation was formed.

A paper by Mr. H. M. Wilder of Philadelphia was read in reply to the following query: "What is the most desirable process in making iodoform; how can it best be dispensed; and how can the vessels in which a preparation of it has been made be quickly deodorized?" If an easy process giving a fair yield was desired, the writer recommended that of Bouchardat; if, however, the greatest stress was laid on the yield, then Filhol's process took the lead of all others. The best way was to apply an alcoholic solution of potash and resin, rinsing with water at the end of half an hour. If this did not fully accomplish the purpose, a concentrated solution of bichromate of potash with sulphuric acid was to be added and afterwards rinsed with water.

A paper by Mr. J. F. Hancock of Baltimore was read in answer to the following query: "Chlorodyne is frequently prescribed by physicians, and seems to be a useful preparation in many cases; give a formula for it which would be suitable for introduction into the U. S. Pharmacopœia." The writer recommended the formula which he presented at the last meeting, and urged the use of the name, Liquor Chloroformi Comp., to distinguish it from the nostrums that flood the market.

Mr. Maisch read an answer to the following query: "Is *Artanthe elongata* really the true source of the matico plant; if not, what plant furnishes the drug?" The writer stated that the term matico was applied in South America to a number of different plants which possessed vulnerary properties.

In answer to the following query, "Rhubarb has of late been much damaged by insect pests; does the rhubarb as shipped in China contain the insect, or does it become infested after arrival in Europe and America?" Mr. William Saunders, of London, Canada, stated that he reared specimens of the insect through the different stages. He had supposed it was the moth common in drug stores, called *Finlazea*, but found it to be a different species new to him.

A paper in answer to the following query was read by Professor E. Scheffer: "Is pancreatin converted into pepton when it is digested with acidulated pepsin." The writer was enabled by his experiments to assert positively that pancreatin when brought into the stomach was decomposed, and that it therefore could have neither physiological nor therapeutic effect when administered internally.

Professor G. C. Wheeler, of Chicago, read an answer to the following query: "It is asserted that it is highly dangerous to mix nitric and carbolic acids, on account of the violent and instantaneous explosions that almost invariably occur; what are the proportions most likely to occasion the explosions, and what are the chemical reactions resulting when these two substances are brought into contact?" The circumstances that gave rise to this query were, that a professor in a western college poured some nitric acid into a bottle containing a trifling amount of carbolic acid, causing it to burst and destroy his eyesight. The result of the experiments by Professor Wheeler proved that the so-called explosion was the rapid development of gases which in their violent liberation projected the nitric acid in all directions and into the face and eyes of the professor.

Mr. Joseph Roberts of Baltimore read an answer in reply to the query: "What are the best tests of purity of hydrate of chloral?" The writer stated there was a new specimen of chloral in the market which would answer all the tests of the United States Pharmacopœia. All chloral from whatever source contained some uncombined chlorine and would afford a precipitate of nitrate of silver, though the amount of precipitate was very slight. When tested for the amount of chloroform, the practical yield came very nearly to the theoretical amounts which should be present. Mr. Roberts suggested that hydrate of sodium yielded a better result than hydrate of calcium for the purpose of separating the chloroform. Also that formic acid was the most injurious contamination likely to be found, and was best tested for by the amounts of alkali necessary to neutralize it, which could be determined by the ordinary process of volumetric analysis.

Professor Maisch spoke of the immense traffic in patent medicines. The Association professed to be opposed to the sale of these medicines. The efforts of pharmacists in this direction would amount to nothing so long as patent medicines were called for by the public. The question had been agitated, what was the best means of informing the public of the dangerous nature of many of these nostrums. Dr. Frederick Hoffman of New York had suggested the publication of a health almanac similar to those issued by the proprietors of patent medicines, which should contain analyses of such preparations. Circulars had been prepared upon this subject which Mr. Maisch desired to have distributed to the Association.

President Markoe exhibited two evaporating dishes, made of rolled block tin, and stated that they were greatly superior to the tinned-copper vessels, the latter of which were liable to contaminate preparations through the exposure of the copper by the burning away of the tin. Such dishes could be made by any coppersmith, were useful for a variety of purposes, and were but little more expensive than the Berlin porcelain dish.

Mr. Bullock read an answer to the following query: "An essay on the preparation of the various bromides of the organic and inorganic bases used in American pharmacy." The writer gave formulas for the preparation of the various bromides and hydrobromates.

In answer to the following query, "Can the formula for scammony resin (U. S. P.) be improved, and what is the objection, if any, to the exhaustion of scammony by alcohol at ordinary temperature and simple evaporation of the tincture?" Mr. Markoe stated that from experiments made thus far there appeared to be no great difference in the actual percentage of resin as prepared by simple evaporation or precipitation with water.

Mr. G. W. Kennedy, of Pottsville, Pennsylvania, read an answer to the following query: "An essay on calabar bean, giving the readiest method of obtaining the various pharmaceutical preparations, and isolating its active principle." The paper gave formulas for making tinctures, solid extract, fluid extract, calabarized paper and calabarized gelatine.

The following query was answered by Mr. Randall Rickey, of Trenton, N. J., in the negative: "Can the alkaloids of cinchona be extracted together in crude form, yet sufficiently pure to permit a ready detection of adulterants; and if so, can the process be profitably carried out by the pharmacist?"

The following query was answered by Mr. Linus D. Drury, of Boston, giving analyses of the commercial articles referred to: "An examination of commercial citrate of iron and quinia for its quinia strength."

Mr. Benjamin Lillard, of Nashville, Tenn., said it was generally understood there were two brands of this article in the market; one marked No. 1, the other No. 2.

At the next meeting this paper was referred back to the author for further investigation and report.

In answer to the following query, "Pharmacists have repeatedly complained that sulphate of morphia, as supplied by manufacturers, is not as soluble as it should be, and strong hypodermic solutions are not readily made; why is this, and what is the remedy?" Mr. Charles Rice, of New York, stated that he had made a number of experiments, all with a negative result, in consequence of which he did not think it worth while to take up the time of the Association with a paper. He had found no difficulty in dissolving sulphate of morphia.

The Association then adjourned to Friday morning at nine o'clock.

The sixth session began at half-past nine o'clock on Friday morning, President Markoe in the chair.

The Metric System.—Professor Sharples offered a resolution that a committee of three be appointed to report upon the subject of metric weights and measures. He stated that a similar resolution had been passed by most of the scientific bodies in the country. No profession was more deeply interested in the subject than the pharmaceutical, which had to deal with two distinct systems of measures, mixing by one and selling by the other. The process of converting one measure into the other was very difficult, and not generally understood. All the trouble arising from this source would be obviated by the adoption of the metric system.

Mr. Saunders stated that a paper on the subject would be read during the meeting, and the resolution was temporarily withdrawn.

A paper on impurities in sulphuric ether was read by Professor P. W. Bedford. The speaker had made careful experiments as to the specific gravities of each variety found in the New York market, noting the loss in volume when mixed with water. Most of the better grades were entirely satisfactory and fit to use for producing anæsthesia, while the commercial grades varied considerably in quality. The speaker gave a statement as to the impurities and other results obtained.

A paper on the impurities of commercial bicarbonate of soda was read by the same gentleman. The paper gave the results of the examination of eleven brands of this article. Four were of English origin, two from France, and five of American manufacture. The examination gave the amount of carbonic acid, of exsiccated carbonate of soda, and the impurities of chlorides and sulphates present. In an article manufactured on so large a scale it was very satisfactory to know that the amount of impurities present is so small.

The committee on the time of the next annual meeting, reported through the chairman, in favour of holding the next annual meeting on the second Tuesday of September, at 3 p.m., and the recommendation was adopted. The committee also reported that the invitation extended to the Association by the delegates from Ontario, Canada, to hold the meeting of 1877 in the city of Toronto, had been cordially renewed.

The Committee on Nominations reported the name of Dr. A. W. Miller of Philadelphia for local secretary, and that gentleman was elected.

Professor J. F. Babcock read a paper on iodide of arsenic. Professor Babcock alluded to the fact that there were, perhaps, some preparations in the United States' Pharmacopœia which might better be transferred to the list of the materia medica. Iodide of arsenic might be one of these, but Professor Babcock was of the opinion that all would agree that where a product was retained in the list of preparations, the process given should be the best one known for the purpose. When iodide of arsenic was prepared by the United States' process, using the ordinary metallic arsenic, the product was not an orange-coloured solid, as the authority states, but a dark brown or black substance which did not readily dissolve. Professor Babcock proposed a new process for the preparation of the iodide, which consisted in dissolving arsenious acid in hydriodic acid, and the subsequent evaporation to dryness. The iodide of arsenic obtained was of much better quality than that prepared by the United States' process. Professor Babcock also called attention to some new and interesting chemical changes taking place when the solution of the iodide is evaporated to dryness.

The secretary read a communication from the conference of the schools of pharmacy at the sixth annual meeting, stating "that the conference was in possession of documentary evidence that the Tennessee College of Pharmacy was opened through its treasurer and acting secretary to examine candidates and graduate them without their attending the customary courses, just the same as if they had attended all the lectures."

On motion of Mr. Roberts, of Baltimore, the documentary evidence was produced and read. It consisted of a letter from Mr. B. S. Lillard, agreeing substantially with the above statement.

Professor Bedford, of New York, offered a resolution that a committee of three be appointed to communicate with the Tennessee College of Pharmacy and inquire whether such action was authorized by the college, or was undertaken on the individual responsibility of Mr. Lillard.

Mr. Lillard seconded the motion and explained the action of the Tennessee College. The latter college conferred upon its graduates the degree of Doctor of Pharmacy. The other colleges conferred the degree of Graduate in Pharmacy. Persons who were already graduates of other colleges had applied to the Tennessee College for its degree, preferring the title of doctor to that of graduate. It was customary for colleges to recognize attendance upon courses of instruction in other colleges, and it was the intention of the Tennessee College, and the meaning of the letter which had been read, to signify a willingness to confer the degree of doctor upon graduates of other institutions without requiring attendance upon all the lectures. The degree would not be conferred without examination. Mr. Lillard defended the action of the college and courted the fullest investigation.

After discussion the motion of Professor Bedford was adopted.

A paper by Mr. James G. Steele, of San Francisco, California, on *Grindelia rubusta*, was read. This substance was stated to be a specific for the poison of poison oak and a valuable remedy for asthma. With the paper were submitted specimens of the dried plant pressed, and of fluid and solid extracts.

Professor Markoe stated that the pharmacopœia process of making spirit of ammonia yielded a very unsatisfactory product, never twice alike; that the description given of it was incorrect, inasmuch as the materials taken by the pharmacopœia never gave a colourless solution. The small amount of organic matter derived from the casks in which the alcohol was sold produced with the ammoniacal gas a more or less deep yellow colour. This objection could be overcome by re-distilling the alcohol previous to conducting the ammonia gas into it.

Professor Sharples's resolution in regard to the metric system of weights and measures was then again brought forward and adopted.

A paper on dilute hydrocyanic acid, by Mr. J. N. Lloyd, of Cincinnati, Ohio, was read. He preserved it by distilling the acid and alcohol together.

A volunteer paper was presented by Mr. William Saunders, of London, Ontario, on the production of "rubber" from the common milkweed—*Asclepias cornuti.* The writer showed that by the action of fermentation on this weed the yield of elastic vulcanizable gum was largely increased and very much improved in quality, as compared with that obtained from the fermented weed. Mr. Saunders gave as the result of his experiments a yield of five per cent., and he thought that the yield might be increased if the weed was ground to a greater degree of fineness before fermentation. Samples of the products were submitted to the meeting.

Several other papers having been read by title and referred for publication, and various resolutions of thanks passed, the Association adjourned to meet in Philadelphia on the second Tuesday of September, 1876.

Parliamentary and Law Proceedings.

POISONING OF FIFTY-EIGHT BOYS BY THE ROOTS OF LABURNUM.

On the morning of the 3rd of August, between six and seven a.m., before breakfast, fifty-eight boys in the Forest Gate Industrial School chewed varying quantities of the roots of an old laburnum tree, which had been cut across the preceding afternoon, they either mistaking it for, or thinking it very much like, stick liquorice, which it certainly resembles in smell; in a very short time, these boys were affected with symptoms of narcotic poisoning, varying in severity from simple sleepiness to complete stupor; none of them complained of any pain, or burning of mouth, throat, or stomach, nor was there any sickness until emetics were given. They were taken into the Infirmary, looking pale and cold, and staggering about; their pupils were somewhat dilated. Dr. Vallance, of Stratford, the medical officer of the school, states that the boys were treated immediately by emetic doses of mustard and water; and, in the worst cases, by sulphate of zinc and ipecacuan. It was remarkable to see the boys, whilst in the act of vomiting, going to sleep, some with the basins in their hands, others standing at the sink. Two boys were much worse than the rest; they, after freely vomiting, were insensible, and showed very strange waving motions of the arms to and fro, whilst now and then their legs, first one and then the other, were convulsively drawn up; there was also in one of the two slight frothing of the mouth, and the pupils of each were *unequally dilated.* This latter symptom was noticed several times. These two boys were strong and robust and thirteen years old. Ten hours after taking the poison they went to sleep, whilst being walked about the yard, after having had cold douches, strong coffee, etc. Upon careful inquiry, it was found that these boys could not have chewed more than half an ounce of the laburnum root. All the cases speedily recovered, and on the next day showed hardly any traces of injury. Dr. Vallance thinks there are indications of great therapeutical value in the laburnum root, although he has failed to find any description of its effects in the books he has consulted. The seeds are summarily put down as narcotic acrid poisons, and they may be so; but certainly, in these fifty-eight cases, the root, whilst showing plenty of narcotic effects, exhibited none that could be called acrid.—*British Medical Journal.*

Poisoning by Opium.

At Bolton, on Friday, September 17, an inquest wa held before Mr. R. Taylor, deputy borough coroner, on the body of Robert Winder, aged 17.

Dr. Livy said he was called to deceased on Thursday morning, and found him in bed, breathing with great difficulty, and insensible. Deceased died fifteen minutes afterwards. Taking into consideration his age, the insensibility, the contracted state of the pupils of the eye, his previous good health, and his general appearance, he suspected that deceased was suffering from a poisonous dose of opium or some of its preparations. He had made a *post-mortem* examination of the body of the deceased that forenoon. There were no marks of violence upon the body. He examined the brain, and the contents of the chest and abdomen, but found no disease sufficient to cause death. There was no rupture or effusion that should cause apoplexy. There was every appearance of poisoning by opium.

John Duxbury, dentist, said he was a companion of deceased. He paid deceased a visit, by request, on Wednesday last. Deceased complained to him of illness, and explained to witness what was ailing him. Witness advised him to see a respectable medical man, and deceased replied that he dared not do so for fear that his father would get to know. Deceased asked witness to get him some medicine from Mr. Walker, druggist. Witness went, and deceased waited outside. Witness got a bottle of medicine and handed it to deceased. The medicine had to be taken at the rate of one tablespoonful three times a-day.

Dr. Livy said that witness had called upon him on Thursday and volunteered a statement. He denied all knowledge of the bottle in the most solemn manner, and said the medicine was obtained from some "quack" in Manchester.

Witness remarked that deceased had some medicine previously from Manchester.

The Coroner: You never told John Winder's wife that you had prescribed for deceased.

Witness: No, I did not. I do not understand medicine.

William Walker, druggist, Higher Bridge Street, remembered Duxbury coming to his shop on Wednesday evening, about eight o'clock. Duxbury said, "I want to speak to you in confidence. I have a friend who is suffering from disease." Witness asked "Why did he not come himself?" and Duxbury replied, "He does not like to come." Witness made up a mixture from a prescription he kept by him for such cases. (Prescription produced.) In addition to the usual ingredients he put one drachm of laudanum in it, to ease the irritation spoken of by Duxbury. There were four ounces of mixture, and he filled the rest of the bottle, which was an eight ounce one, with water. He suspected that the medicine was for Duxbury himself.

Dr. Livy said according to the prescription produced deceased would only have taken half a drachm of opium, as only half of the mixture was taken. Half a drachm was only equal to two grains of solid opium, and would not poison a baby, much less a man.

Witness (continuing) said that Duxbury called on him on Thursday morning, and, referring to the death of deceased, said, "The medicine I had last night was for Winder. Don't say to any one that I have been to you for any medicine of the sort." Witness replied: "There was nothing in that mixture that should hurt him, and I don't care who knows what was in it." Duxbury then explained that Mr. Winder had seen him about the matter, and he had told him that the medicine was obtained from a "quack" in Manchester, concluding with saying, "Whatever you do deny that you sent this medicine out."

Dr. Livy: Did you label the medicine?

Witness: No. Duxbury said: "Never mind it; he won't want one of those on."

The Deputy-Coroner: Is it the first time Duxbury has come to you for medicine?

Witness: I don't recollect him ever having medicine of this kind before, but he has had other medicine; at one time for his sister, and I think also for himself.

Witness, continuing his evidence, said that Duxbury went on to say "You know there will be a precious row about this stuff; for they have said to me that if they found out the druggist that sold this medicine they would transport him." It was, added witness, either "they would transport the druggist or, he deserved transporting."

Dr. Livy: Was that to induce you to be silent?

Witness: I should think so. He appeared to be afraid.

The Deputy-Coroner: The medicine you made up would not cause death?

Dr. Livy: We are not certain that the medicine is as it was dispensed.

The Deputy-Coroner then advised the jury to retire and consider their verdict.

After an absence of about a quarter of an hour the jury returned, and

The Deputy-Coroner said: Have you agreed upon your verdict?

The Foreman (Mr. Waddington): We have arrived at the belief that Duxbury has dealt frequently in medicine, that he has told persons that he has prescribed frequently for the deceased, and we should like to ask him whether that is a fact or not.

The Deputy-Coroner: Is that a fact, Duxbury?

Duxbury: It is not.

Tho Deputy-Coroner: You never bought anything before for deceased?

Duxbury: I have given him some nitrate of silver for his mouth. In answer to further inquiries he said, "I don't keep morphia. Deceased told me that he had got some medicine from Manchester."

The Foreman: Did you not say that you slept with deceased at Blackpool at Whitsuntide, that he was as bad as could be then, and that you frequently prescribed for him?

Duxbury: This was the first action I ever did for him, and this was done at his request.

The Foreman: I think we shall require the stomach to be analysed.

Dr. Livy: We know that deceased has had opium. There is no doubt that he has died from an excessive dose of opium, although Mr. Walker has not put a poisonous quantity in the medicine, if his evidence is correct, and I don't see why we should not take it as correct. It would be very difficult to ascertain whether there was a poisonous quantity of opium in the bottle, as the difference between a medicinal and poisonous quantity is so slight.

The Foreman: If an analysis were made perhaps the quantity could be ascertained, and then we should be informed whether it would cause death.

Dr. Livy remarked that an analysis would not be decisive. The analysis might only show that there was a proper quantity of the opiate in the mixture, and if the stomach showed that an overdose had been taken deceased might have got it from elsewhere.

After some further consideration, the jury were assured that if anything was discovered to criminate any person in the matter, further proceedings could be taken, and the following verdict was arrived at, "That the deceased died from an excessive dose of opium, but by whom administered there is no evidence before the jury to show."—*Condensed from the Bolton Journal.*

Alleged Adulteration of Citrate of Magnesia.

On Tuesday, Sept. 21, at the Greenock Police Court, James Kerr, Druggist, was charged with the adulteration of citrate of magnesia. Mr. Macdonald (of Messrs M'Clure and Macdonald), writer, appeared on Mr. Kerr's behalf, and asked a continuation of the case, in order that a portion of the magnesia said to be adulterated might be analysed. An order was granted by the Court for Mr. Macdonald to procure a quantity of the magnesia, and the case was continued till the 28th inst.—*Greenock Gazette.*

Poisoning by Coal Gas.

On Thursday, September 23, an inquest was held by Dr. Danford Thomas, deputy coroner for Central Middlesex, on the body of Mary Harriss, aged 53, wife of an accountant. From the evidence of the deceased's husband, residing at 36, Great St. James's Street, it appeared that he and deceased went to bed at one o'clock on Friday morning. They had had visitors, to whom they gave up their own bed-room, and went into another. In the latter room there had been a smell of gas for days previously. At 4 o'clock and about 5.15 he awoke, and spoke to his wife. On the last occasion, receiving no answer, he got up, and found her lying with her hand across the rail of the iron bedstead, with her face downwards. He removed her back to her proper position and then heard her moan, and thinking she was in a fit he sprinkled her face with water. He considers he was himself partially stupefied, as he fell off to sleep again, and did not awake again till 7 o'clock. He then tried to rouse his wife. As he could not do so he believed she was dead, and detemined to call for assistance, but was unable to do so, and fell to sleep again and did not wake till about half-past eight. He had then some slight recollection of being taken out of bed, and he was not thoroughly recovered for an hour after. His cousin (one of the visitors) roused him, and on finding his wife dead, sent for a doctor, who pronounced life extinct some hours. He knew there was a smell of gas in the room, and intended to have it seen to, but thought he would rest another night.

The cousin referred to said he went to the room and found the deceased dead, and the husband partially insensible by her side. A gas engineer, who had been doing some fittings in a room downstairs the day before, said he knocked up the piping from the ceiling which had been connected with a pendant. On examination of the piping under the floor of the room where deceased slept, it was found that the connection of the pipes was only made with white lead, instead of solder, and had been in that state for years. A slight cause would render the joints imperfect, and bring about an escape of gas. Dr. Lydall said the death had been caused by inhaling coal gas, and the jury returned a verdict to that effect.—*Standard.*

Poisoning by a Liniment.

An inquest was held at Wrexham, before Mr. B. H. Thelwall, coroner, on Friday, Sept, 24, respecting the death of Mrs. Martha Morgan Griffith, aged 33 years.

Mrs. Mary Roberts, said: I am a monthly nurse. I was seventy years of age last May. I have been a monthly nurse twenty-four years, and this was the fifth time for me to nurse Mrs. Griffith. I was called in here on Sunday morning between seven and eight o'clock. The child was born about half-past eight. Dr. Williams sent a liniment on Wednesday, and it was put in the room. The small bottle produced is the bottle. The bottle was on the drawers yesterday morning. One of the servants brought it into the bedroom, and said it was a liniment for the head. I read what was on the bottle when it was brought in. I never used any of it for the head, because deceased had no pain in her head. I knew it was poison—that it was not to be taken. There was no word "poison" on the bottle, but I knew it would do harm if given internally. I did not actually know it was poison, but I knew it was not to be taken. The draught for Mrs. Griffith came in on Wednesday, and it was afterwards given to her when I was not in the room. The draught now on the table came in on Thursday night, and it was to be given on Friday morning if the first draught was not effective. I slept in the room on Thursday night. I got up at six o'clock on Friday morning, and I was called by Mrs. Griffith. I knew what was wanted—namely, the draught. I had no conversation with her. I was up only once in the night. I was fast asleep when she called. There was a good light in the room. When I got out of bed, I went to the drawers and took off the liniment, it being the first bottle to hand. The other bottle was close to it.—The Coroner: Did you read what was outside the bottle? No, but I read it when it came in first.—Are you able to read? Yes.—Was there sufficient light? Yes, there was.—How was it that you made the mistake of giving that bottle instead of the other? I cannot give you a reason for it. I did it in a mistake, and I cannot tell you any more.—You are quite sure you did not do it intentionally? Oh! no; not for the whole world.—You must have been half asleep? I cannot tell you that, sir.—You admit having given her that poison? Yes I gave it her.—And you thought it was what she ought to take? Yes, I did it in a mistake.—When did you find out your mistake? I did not find it out until the doctor told me. I gave her some gruel afterwards. She was taken with shivering a quarter of an hour afterwards, and I then gave her some gruel. After she had the gruel she was taken ill, and then she was very sick. The girl came up with some tea, but she could not take it, and we called Mr. Griffith in. He sent for Dr. Williams between seven and eight o'clock. Mr. Griffith proposed to send for the doctor, and I was present when he came.—By the Coroner: Mr. Griffith came in about an hour afterwards I had given her the liniment. She did not say anything to me afterwards. When Mr. Griffith came in he did not ask whether I had given her the draught.—The Coroner: Supposing there had been a red lable on the bottle, with the word "poison" on it, would you have been able to see it? I should have been able to see it if there had been "poison" on it, although, at the same time, I knew the contents were not to be taken.—If there had been a large label on it with "poison" you would have seen it? Of course I should. The three bottles were on the drawers together.—The direction on the bottle was, "20 drops to be put on the painful side of the head when in pain." Witness: I was told to put the liniment on her head. I found the bottle on the drawers and did not know how to put it on except what was stated in the directions on it. I did not know that it was mixed with water.—Dr. Williams: Do you not remember my telling you when giving the medicine that the way to use it was to drop 20 drops into a teaspoon and then take the finger and rub it over the painful part? I do not remember your telling me that.

Dr. Williams: She is so deaf that she might not have heard. I never order that without giving those directions.

Mr. Thomas Jones: Is it not usual to put "poison" on such a bottle.

Dr. Williams: Some do and some don't, but the fact of her not reading the directions is the real cause of death in this case. If she had only read it, she would have seen what was to be done, whether "poison" was on it or not. I gave Mrs. Griffith strict instructions about it, and the witness was standing by, but I suppose she did not hear them.

Dr. Williams was then sworn and said: On Sunday morning, between seven and eight o'clock, I was called to attend Mrs. Griffith. She was delivered of a very fine child within ten minutes of my arrival. Everything went on as well as it possibly could, and she had a very good time. She recovered, and I remained with her about an hour or so, then I left. On Wednesday evening she was suffering a good deal from a pain on the side of her head, which had a great deal of the character of neuralgia. She was a very neuralgic subject, and a very delicate woman. I then sent her that liniment, with instructions that it was a strong medicine, and that she must take care of it. I gave the instructions myself to Mrs. Griffith, she being well enough to hear them. The old woman was standing by. I told Mrs. Griffith that twenty drops were to be put into a teaspoon, and then the finger to be dipped in and rubbed on the part of the head which was painful; and I told her it was very strong, and that she must be very careful. She understood that it was poison, and I thought the old woman knew all about it; but I think she is very confused and has forgotten. Next day I found deceased a great deal better, and she appeared not to have had any occasion to use the liniment. On Thursday morning, as there had been no action in the bowels, I desired her to take some solution of citrate of magnesia, but it did not do her any good. I then said she must have a draught. Mr. Griffith himself came with me to the surgery for it. Mr. Gerrard, my assistant, made up the draught. On Friday morning, about half-past seven, I received a message that I was wanted immediately, and on the way to the house I met another messenger urging me to make haste. Knowing deceased was a very fainting subject, I had previously gone into the surgery for some ammonia to take with me. I got here a little before eight, and I found Mrs. Griffith in her husband's arms. She was gasping for breath, was bathed in cold perspiration, with a very feeble pulse, and quite in a state of asphyxia, with difficulty of breathing, and frothing at the mouth. I could not understand the symptoms. I asked if she had had the draught, and I was told that she had, and that she had also had gruel. I did not look at the bottle, but asked the question. My first thought was, "Can it be poison?" and then I thought, "No, there is no poison here to account for it." I administered brandy to her, and Mr. Griffith said he had also given her some brandy. She rallied a little, her pulse improved, although it had almost gone. She herself said, "brandy! more brandy!" once or twice. I gave her brandy, and her pulse improved, her countenance, which was before pale and livid, improved in character, and the lips, which before were pale, recovered almost their natural colour. Her pulse was stronger, and I thought she was going to revive from a fit of fainting. I put her on pillows, and gave her brandy and ammonia and she seemed to be rallying a bit. But I found she was fainting again, and I told him I should like very much to have a consultation, and that as Dr. Griffith had attended her so many years I should like very much for him to see her. He was sent for, but he was not well enough to come. I said her case was a very serious one, and told Mr. Griffith that I would be very happy for another medical man to see her, I being comparatively a stranger to her. He said. "No, I do not wish anybody else; I have every confidence in you, and I leave her entirely in your hands." I then said, "I will thank you to send for my son; I should like to have him here to help me." They sent immediately for him, but before he arrived she was dead—she gave two or three gasps and died. I think she lived about half-an-hour after I came. The liniment that was given to her was aconite, and there is no antidote to it. Brandy and ammonia are proper remedies; they tend to sustain life and to promote vomiting. She vomited, but if I had had an emetic I dared not have given it her, because she was in a dying state—it would have accelerated her death. Neither could a stomach pump have been used if I had had it by me, because she was gasping for breath. Not being able to reconcile the symptons, I feared what we call embolism, but there were other symptoms that would not be accounted for by that. I then looked around me, and saw the three bottles side by side, and was horrified to see that the little bottle which had contained the liniment was empty. I immediately called Mrs. Roberts, and said "Mrs. Roberts, which of these bottles did you give to Mrs. Griffith?" and she took up the little bottle and said, "this." I then had to tell her what she had done, and I thought the old woman would have had a fit and died. She exclaimed "Oh! that I should have done such a thing to the best friend I have in the world." She was fainting and I had to give her brandy and support her for a long time. I never give that medicine without instruction. It is a point of conscience with me whenever I order that, or the liniment of belladonna, to give the instructions I have referred to.

The Coroner: But on this occasion you gave the instructions to the patient herself; and a patient may be too ill to give instructions to the persons giving the medicine.

Dr. Williams: On this occasion I gave the directions to the most able person, which was Mrs. Griffith herself, who was perfectly conscious and as well able to receive the instructions as you are now.

In answer to Mr. Baugh: The misfortune is that the two bottles had been put together. I said to Mr. Griffith, "How came that bottle to be left there?" he replied, "I am afraid that might be my fault." Another peculiar circumstance of the case is with reference to the woman's giving the medicine. Mr. Griffith told me that on no occasion had anybody ever given her medicine but himself; and he added, "On every occasion I have given the medicine, and if the old woman ~~had only~~ waited a quarter of an hour, I should have been in the room to give it myself." It is strange that this was the first dose the old woman had ever given her, although she had been in attendance so long.

In answer to Mr. Thomas Jones: There is a law compelling chemists to put poisons in different coloured bottles.

To the Coroner: Aconite is sometimes given to persons in small doses. There was sufficient in that bottle to poison four persons, though I would not say how many it might not kill.

Mr. John Gerrard, dispenser for Dr. Williams, said he made up the aconite on Wednesday. The liniment consisted of aconite, spirits, and a small quantity of camphor. When the bottles were for respectable persons he did not usually put "poison" on them, for they could depend upon such persons, but in other cases the word "poison" was used.

The Foreman: Would it not afford great protection if you put "poison" on all bottles containing poison?

Witness: Yes, it would. It would be a very good plan.

The Coroner then summed up. He said there had been a great deal of negligence on the part of the nurse, but there had certainly not been criminal negligence, for no one had attempted to show that she had any motive to take away the deceased's life. An Act of Parliament made it illegal for a druggist to sell any poisons without a label, but that did not apply to qualified practitioners; and without casting the slightest reflection upon Dr. Williams, he would say that the dispensers of all medical men ought to label poisons in a distinctive manner. A bottle containing poison might be taken into a sick room and not used, and then afterwards it might get into the hands of the children, or some other persons, who, not seeing it labelled poison, might make use of it with fatal results.

Dr. Williams: I agree with you that it is a thing that ought to be done, and I have laid down a law, that, come what may, nothing of this sort is in future to go out of my surgery without a label of the kind you mentioned.

The jury, after five minutes' consideration, returned a verdict that deceased had died from the admistration of a dose of aconite, given to her by the nurse in lieu of a draught; and that it was given purely in mistake, and with no criminal intent; and further, they strongly urged upon the medical profession in general that no medicine of this character should be sent out of a surgery without the word "poison" be legibly printed upon it. At the same time, they did not cast the slighest reflection upon Dr. Williams.—*Condensed from the Wrexham Advertiser.*

POISONING BY STRYCHNINE.

On Saturday, September 25, Walter Thompson Hunt, accountant, was indicted at the Central Criminal Court, for the manslaughter of Mary Ann Hudson. The evidence for the prosecution was in the main identical with that given before the coroner, a *résumé* of which has already appeared in this Journal (before, p. 220). No information was given as to the source from which the prisoner obtained the strychnine found upon him. After a few minutes' deliberation, the jury found the prisoner guilty, and Mr. Justice Field, sentenced him to five years' penal servitude.

POISONING BY NEURALINE.

In *The Lancet* for Sept. 25, Mr. William Sedgwick, M.R.C.S., records a case of suicidal poisoning by neuraline, which has just occurred in Marylebone, and in which death appears to have resulted quickly and almost, if not altogether, without a struggle, after swallowing a comparatively large quantity of that extensively advertised preparation of aconite. The deceased, who had previously been in sound health, was a gentleman of good position in Holland, aged thirty-six years, and had lately arrived in this country. In addition to other domestic troubles, he had been much overcome by the death of a dearly-loved daughter, which had unexpectedly occurred abroad during the previous week. When the body was first viewed—probably about twelve hours after the poison had been swallowed—it was found lying in a prone position, inclining towards the left side, with the arms folded and the legs close together and straight. There was extensive and well-marked cadaveric lividity, and the rigor mortis was fully established. On the dressing-table in his room were two small and octagon-shaped bottles, marked "Neuraline," the corks of which had been pushed in, and their fluid contents had apparently been emptied into a tumbler which was found on a chair near the bedside. This tumbler, which smelt strongly of neuraline, had been drained of its contents as soon, probably, as the deceased had undressed and gone to bed. There was a slight smell of neuraline perceptible near the mouth of the deceased, and from a letter, which was found beside the two empty neuraline bottles, it was evident that he had intended to commit suicide.

As no *post-mortem* examination was allowed by the coroner (Dr. Hardwicke), there was no opportunity of ascertaining the effects of aconite in a concentrated form on the internal organs; nor of verifying previous observations respecting the state of the mucous membrane of the stomach and duodenum in cases of death from this poison. The jury, after some remarks on the absence of a *post-mortem* examination, returned a verdict of "Death from Suicidal Poisoning by neuraline whilst in a state of unsound mind."

Neuraline, according to Dr. Harley is a preparation of tincture of aconite, mixed with chloroform and rose-water; (*Pharmaceutical Journal*, Jan. 1872, p. 618; cited by Taylor, 'Principles and Practice of Medical Jurisprudence,' second edition, 1873, vol. i., p. 427.)

Reviews.

HANDBOOK OF THE TRADE PRODUCTS OF LEH: with the Statistics of the Trade from 1867 to 1872, inclusive. By J. E. T. AITCHISON, M.D., F.L.S. Calcutta: Wyman and Co. 1874.

Drugs and pharmaceutical products form such an important item in the trade of nearly every part of the world, that it is not to be wondered at that in almost every book of travel we find some references to plants and other products used for curing diseases of the human system, still less surprising is it that in glancing through a book of the nature of that whose title stands at the head of this notice, the eye should frequently rest on references to medicinal substances. So numerous are these over vast and productive countries like India and China that a good deal of interest centres in the resources of those countries. It is not, however, with the actual products of the soil of Leh and its neighbourhood that the book before us treats. It is essentially an enlarged "dictionary" of *trade* products, of articles that are brought into Leh in course of commercial dealings with the neighbouring countries, and under some heads a large amount of valuable and detailed information is given.

The arrangement of the book is alphabetical, the trade or native names being printed in black type. This arrangement makes it more useful, perhaps, for the purpose for which it was compiled, that of a handbook for use in India or the country with which it deals, but for European use it requires a good index both of scientific and European names, neither of which, however, it has. This is an addition that could easily be made, and we counsel those who have the book in its present form to make it more useful for ready reference by running over it and adding a MS. index. Many of the plants mentioned as being used medicinally by the Kashmiris and Yarkandis are enumerated in the Indian Pharmacopœia, but they are mostly placed there under non-officinal products; thus the rhizomes of *Acorus calamus* or sweet flag, though not officinal, are esteemed as a stomachic and tonic, and are prescribed by most native practitioners, being found in nearly all the Indian bazaars. Dr. Aitchison says they are brought in small quantities from Kashmir to Leh. The plant grows in Badakshan as well as in Yarkand, and the root is used medicinally. It is said to be a powerful insecticide, more "especially in relation to fleas."

In the root of the spikenard (*Nardostachys Jatamansi*), under the name of Balchir, we have another non-officinal substance. The plant, as is well known, belongs to the Valerianaceæ, and the roots occur in short pieces about the thickness of the little finger, covered over with coarse brown fibres. It has a bitterish taste, and a strong odour somewhat resembling patchouli. It has been employed in India in hysteria and convulsions, and has been recommended for careful trial by European practitioners. In Dr. Aitchison's book we are told that it grows in Kashmir, from whence it is taken to Leh, to be exported to Lhassa. None goes to Yarkand. Its chief use in Ladakh and Lhassa is for incense. It seems to have the same attraction for cats that valerian has in this country, for we are told of a trader at Leh who was once nearly driven mad while conveying a load of the root from Kabul to Peshawur, by the numerous cats surrounding him at night wherever he halted. Under the name of "Banafsha" the entire plants, dried, of several species of *Viola* are used medicinally, chiefly as an emetic. These are imported into Leh in some quantities, from the Punjab and Kashmir, for the purpose of exportation to Yarkand. In the Murree Hills enormous quantities of the flowers of *Viola odorata* are collected for exportation to the plains, and "in the Jhelum and Hoshiarpor districts the plant of *Viola cinerea* is largely collected to be used medicinally."

Dr. Aitchison's testimony as to the quality of Kashmir saffron, as imported into Leh, is far from being a recommendation of its generally acknowledged superior quality

Saffron is a Government monopoly in Kashmir, "and," says the author, "is wholly exported to Lhassa, where it is used both as a dye and as an incense. Amongst the Kashmiris it is eaten as a condiment. That which I had an opportunity of seeing at Leh was supposed to be of two qualities. In even the best I could scarcely detect any of the stigmatic portion of the crocus; and as to the second, it was not saffron at all."

The Kút or Koot root, sometimes known as Putchuk (*Aucklandia costus* of Falconer, *Aplotaxis auriculata* of Decandolle), is well known on account of its having been supposed by Dr. Falconer to be identical with the costus arabicus of the ancients. It is frequently seen in the Indian bazaars, and is sometimes smoked, being considered narcotic; its chief use, however, is as a perfume and for protecting cloth from insects, quantities of it being bound up with bales of goods before being stowed away. It forms a large article of export between Kashmir and the Punjab; small quantities are imported from Kashmir into Leh, for exportation to Lhassa, where its chief use is for incense. So strong is the violet-like odour given off by this root that loads passing along the road in course of transit are at once recognized, and even the sacks in which the root is packed retain the perfume for a very long time. From the foregoing remarks on the character of, and kind of information given in Dr. Aitchison's book, it will be seen that, though not absolutely treating of each subject in an exhaustive or even a full manner, there is a good deal of information on the application and traffic in useful products in a somewhat remote part of the world.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

A DISPENSING QUERY.

Sir,—Some time ago I received a prescription, very like the one described by "Suburban" and doubtless emanating from the same physician, viz.,

Liquor Plumbi Subacet. . fl. oz. iij
Extract. Papav. . . . . oz. j
M. ft. Lotio.

A table-spoonful to be mixed with a pint of warm water and used as a lotion.

The manner in which I dispensed it was to dissolve the extract in sufficient hot water to measure 5ozs., to this the Liquor Plumbi was gradually added, making the bulk up to 8ozs. I then labelled it "Two table-spoonfuls to be mixed with a pint, etc., etc.," at the same time explaining to my lady customer "the reason why" at which she was perfectly satisfied. I know no other practical "modus operandi." The prescription had been previously dispensed in London, I forget where. Perhaps some of our city cousins can point out "a better way;" if so it will be very useful to us in the country when another such-like incompatible prescription turns up.

W. WILSON.

Morice Town, Devonport.
September 25, 1875.

[*** In the event of the dispenser not being able to communicate with the prescriber, this is the only practical way of dealing with such a prescription.—ED. PHARM. JOURN.]

"*Celosia.*"—(1) *Artemisia vulgaris*; (2) *Prunella vulgaris*.

S. T. S.—The fungus sent is *Calocera viscosa*.

"*Juncus.*"—Probably *Juncus nigritellus*. Specimens of rushes should always be sent with the fruit fully formed.

A. L. F. B.—(*a*) *Viola tricolor*, *β arvensis*; (*b*) *Stachys palustris*; (*c*) *Euphorbia Helioscopia*; (*d*) *Mentha arvensis*, var. *vulgaris*; (*e*) *Sanguisorba officinalis*; (*o*) *Poa annua*; (*x*) *Eriophorum Polystachion*; (3) *Atriplex Babingtonii*.

G. Watt.—(1) *Polygonum aviculare*; (2) *Polygonum convolvulus*; (3) *Stachys Betonica*; (4) *Linaria vulgaris*; (5) *Convolvulus arvensis*; (6) *Raphanus sativus*; (7) *Centaurea Cyanus*; (8) *Knautia arvensis*; (9) *Campanula rapunculus*.

The First Steam Voyage across the Atlantic.—In reference to a statement in Sir John Hawkshaw's Address before the British Association (see before, p. 194), to the effect that the "Sirius steamed from Bristol to New York," Mr. James Beale, President of the Cork School of Art and Science, has favoured us with the following correction:—"I happened at the period, 1838-9, to be a good deal occupied on steam business in London, and on an occasion going to Blackwall in an omnibus in company with several gentlemen, one a banker, and two members of the East India Company's Board, the question of a speech recently made by Dr. Lardner, at the British Association, was discussed, the doctor having given it as his opinion at that meeting, 'that there never was a steamer built, nor he feared would there be one, which would carry coal sufficient to steam across the Atlantic.' In the course of discussion I was referred to for an opinion, and I immediately replied that not only was it practicable, but that if any gentleman would join me I would guarantee to coal and send out a vessel then built from Cork harbour to New York and find a captain who shall be competent to command her. I named Lieutenant Richard Roberts, R.N. It was at once agreed to, and I chartered the Sirius steamer of 800 tons from the St. George Steam Packet Company, coaled her at Passage, and Capt. Roberts at once willingly took charge of her, making a most successful voyage in sixteen days to New York, having abundance of coal to steam all through."

J. M. (Paris).—The U. S. Pharmacopœia does not include a formula for Elixir of Bromide of Potassium; but a formula that has been issued with the sanction of the American Pharmaceutical Association will be found in vol. iv., p. 683.

"*Die Lunae*" (Paris).—A recipe for a cement that will fasten india rubber to leather will be found in vol. iv, p. 622, but is too long to be repeated here.

"*Montpelier.*"—We know of no such work. See Mr. Pocklington's articles on the Microscope in Pharmacy, published in the later volumes of this Journal.

"*Iota.*"—We are unable to say. Perhaps the information might be obtained by application to Dr. Carpenter.

W. J. Bray.—See Dr. De Vrij's papers on the application of the Molecular Rotation to the determination of the Cinchona Barks (*Pharm. Journ.*, [3], vol. ii., pp. 1 and 521).

Erratum.—On p. 260, col. ii., line 21 from top, *for* "and tallised out" *read* "and crystallized out."

J. R.—Several papers on Coated Pills, have appeared in the present series of the Journal (see vol. ii. p. 467; vol. iii. p. 212; vol. iv. pp. 575 and 953). We are unable to recommend particular manufacturers.

H. Hutton.—Aurous oxide (Au_2O) is obtained as a green powder by decomposing chloride of gold with cold potash solution. Auric oxide (Au_2O_3) is precipitated from the solution of the trichloride by alkalies. A purple oxide of gold, intermediate in composition between these two is produced by the action of dichloride of tin and organic substances or solutions of gold. (Watts' Dict. Chem.)

M. P. S.—We are unaware of the existence of such a society.

J. M. C.—(1) Absolute alcohol would answer best for the purpose of dissolving the iodine, and mixing with the lard. You would not be justified in adding iodide of potassium. (2) This is not in our province.

A Dispenser.—The formula is a well known one. As prescribed by the originator Liq. Ammon. Fort. (B.P. of course) is intended.

M. J. P.—(1) Add calcined magnesia: (2) Use calcined magnesia and a little powdered soap. In each case the oils will be partially decomposed, but it is the only practical mode of making up such pills.

D. Jenkins.—(1) Do not know the preparation; (2) Liq. Calc. Bisulph. is a special preparation made for brewers.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Brewster, Mr. Eastwood, Mr. Blyth, Mr. Wilson, Mr Rees, Mr. Dolman, Mr. Holden, "Cymro," "Anemone."

ON TEA.*

BY G. W. WIGNER.

(*Continued from page 263.*)

By considering together the forty samples of ordinary teas and twenty-seven of special varieties we obtain a series of figures which may be taken to represent the limits of variation in genuine teas as imported.

Average of Sixty-seven Samples.

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	5·78	3·15	2·17	·46	1·45
Maximum	7·02	3·88	2·87	1·67	1·96
Minimum	5·17	2·64	1·33	·04	1·08

The average results expressed in percentages of the total ash are—

Soluble in Water (Containing Alkali calculated as Potash, 25·09 per cent.)	54·50 per cent.
Soluble in Acid	37·54 "
Silica	7·96 "
	100·00

While the maximum percentage of soluble ash calculated in the same way is 70·60, and occurs in a very high-priced sample of Oolong (No. 53), and the minimum 38·33, which occurs in a very inferior sample of Caper (No. 74), though I believe from a most careful examination that it was perfectly genuine.

If, however, the extraneous siliceous matter present in the sample is deducted, the proportion of soluble ash will be 45·86 per cent.

The nearest approach to this figure is in another Caper (No. 81), which gives 46·64 per cent. soluble ash, and it is only in rare cases that a sample of any other tea but Caper contains less than 50 per cent. of ash soluble in water; and there is only one case in which the ash soluble in water falls below the ash soluble in acid, the figures then being 2·75 and 2·87 per cent.

If, instead of considering these samples in their ordinary state, the results are calculated to the dried teas, we get figures which are in some respects more nearly constant. Thus, the seventeen ordinary teas, after drying, give the following results:—

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	6·25	3·34	2·43	·48	1·50
Maximum	6·48	3·68	3·07	·82	2·07
Minimum	5·98	2·94	2·15	·16	1·26

The Eighteen Special Teas.

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	6·23	3·74	2·14	·35	1·67
Maximum	7·42	4·16	2·91	·93	2·11
Minimum	5·57	3·15	1·43	·04	1·42

And the Nine Capers.

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	6·61	3·48	2·02	1·11	1·40
Maximum	7·33	3·84	2·05	1·46	1·42
Minimum	6·15	3·21	2·00	·93	1·38

And again, putting the whole of the Sixty-seven Samples together, after Drying.

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	6·33	3·45	2·38	·50	1·54
Maximum	7·42	4·16	3·07	1·76	2·11
Minimum	5·57	2·94	1·43	·04	1·26

In the original teas, the variation in total ash amounts to 32 per cent. of the average, but in the dried teas it is only 29·3 per cent., while the variations in alkali in the original teas are 63·5 per cent. of the average, and in the dried teas only 55 per cent.

Having thus carefully considered all the principal species of tea as imported we will pass to retailers' samples.

It is, of course, an uncommon thing to buy an unmixed sample of tea at a shop. The true art of the tea dealer consists in this blending of teas, and there can be no doubt that the consumer gains by it. It is, however, inevitable that in the process of mixing a small amount of dust and dirt should be introduced, and the extent to which this occurs may be fairly estimated from the following figures which show the results of thirty-three retailers' samples. These include almost every price and quality of tea.

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	6·39	3·29	2·39	·71	1·30
Maximum	7·25	3·91	3·35	1·45	1·78
Minimum	5·15	2·71	1·38	·20	·94

Or if the results are calculated to the Dried Tea—

	Total Ash per cent.	Ash soluble in Water per cent.	Ash soluble in Acid per cent.	Silica.	Potash.
Average	6·74	3·58	2·52	·69	1·48
Maximum	7·79	4·22	3·68	1·56	1·98
Minimum	6·69	3·11	1·63	·22	1·06

These results show about half a per cent. of extraneous matter, *i.e.*, dirt added in the mixing process, which is probably quite as little as could be reasonably expected.

The average percentage of soluble ash remains almost the same, and the percentage of alkali is slightly less.

Passing from the ash to the extractive matter I find it is by no means a matter of indifference in what way this is determined.

The proportion of soluble matter yielded by tea differs very greatly according to whether the tea is powdered or in whole leaf, and also according to the amount of water used and the number of extractions to which the sample has been submitted.

The most accurate method would appear to be to pulverize the leaves and then boil the powder repeatedly, filtering each time until no more soluble matter can be extracted; but in practice this process proves to be almost interminable, and it may be from this cause that the results sometimes announced in disputed cases have been so discordant.

Samples which have been pulverized and boiled four times in succession with one hundred times their weight of water each time, and carefully washed on the filter, still yield more soluble matter on re-boiling.

I prefer, therefore, for reasons which I will give, to adopt a different method.

Powdered tea almost invariably yields more extract than whole leaf tea, but the excess is variable. In some cases it is only 1 per cent., and in others as much as 5 or 6 per cent. I cannot, however, discover any rule or apparent regularity in this variation. It is easy to obtain uniform results from the pulverized samples, but impracticable to do so from whole leaf.

I have therefore always adopted the rule of powdering.

I have made many experiments to determine the relative proportions of soluble matter yielded when tea is treated in different ways, and the following, which were made on an average sample of some sixty pure black teas, give results, which serve as a very fair guide.

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* Read at a Meeting of the Society of Public Analysts at the Museum and Library, Bristol, August 26, 1875.

Each sample was boiled for an hour under a vertical condenser, cooled, filtered, and the extract evaporated.

	Per cent. of Extract.
One part of Tea in 200 parts of water yielded	34·10
One „ „ „ 100 „ „ „	30·55
One „ „ „ 50 „ „ „	27·55
One „ „ „ 20 „ „ „	22·96
Exhausted leaves from, boiled a second time „	8·17
„ „ „ „ third „	3·75
„ „ „ „ fourth „	1·79
Total of the four boilings of one part of tea in 20 parts of water	36·67

Even in the last case the tea was not exhausted, for on making fresh experiments I found that 10 grains of the same sample boiled four times in 3500 grains of water each time yielded altogether 39·70 per cent. of extract, while 50 grains boiled four times in the same quantity of water yielded only 35·10 per cent. of extract.

Other experiments on different samples have confirmed the general character of these figures, though the details differ a little.

On considering these facts I concluded that the most reliable method was to make the one per cent. infusion because the results appeared rather more uniform, and there was obviously less chance of error than when the same sample has to be boiled four or five times.

I have therefore adopted it in all the following analyses.

The ash of the extract is generally heavy. In some cases it approaches very nearly to the ash of the original tea, and in exceptional cases even exceeds it. I shall have to speak further on this point when I consider the actual composition of the ash of tea, and tea extract.

(*To be continued.*)

THE REPORTED DISCOVERY OF A NEW ELEMENT.

BY M. LECOCQ DE BOISBAUDRAN.

The chemical and spectroscopical characters of the reported new element, "gallium," mentioned in our last number, are thus described by the discoverer, in a paper communicated to the French Academy through M. Wurtz.*

On the 27th of August, 1875, I discovered indications of the probable existence of a new elementary body in the production of the chemical examination of a blende yielded by the Pierrefitte mine, Argelès Valley, Pyrenees.

The oxide (or perhaps a subsalt) is after a time precipitated by metallic zinc in a solution containing chlorides and sulphates. It does not appear to be the metal itself that is reduced by the zinc.

The chloride is precipitated by a small quantity of ammonia. In a mixture containing an excess of chloride of zinc, if the liquor be treated with an insufficient quantity of ammonia, the new body is precipitated before the zinc. Nearly the whole is found in the first precipitate, the proportion in the second being very small.

Even in the conditions which would correspond with a state of peroxidation (upon the hypothesis that the body possesses two degrees of oxidation analogous to those of iron), the oxide is soluble in an excess of ammonia.

The salts are precipitated by sulphydrate of ammonia, an excess of which does not appear to dissolve notably the sulphide found.

The salts are precipitated by sulphydric acid in presence of acetate of ammonia and much free acetic acid. In presence of zinc the new body is concentrated in the first sulphide deposited. Six successive precipitations however are required before the complete disappearance of the sulphide of zinc.

The salts are not precipitated by sulphydric acid from a solution slightly acidulated by hydrochloric acid.

The oxide dissolves in an excess of carbonate of ammonia at the same time as the zinc.

The extremely small quantity of material at my disposal has not allowed me to isolate the new body from the excess of zinc which accompanies it. Some drops of chloride of zinc in which I had concentrated the new substance gave under the electric spark a spectrum composed principally of an easily seen narrow violet line, situated near to 417 upon the scale of wave lengths. I also observed a very feeble line about 404.

An additional note read at the same sitting contains the following supplementary details:—

The experiments which I have made since the 25th of August confirm my opinion that the body observed must be considered a new element, to which I propose to give the name "gallium."

The sulphide is really insoluble in an excess of sulphydrate of ammonia.

Although the quantity at my disposal is still very small, I have obtained the chloride in such a state of concentration that the line 417 is already rather bright under the action of the induction spark.

The chloride gives the line 417 in a gas flame, but more feebly than with the spark.

The salts are readily precipitated in the cold by carbonate of baryta.

From a mixture with great excess of chloride of zinc, the new body is precipitated by sulphydrate of ammonia with the first portions of the sulphide of zinc.

Repeated evaporations with great excess of aqua regia do not appear to cause any loss by volatilization of the chloride.

It appears to me that the sulphide should be as white as that of zinc; but this point must be settled by the complete purification of the substance.

When hydrated chloride of zinc containing traces of the new body is heated to the point when a little oxychloride of zinc is formed, all the gallium remains in the insoluble state (under the form of oxychloride, I suppose), but it is readily soluble in a few drops of hydrochloric acid.

The spectrum is more brilliant with a spark of medium length than with a very short one.

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* *Comptes Rendus*, vol. lxxxi., p. 494.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 9, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COMMENCEMENT OF THE SESSION.

THE goodly gathering of students in pharmacy, both old and young, at Bloomsbury Square, on Wednesday evening last, graced as it was by the presence of many ladies, was an unmistakable manifestation of the enduring interest excited by the cause of pharmaceutical education. Year after year the pleasantly monotonous reports of the Professors, testifying to the diligence and good conduct of their pupils, are received with applause by the most crowded evening meeting of the session, and the young men who come up to receive their well-merited honours from the hands of the Chairman have never reason to complain of the want of warmth in their reception.

Last Wednesday's meeting proved no exception to the rule. The audience was numerous; the plaudits were hearty; and the novel points in the speeches of the Professors may be briefly epitomized. Professor REDWOOD showed that the new system of short courses of lectures was by no means identical with deficiency of teaching. Professor BENTLEY exulted in the notable increase this year in the number of competitors for the Botanical prize. Lastly, Professor ATTFIELD, after an interesting analysis of the apparent results of the institution of compulsory examination upon the demand for education, became the mouthpiece for the laboratory students in respect to an anomaly which will, no doubt, receive the careful consideration of the Council.

But the Address to Students is always an important feature in the opening meeting of the Session, and Mr. CHARLES EKIN's thoughtful words of welcome and advice fully justified the Council in its choice. Mr. EKIN's hearers will not be able to complain that he has misled them by a will-o'-the-wisp of an unattainable position. He truly told them that pharmacy is not a profession, but a trade, requiring as a first requisite business habits in those who follow it. But he also argued that professions held no monopoly of the public respect, and that "it is quite possible to be an educated man and a gentleman, and yet engage in trade pursuits."

Mr. EKIN also entered a healthy protest against the outcries that sometimes arise about the alleged uselessness of so much scientific knowledge to a pharmacist. These wails were attributed to mental dyspepsia that has probably originated in the overgorging of the mind in one frantic preparation to pass an examination. Mr. EKIN has no sympathy with the sufferers, and is evidently of opinion, that if the Preliminary examination were made a more stringent test of the general education of youths before their apprenticeship, the value of education would be better appreciated, and the subsequent examinations would not be held up as a bugbear by the men who would then enter the business.

Besides maintaining that the better botanist, chemist, and physicist the pharmacist is, the more intelligently will he carry out the thousand and one little processes in which he is daily engaged, Mr. EKIN illustrated how his special training could always be made a source of pleasure in his hours of recreation. And although the interest in the Address somewhat lulled during the reading of his list of—to some of his hearers—unfamiliar names, we venture to say that many who read the Address will thank Mr. EKIN for calling attention to the numerous specimens of exotic plants we have almost at our doors.

NEW BOOKS FOR STUDENTS.

As the latest English work devoted to the illustration of medicinal plants was published nearly forty years ago and has been long out of print, many of our readers will be glad to learn that Messrs. CHURCHILL have just issued the first part of a work by Professor BENTLEY and Dr. TRIMEN (of the British Museum), which is to contain descriptions with original figures of all the medicinal plants of the British Pharmacopœia, as well as of many of the more important of the United States and Indian Pharmacopœias. Having been favoured with a copy, we find that it contains figures of *Solanum Dulcamara*; *Digitalis purpurea*, *Mentha viridis*, *Mentha piperita*, *Mallotus philippinensis*, *Croton Eluteria*, *Croton Tiglium*, and *Stillingia sylvatica*.

These plants, some of which may still be found in bloom, are admirably drawn of the natural size, and full details illustrating the structure of the flower and fruit are added. Three or four pages of descriptive letter-press accompany each plate, and together they form an independent, complete and separately numbered section, a plan that will allow of the plates being arranged in botanical order at the conclusion of the work.

We are also informed that in the course of the coming week Mr. VAN VOORST, will publish another—the sixth—edition of Dr. ATTFIELD's 'Manual of Chemistry,' which will be illustrated by about one hundred engravings.

THE YORKSHIRE COLLEGE OF SCIENCE.

ON Wednesday, the Yorkshire College of Science was inaugurated at Leeds, under the auspices of the Duke of DEVONSHIRE and several gentlemen of high standing in the scientific world. Addresses were delivered by Dr. Lyon Playfair, Sir John Lubbock, and others. Notwithstanding a large sum has been raised, funds are still lacking for the raising of suitable buildings and other desiderata.

THE WOLVERHAMPTON ASSOCIATION.

The opening Sessional meeting of this society, which now has for its patrons the Mayor of Wolverhampton and the Members of Parliament for the Borough, will be held on Thursday evening, the 14th inst, at eight o'clock, in the Committee Room of the Agricultural Hall, Wolverhampton, when an address will be delivered by the Local Secretary of the Pharmaceutical Society, Mr. W. Y. Brevitt. It is proposed by the Council of the Association to institute classes for the study of (1) Latin and the subjects for the Preliminary examination, (2) Pharmaceutical Chemistry, (3) Materia Medica and Botany, and (4) Practical Pharmacy: but these classes will not be commenced unless a sufficient number of students in each subject intimate their intention to join them. It is therefore desirable that pharmaceutical students in the district who may wish so to do, should communicate with the Honorary Secretaries as soon as possible.

CINCHONA BARK FROM SANTA MARTHA.

Her Majesty's Vice-Consul at Santa Martha reports a considerable decrease in the shipments of cinchona bark which hitherto has formed a prominent article of export from that place. The quantity has fallen from 14,829 serons in 1873 to 3213 serons in 1874. This appears to be principally due to the diversion of the general export trade to Savanilla, in consequence of the construction of a railway that has placed that port in connection with the inland districts. The bark shipped from Savanilla during 1873 (the latest date given) amounted to about 2200 tons, and was valued at more than a million dollars.

VEGETABLE IVORY.

Owing to the great demand there is in the German market for the so-called ivory nut (*Phytelephas macrocarpa*), its price in Carthagena, the port to which it is brought from the forests bordering the rivers Atrato and Magdalena, has nearly doubled within a short time. It is estimated that the exports of the present year will treble those of last, which amounted to 275 tons.

TAHITI PRODUCTS.

Amongst the exports during the year 1874 from Tahiti, Her Majesty's latest acquired dependency, were 7500 gallons of lime juice, of an average value of 1s. per gallon, and nearly 5,000,000 oranges. There were also about 150 tons of an edible fungus exported to China, the export price of which was £50 per ton.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, October 6, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Atherton, Baynes, Betty, Cracknell, Frazer, Hampson, Hanbury, Owen, Rimmington, Robbins, Sandford, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

The late Mr. Daniel Hanbury.

The President stated that he had received a communication from Mr. Thomas Hanbury, to the effect that he desired to publish, in a collected form, his late brother's writings, but understood that the previous consent of the Society was necessary. The President had at once said that he was sure the Society would be very glad to assist him to the utmost in such a desirable work, and had suggested that Mr. Thomas Hanbury should send a letter to the Council upon the subject. A letter had since been received to this effect, in which Mr. Hanbury added that Mr. Ince was preparing a brief memoir to prefix to the volume.

Mr. Sandford then moved, and it was resolved unanimously:—

> "That this Council authorize Mr. Thomas Hanbury to republish any writings of the late Mr. Daniel Hanbury in which they may possess any copyright or right of publication, and further desire that the editor and publishers of the *Pharmaceutical Journal* should assist Mr. Hanbury by the loan of blocks, or in any other way possible, to promote so desirable an object."

Elections.

MEMBERS.

Pharmaceutical Chemist.

Havard, Benjamin	Narberth.

Chemists and Druggists.

Miles, George	Freemantle.
Morgan, Frank G.	Petworth.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations, and being in business, were elected "Associates in Business" of the Society:—

Minor.

Ashley, Henry	Gravesend.
Greig, William	Old Kent Road.
Windmill, William Henry	Leytonstone.

Modified.

Trim, Edmund	Bournemouth.

ASSOCIATE.

Alfred Carter, of Ballarat, Victoria, having passed the Modified examination was elected an "Associate" of the Society.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Brumwell, William Preston	Newcastle-on-Tyne.
Duncan, Alexander	London.
Eliott, Samuel, jun.	Liskeard.
Hall, Richard Arthur	Leigh.
Holding, John	London.
Judson, Charles Thomas	Leeds.
Maclean, James	Jedburgh.
Mortashed, Henry Charles	Westminster.
Parry, Robert	Bettws-y-Coed.

A member was restored to his former status in the Society upon payment of the current year's subscription and a fine.

The name of Joseph Ward, of Leek, Staffordshire, was restored to the Register of Chemists and Druggists.

FINANCE.

The report and recommendations of this Committee were received and adopted, and sundry accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee was read, including recommendations that the following grants be made:—

£20 for the benefit of the children of a late pharmaceutical chemist, for thirty-one years a member of the Society.

£15 to a female chemist and druggist by registration, who had been in business some years on her own account, but is at present in a situation. She has four children, two of whom are in an orphan asylum.

£5 to the widow of a registered chemist and druggist.

£10 to the widow of a late member of the Society, with three children.

Mr. **SHAW** suggested the desirability of the Council discontinuing canvassing cards in view of the annual elections of annuitants, inasmuch as it entailed a great expense on the candidates.

Mr. **OWEN** thought this was too large a subject to be entered upon then. In his opinion the new plan which had been introduced into some charities had not been at all successful.

Mr. **ROBBINS** said he had been recently consulted with regard to the issue of cards, and had recommended the candidate not to do so as the Council discountenanced the practice. He had since seen that his name had been placed on one of the canvassing cards, and to avoid being considered inconsistent, it was necessary for him to explain that this occurred by an error.

Mr. **HAMPSON** suggested that the matter should be considered by the Committee. If any action at all were taken in the matter it would be necessary to draw a strict line, and forbid the circulation of cards altogether.

The **PRESIDENT** said there were two parties in this question, the canvassing and the non-canvassing, and he thought the Council had better wait some time longer before attempting any action.

Mr. **FRAZER** did not see that the Council had any right to interfere in the matter at all. These cards were simply private documents issued by the various parties, and he was at a loss to see how the Council could forbid their issue.

The report and recommendations of the Committee were received and adopted, and the Treasurer was requested to pay the annuitants up to Christmas next.

LAW AND PARLIAMENTARY.

The report of this Committee was presented. It included the following information from the Solicitor respecting the result of some legal proceedings he had taken:—

In the case of Thomas Bennett, of 86, Fowler Street, Sheffield, a County Court action for a penalty had been commenced on the 3rd of August, and prior to the day appointed for trial the defendant had paid into court the £5 penalty and costs.

In the case of Edwin Probett, of St. Helen's Road, Swansea, the defendant had ceased trading as a chemist and druggist; and had also paid the costs of the proceedings against him.

In the case of Arthur Mitchell Carr, of Attercliffe, Sheffield, a County Court action for two penalties of £5 each had been commenced, and on the day appointed for trial, judgment for the full amount had been obtained.

Several fresh cases of infringement of the Pharmacy Act, 1868, having been brought to the notice of the Committee, it was recommended that the details be placed before the solicitor, with instructions in some instances to proceed at his discretion, in others to advise the Council thereupon.

After some discussion upon some of the cases, the report of the Committee was received and adopted, with a slight amendment.

GENERAL PURPOSES.

Grant to the Leeds Chemists' Association.

An application having been received from the Leeds Chemists' Association asking for a grant of £25 for increasing the number and efficiency of lectures, etc., the Committee recommend that the grant be made.

Mr. **HAMPSON** said it appeared to him a serious matter to vote this sum of money to educational purposes, especially for the subsidizing of lectures. The Council had no control over the money after it had been voted and would not know the character of the lectures given, except in an indirect way. It also appeared to him that these votes must be made periodically if they were to be of any service, for they could not expect the Associations of Manchester or Leeds to be in a better financial position next year than they were now. He did not think the Society was responsible for education to be carried on all throughout the country; in such places as Manchester and Leeds there were science and art classes established with the aid of the Government, medical schools, and other avenues of instruction which ought to be sufficient for the requirements of the case. It was also to be remembered that these useful local societies were not simply educational institutions but were also exerting political power on pharmaceutical questions, and to a certain extent were trade societies, and if any money were subscribed, although no doubt it would be expended, perhaps wholly, for educational purposes, still it would have the effect of keeping in existence associations for mixed objects. He considered that it was proposed to vote this money in rather a slipshod manner without any sufficient guarantee that it would be expended in a proper way. If money were to be voted for this purpose, he should prefer its being given to some independent and specially educational establishment.

Mr. **SUTTON** said he was rather sorry to see the course being adopted of giving large sums of money to these large centres, which did not so much want it. There were many smaller places where no facilities for teaching existed, and those were the cases where help was really wanted.

Mr. **WILLIAMS** was glad this matter had been brought forward by Mr. Hampson. He had a strong opinion himself upon the question, and though he should like to see the Society, if it were rich enough, establish efficient schools in various parts of the country, where real education should be carried on, it was obvious that its means were quite inadequate to any such purpose. It seemed to him an injustice that a few favoured centres should get grants from the money subscribed all over the kingdom, when little places, possibly with greater need, did not receive assistance. The Council should so distribute the funds of the Society as to make their application universal and for the general good. But at present it was not so. He did not think on such matters the Council was bound to adopt blindly the report of any Committee, but he had no intention of opposing the present recommendation, his remarks simply applying to the general principle involved.

Mr. **SCHACHT** said the question of principle with regard to these grants had been long ago decided. At one time he had made himself somewhat of a bore in pressing these principles rather frequently on the Council, and ultimately it was decided that these provincial centres of education should be assisted, if necessary, by grants of money and in other ways, from the parent society. Certain methods were proposed by which this should be done,

one by himself, but all from their complexity or for other reasons, proved abortive, and it was finally decided to judge each case as it arose on its own merits. Regulations were drawn up and issued, and it appeared that in the present case all the prescribed conditions had been fulfilled, and the Committee had decided that the application was a legitimate one. One point must be borne in mind in considering these applications, viz., that most provincial centres could secure good teaching of chemistry and botany without much difficulty, those being subjects subsidized by the Government, but they could not so easily obtain teachers of pharmacy and materia medica, and it was here that the chief expense was incurred in the way of lectures. This was Mr. Brown's argument in asking for the grant for Manchester, and the same thing applied to the Leeds Association, which he thought had made a very moderate request. He quite agreed with the idea that, if possible, provincial schools should be self-supporting, but he also hoped the time would come when the same could be said of the London school. It had never yet been so, however, and the Society had always deemed it right to render assistance. Therefore, it seemed to him rather ungenerous to object to this grant being made to Leeds. There was so much good work done there, that he thought the Association might be freely entrusted with the money it now asked. If, in the future, these applications became too heavy a burden on the resources of the Society, it would be time to make a selection, and then possibly it might be decided to refuse grants to large towns where strenuous efforts were made and local contributions raised, and only give them to small places which had nothing, and did nothing.

Mr. HANBURY suggested that where medical schools were established there must be the teaching of materia medica, and that perhaps those lectures might be utilized by pharmaceutical students.

Mr. FRAZER said the question was very simple. They had long since decided to assist provincial education, and it was not the time to re-open that question. The application before them was either formal or informal, and if, as he understood, it was perfectly regular, there was no ground for rejecting it. With regard to small towns, he was not aware of any application from such a place having been refused. He was surprised at the political aspects of the local societies having been introduced into the discussion, because he did not see that they had anything to do with it.

Mr. ATHERTON said he thought that a former unanimous decision of the Council on a matter of principle should not now be contested, nor could he understand why gentlemen should try to throw cold water on such an enterprise. At the present time provincial associations had hard work to get on at all, but they were struggling manfully and ought to receive the sympathy of the Council rather than the reverse, in their efforts.

Mr. SHAW remarked that a grant of £10 had previously been made to Leeds for the purchase of books. He agreed to what Mr. Sandford had said on a former occasion, that wherever the Council found an association doing educational work, its efforts should be assisted, and he thought it rather ungracious to make any demur. With regard to the application of the funds, a balance-sheet could be called for at any future time if a further application were made.

Mr. BETTY was not sorry the question had been raised, because its discussion would attract public attention, and demonstrate the willingness of the Council to encourage provincial education. It had been said that certain provincial associations had a duality of objects —that they were political as well as educational; but at present, when there was no burning political question on the horizon, he thought these societies might be fairly regarded as simply educational centres. Then, again, it had been urged that education was cheapened by such means, but that was the very thing they had always been advocating, and was one of the main objects in founding the Society. As a matter of consistency, so long as the Pharmaceutical Society proclaimed itself an educating body, it was bound to assist education whether in London or in the country. The British king, when being led in fetters along the streets of Rome, exclaimed —"How is it possible that those living in such luxury at home could envy Caractacus his humble cottage in Britain?" and he could not but wonder how those who were seated in such magnificence in Bloomsbury Square, with every educational facility at command, could begrudge a grant of £25 to Leeds.

Mr. HAMPSON wished to add one word in explanation, viz., that he had not meant any special allusion to Leeds, but simply to allude to an established fact, in speaking of the political and trade characters of provincial societies.

The VICE-PRESIDENT said he foretold last year, when the application from Manchester was discussed, that the Council would have similar applications from other societies, and he found on reference to the discussion that Mr. Sandford then expressed a hope that it would have very many. He shared the same feeling, for whilst the Council subsidized education in London he did not see how it could refuse to do so in the country, the time when education could provide for itself not having yet arrived. He thought, however, an endeavour should be made to impress upon local societies which applied for aid, the desirability of associating themselves more largely with the parent society than had yet been done in the case of Leeds, for only 15 out of 40 members and 5 out of 47 associates of the Leeds Association were connected with the Pharmaceutical Society.

Mr. SCHACHT desired to point out that although but a small number in any town might be members of the Pharmaceutical Society, yet, if they had been members for many years, they would have contributed largely to the general funds.

Mr. SANDFORD said he was quite prepared to reiterate his desire that there should be frequent applications of this kind, because if the Council was to promote education it should do so fairly and liberally. He should be glad if the Society could cease altogether to be a school-keeping body, but he would still apply all the disposable funds to the promotion of education throughout the country. This principle was settled long ago, and he regretted that it should have been raised again. It appeared that the former grant of £10 for books had been well applied, for the applications stated that the Society had a library of 240 volumes, mostly standard works, that it took in the leading periodicals, and provided a reading-room for the use of members. With regard to the remarks of the Vice-President, he believed that if the Council acted liberally, it would probably induce many more gentlemen to join the Society.

The resolution adopting the recommendation of the Committee was then put and carried unanimously.

PHARMACEUTICAL LABORATORY.

Mr. SCHACHT said he should be glad to know on what grounds the Library, Museum and Laboratory Committee had decided that his proposal for establishing a pharmaceutical laboratory could not at present be entertained, as he was not present last month when the report on the subject was made. If it was simply for want of room he should be glad if the idea were allowed to germinate, and something like a proper collection of pharmaceutical apparatus were gradually collected. He mentioned the subject again because he was firmly convinced from experience that it would be an immense boon to persons throughout the country to be able to inspect and examine such a collection of apparatus as was required for pharmaceutical work.

Mr. ROBBINS said the matter was fully discussed in the Committee, and it was thought that, to carry out the proposal for a practical laboratory, the Society would have to become manufacturers and vendors of preparations, which was not at all desirable. Besides it would be very difficult to decide what particular form of apparatus would be the best for every purpose to which it might be applied.

The PRESIDENT said he did not take quite the same view as Mr. Robbins, but the Committee came to the conclusion that practically all these matters came before the students in the lecture rooms and laboratory.

Mr. WILLIAMS said the question was mainly one of space, and if room could be found for such a collection of apparatus as Mr. Schacht desired, he thought the Committee would have reported very differently. The opinion of the professors was, that all which was essential to education was already provided for, and there was also the argument that the pupils learned practical pharmacy behind the counter, and not in the Society's rooms, where they came rather to learn the scientific principles upon which it is based.

Mr. SCHACHT said the Committee did not seem to have come to a very unanimous conclusion. One gentleman said the suggestion was not adopted because there was no room; another because it would necessitate the Society becoming traders, which was not desirable; and a third said that everything suggested was provided, and already being done. He could only assume where there was such diversity of opinion that his proposition had not been understood, which was no doubt his own fault. He certainly never contemplated the Society making all sorts of galenical and pharmaceutical preparations, but he thought it would be a great assistance to many gentlemen who were desirous of fitting up a small laboratory for their own use, if they could see the various apparatus required, and be instructed in the mode of working the same, the cost for fuel, the amount of production to be expected from a given size of apparatus, and so on. He, himself, might get access to this information privately by the kindness of individuals, but many other members would not be so fortunate, and would be very glad if they could obtain the necessary details by a visit to the Society's premises. The Council was constantly preaching about pharmacists ceasing to be mere vendors of drugs, and becoming practical men, but this was impossible unless some such facilities were provided.

After some further conversation the consideration of the matter was deferred.

THE CLASSIFIED REGISTER.

The Registrar placed on the table a copy of an alphabetical list of towns with the names and addresses of the registered chemists and druggists residing therein.

It was resolved on the motion of Mr. Atherton:—

> "That the Registrar be requested to provide books suitable for entering the names of chemists and druggists as now classified locally, and that he be required to make such alterations therein from time to time as may be necessary to keep the said register correct."

Mr. WILLIAMS suggested that it would be comparatively easy to print the list of persons in business, it being principally the associates and assistants who changed their addresses frequently.

THE STUDENTS' ASSOCIATION.

The consent of the Council was granted to certain alterations in the rules of the Pharmaceutical Students' Association, relating principally to the enrolment of honorary members. It was stated that there were already fifty-eight members, and that during the last session there had been thirteen meetings, with an average attendance of 17·69.

PHARMACEUTICAL MEETING.

Wednesday Evening, October 6, 1875.

The Opening Meeting of the Session, 1875-6, was held at 17, Bloomsbury Square, on Wednesday evening last. The chair was taken at half-past eight by the President of the Society, Mr. THOMAS HYDE HILLS.

The minutes of the previous meeting having been read and confirmed, the following Donations to the Library and Museum were announced, and the thanks of the Society voted to the Donors:—

Library:—'Museums: their Commercial and Scientific Uses,' from Mr. James Collins (Author); 'London University Calendar, 1875,' from the University of London; 'Glasgow University Calendar, 1875-6,' from the University of Glasgow; 'Collectanea Medica ad praxim potissimum spectantia, Curâ et studio Jacobi Manclerc, M.D.,' (MS.), from Mr. C. H. Snell; 'Guy's Hospital Reports,' third series, vol. xx., from Guy's Hospital; 'St. Thomas's Hospital Reports,' new series, vol. v., from St. Thomas's Hospital; 'A Methodical Synopsis of Mineral Waters, by John Rutty, M.D., 1757,' from Mr. F. C. Clayton; 'The Dispenser's Chart,' from Mr. H. K. Lewis (Publisher); 'The Veterinary Journal and Annals of Comparative Pathology,' edited by George Fleming, F.R.G.S., vol. i., no. 1, from Messrs Baillière, Tindall and Cox (Publishers); 'Welcher Smilaxsorte gebührt der Vorzug bei Anfertigung der in der Medicin gebräuchlichen präparate,' von E. Marquis;' 'Vergleichende Untersuchungen der Wichtigeren im Handel Vorkommenden sorten des Galbanum-und Ammoniak-gummis, von E. Hirschsohn,' and 'Antiseptica und Bakterien, von L. Bucholtz,' from Professor Dragendorff; 'Daniel Hanbury,' by Dr. N. P. Hamberg, from the Author (?); 'Daniel Hanbury, Nekrolog,' by Professor Flückiger, from the Author; 'Des liquides de l'Hydrocèle de la Tunique vaginale et de l'Hydrocèle enkystée de l'Epididyme,' and 'Sur les différents modes d'administrer phosphore en nature,' from Dr. C. Méhu (Author); 'Annual Report of the Board of Regents of the Smithsonian Institution for 1873,' from the Smithsonian Institution; 'The Dunciad, with notes variorum, and the Prolegomena of Scriblerus,' also 'The Dispensary, a poem in six cantos, ninth edition, 1726,' from Mr. H. O. Huskisson; 'Minutes of the Meeting of the General Medical Council, 1875,' from the General Medical Council; 'A Report on the Hygiene of the United States Army, with descriptions of Military Posts, 1875,' from the Surgeon-General, U. S. Army; 'Etude chimique sur la source Sulfurée Sodique forte et Iodo-Bromurée de Challes (Savoie),' by Dr. F. Garrigou, from the Author (?); 'Estudo Analytico e Comparativo dos principaes Acidos Organicos, 1874,' and 'Chloral e Chloroformio, 1874,' from Dr. D. J. Freire, jun. (Author).

Museum:—Volatile Oil of Elemi, from Messrs. Allen and Hanburys; crystals of Iron Alum and Alcoholic Extract of Jaborandi, from Messrs. Morson and Son; Artificial Vanillin and specimens of Brazilian drugs, illustrating papers in the *Pharmaceutical Journal*, from Messrs. Cyriax and Farries; fine crystals of Iodide and Bromide of Potassium, with glass shades for the same, and a fine "bell" of Camphor, from Messrs. Atkinson and Co.; very fine translucent specimen of Kauri Gum, from Messrs. Fitch and French, Melbourne; specimens of East Indian Pale Bark, from Mr. J. E. Howard; fine masses of crystals of Sulphocarbolate of Zinc and Chromate of Ammonia, from Messrs. Hopkin and Williams; specimens of entire Tamarind Pods, from Mr. J. Reeks, Southampton; specimen of volatile oil of Limes, and a powder used in Brazil as a remedy for snake bites, from Messrs. Davy, Yates and Routledge.

Herbarium:—Specimens of *Eriocaulon septangulare*, from Mr. G. C. Druce; specimens of *Verbascum pulverulentum* and *Bupleurum falcatum*, from Mr. Corder; specimens of *Nepeta Cataria* and *Gentiana Pneumonanthe*, from Mr. T. W. Nettleship; specimens of *Hieracium murorum* and *H. corymbosum*, from Mr. J. E. Griffiths, Bangor.

The Chairman called on Professor Redwood to make his—

Report on the Chemistry and Pharmacy Class.

Professor Redwood said the report he had to make with regard to the class under his charge was in every respect satisfactory. Time did not allow of his going much into detail, but he felt bound to state that on no former occasion, and he had occupied a position as Professor in that institution from its very commencement, had he felt more pleasure in imparting instruction to a class of students than during the last session. He said so mainly for this reason, that on one or two occasions previously it had been found with regret that some of those who came to the institution were anxious to avail themselves of its advantages in as brief and cursory a manner as possible; but during the last session he had been gratified to find a most important improvement in that respect, inasmuch as they had a class of young men who came for the obvious object of acquiring knowledge for its own sake, and for the benefits they might derive from it; and he could state, for his own part and also that of his colleagues, that from the commencement of the session to the end there was but one uniform disposition manifested by the students, to avail themselves to the fullest extent possible of all the means of instruction afforded them. The result was that in the first place not only had they a larger number of entries than during several years previously, but there was a far greater regularity in the attendance, so that almost every lecture had been attended by almost every student who had entered: in the next place, the students as a rule all took part in the examinations held at the conclusion of the lecture, usually once a week, and he was quite certain that the disposition manifested, and the regular attendance both at the lectures and the weekly examinations, had had a great influence on the result of the examinations for the prizes. These examinations had taken place on two occasions, the lectures being now divided into two courses of five months, and each consisting ostensibly of 60 lectures, but finding such an earnest desire to learn on the part of the pupils, and wishing to contribute all in his power to their improvement, the lectures had been extended, by making each one of the duration of an hour and a half, instead of one hour as formerly, so that practically each course may be said to consist of 90 lectures. The same plan would be pursued during the present session. At the conclusion of the first course of lectures in February last, when an examination was held and a bronze medal awarded, 15 candidates came forward, 5 of whom gave answers, which were estimated respectively at values represented by 92, 88, 83, 72, and 70, out of a possible total of 100. Under the existing regulations, the first only of these, Mr. Henry Ellis, was entitled to any mark of distinction; and he regretted that the other four had not even an opportunity of having their names recorded, in order that due credit might be given them for their exertions. At the end of the Session, in July, two separate examinations took place; in the first place, there was an examination similar to that which had taken place in February, of students who had only attended our course of lectures of five months' duration. These students were allowed to compete for a bronze medal, that being the only prize or mark of distinction awarded. Then, in addition to this examination, there was another, to which all students, whether of one course or more, were admitted, and the successful competitors in this, according to the value of their answers, might obtain a silver medal, the highest prize, and also certificates of honour, and certificates of merit, to the number of which certificates there was no limit. The bronze medal on this occasion was awarded to Mr. William Coles, whose answers were valued at 88. As in the case of the other bronze medal examination there were several other competitors, in this case five, the values of whose answers would have entitled them to some mark of distinction if such had been offered by the Council. They were all, however, entitled to compete with their seniors in the higher examination, and some of them did so, making the number of competitors in that examination fifteen. The competition was a remarkably good and close one, and no less than 10 out of the number succeeded in obtain-well merited rewards. The names of the successful competitors, with the numbers representing the values of their contributions, were as follows:—

Examination for Bronze Medal, in February, 1875.

Name.	Value.	Award.
Henry Ellis	92	Bronze Medal.

Examination for Bronze Medal, in July, 1875.

William Coles	88	Bronze Medal.

Examination for Silver Medal and Certificates, in July, 1875.

A. H. Naylor	90	Silver Medal.
Henry Ellis	89	Certificates of Honour.
George Green	88	
Thomas Eminson	86	
J. G. Atkinson	84	
William Coles	75	
J. A. Basker	70	Certificates of Merit.
T. H. B. Long	70	
William Wyles	68	
Thomas Slater	62	

The questions were as follows:—

Chemistry and Pharmacy.

The Bronze Medal. First Course.

Time allowed: Four Hours.

1. If a piece of platinum were weighed in the ordinary way in air, with brass weights, and its weight found to be 500 grains, and if it were afterwards weighed with the same weights under an exhausted receiver, that is *in vacuo*, would the second indication differ from the first, and if so would it be more or less?

2. What is the meaning of the term fluorescence, and how would you explain the phenomenon?

3. What is the latent heat of water, and how would you determine it?

4. Explain what is meant by the transmission of heat. Name a solid body that possesses the property of transmitting heat in a high degree, and another that possesses the same property in a low degree.

5. How would you reduce phosphorus to a finely divided or granular condition?

6. Describe the production of nitric acid as it would be practically conducted on a large or small scale, referring to details in the process. State the composition of anhydrous nitric acid, and of the nitric acid of the Pharmacopœia, and describe the method of obtaining the latter of these.

7. What is the composition and the assumed constitution of borax? What are its sources, and how is the borax of commerce usually prepared? Describe the properties of borax.

8. Describe the production of lead from its native source. Describe also the oxides of lead and the methods by which they are produced.

9. Give a sketch of the production of alcohol, acetic acid, lactic acid, and butyric acid, by fermentation from sugar. State their respective compositions, and show how they are related to each other.

The Bronze Medal. Second Course.

Time allowed : Four Hours.

1. Give the weight of a gramme expressed in troy grains, and state the relation existing between the gramme and kilogramme, and between the cubic centimetre and the fluid ounce.

2. Describe the method you would adopt for taking the specific gravity of calomel, giving the details of the process minutely.

3. In taking the specific gravity of chloroform in a room, the temperature of which is 75° F., what special precautions are necessary to insure accuracy in the determination?

4. What is the meaning of the term, "convection of heat?"

5. Explain the principle of the action of the syphon.

6. How is ozone produced, and what are its properties?

7. Describe the production and properties of carbonic oxide.

8. What are the chemical changes that occur in the conversion of barley into malt?

Silver Medal and Certificates.

Time allowed : Six Hours.

1. What is the specific gravity of a liquid, a fluid ounce of which weighs 445·4 grains?

2. Explain the law known as Marriotte's law, relating to the effects of pressure on the density and volume of a gas.

3. What is the principle of hydrostatic pressure in accordance with which the hydraulic press is constructed, and in what way is that principle turned to account, in confining the water in the large cylinder of the press?

4. Explain the terms Isomorphism and Dimorphism.

5. Explain the phenomena of fluorescence, and give a few instances in illustration.

6. Describe the Pharmacopœia process for the production of phosphoric acid, with full details.

7. Describe the production of calomel and of yellow oxide of mercury.

8. Define the terms alcohol, ether, aldehyde, and ketone, as used by chemists as generic terms.

9. Describe the Pharmacopœia process for the preparation of chloroform.

10. Give the formulæ representing the composition of the following compounds:— cane sugar, grape sugar, acetic acid, lactic acid, acetic ether, nitrous ether.

At the close of the Professor's report the Chairman distributed the prizes, saying a few words of congratulation and shaking hands with each successful competitor.

The Chairman then requested Professor Bentley to make his—

Report on the Botany and Materia Medica Class.

Professor Bentley said that for twenty-five years he had been in the habit of saying that if he had one happy day in the year it was when he found himself in that hall, surrounded by a body of pharmacists and pharmaceutical students. He was not very well in health when he went away, and though he thought himself quite well when he came back, he found he had not entirely recovered until he came into that room. He had but very little to say in addition to what had been said by his colleague, Professor Redwood, especially as they were all impatient to hear Mr. Ekin, but he could say conscientiously that he had every reason to be entirely satisfied with the general conduct, diligence, and progress of the students during the past year. He had said the same before, and he felt confident that that which had taken place for twenty-five years would still continue for the future, and that if he had again the honour of addressing a similar audience another year he should have the same gratifying statement to make. Having been a student there himself, and being the first who had taken a prize, he naturally felt additional pleasure in announcing the names of those who had gained honours, but before doing so he wished to add his testimony to that of Professor Redwood, and impress upon all students the great desirability of taking advantage of the weekly examinations. With regard to the competitions, there were at the end of February 16 candidates, and though he only had one name to announce, that of Mr. Alfred Wright, who took the bronze medal, nearly all distinguished themselves by the excellence of their answers. At the end of the session there were two competitions, one for the bronze medal and the other for the silver medal and certificates; Mr. T. Eminson took the bronze medal with great credit, and for the other examination he was happy to say there were 19 candidates. This was of itself very satisfactory, but what was still more encouraging, of those 19 scarcely any but came up to a high standard, while 13 gained certificates. The present students were looked to as the successors of the great historic names with which they were all familiar, some of whom had but lately passed away, and he hoped the present race would always look up to them as examples for their admiration and emulation. He concluded by announcing the following names of the prize takers:—

Ten Months' Course.

Silver Medal	Henry Ellis.
Certificates of Honour	Theophilus Hen. Beavan Long. Thomas Eminson. John George Atkinson. George Green.
Certificates of Merit	John Anthony Basker. William Coles. Ernest Cardwell. Wm. Arthur Harrison Naylor. Charles White. Bernard Dyer. William Wales Edward. William Wyles.

Five Months' Course.

first course.

Bronze Medal.—Alfred Wright.

second course.

Bronze Medal.—Thomas Eminson.

The following were the questions for these examinations:—

Silver Medal and Certificates.

botany.

Time allowed : Three Hours.

1. Describe Pitted, Spiral, Annular, Reticulated, and Scalariform vessels.

2. Describe the structure of Aerial and Submersed leaves; and tabulate the distinctive characters of the leaves of Acotyledonous, Monocotyledonous, and Dicotyledonous plants.

3. What is the Placenta? Describe the different kinds of Placentation.

4. Why do we classify plants? Define Species, Variety, Genus, Natural Order and Class.

5. Give the essential characters of the following natural orders, and enumerate the official plants which they respectively contain:—Rutaceæ, Cucurbitaceæ, Scrophulariaceæ, Polygonaceæ, Amaryllidaceæ, and Liliaceæ.

MATERIA MEDICA.

Time allowed; Three Hours.

1. What are the botanical and geographical sources of the official Matico? Give its physical and chemical characters, its uses and official preparations, and mention any leaves which have been substituted for it, and the means by which they may be detected.

2. What is Cinnamon? How is it obtained? and what are the characters by which it may be distinguished from Cassia?

3. Mention the botanical and geographical sources of Myrrh? Describe its physical and chemical characteristics, the substances used to adulterate it, and the means of detecting such adulteration.

4. Enumerate the official plants of the Rosaceæ. What are the botanical and geographical sources of Kousso? Describe its characters, and state its properties, official preparations, and doses.

5. What are the physical and chemical characteristics of the Rhizome and rootlets of *Helleborus niger?* and show how they may be distinguished from the corresponding parts of *Actæa spicata.*

6. What is Saffron? Describe the manner in which it is obtained and prepared for use, its general characters, the substances used to adulterate it, and the means of detecting such adulterations.

A *vivâ voce* examination was also held, when numerous medicinal plants were submitted to the several candidates who were expected to name them, to give their natural orders, and to answer any other question which was put to them.

The Bronze Medal. First Course.

BOTANY AND MATERIA MEDICA.

Time allowed: Three Hours.

1. What is Starch, and where is it found? Describe its general characters.

2. Describe the external appearance and internal structure of an acrogenous or acotyledonous stem.

3. Define the following: Cell, Vessel, Stoma, Epidermis, Hair, Gland, Parasite, Epiphyte, Pollen, Placenta, Fruit, and Seed.

4. What are the botanical and geographical sources of Pareira Root? Describe its general and chemical characters, and enumerate its official preparations.

5. Describe the characters of Chamomile Flowers; mention those flowers which have been used as adulterations or substitutions, and show how they may be distinguished.

6. What official drugs are derived from the Gentianaceæ? Enumerate their official preparations. Describe the characters of Gentian Root.

7. Describe the general and chemical characters of black and white mustard seeds.

The Bronze Medal. Second Course.

Time allowed: Three Hours.

1. Define the following:—Root, Stem, Bulb, Rhizome, Tuber and Corm.

2. Describe the structure of the bark of a Dicotyledonous stem. What is the so-called bark of a Monocotyledonous stem?

3. Describe the structure and mode of growth of a Leaf-Bud.

4. Describe the structure and development of the Pollen.

5. What is the botanical source of Elaterium? Describe how it is obtained in the greatest purity, its physical, chemical, and medical properties, and the means of ascertaining its purity.

6. What official drugs are obtained from the Lauraceæ? How would you distinguish Bay Berries from Cocculus Indicus?

7. Mention the official substances which are derived from the Melanthaceæ. What is the botanical source of Colchicum Corm? When should it be collected for use? How is it distinguished from Tulip Bulb? and what are its physical and chemical characteristics, and its official preparations and their doses.

The CHAIRMAN having presented the medals and certificates to the successful competitors, called upon Professor ATTFIELD to make his

REPORT UPON THE PRACTICAL CHEMISTRY CLASS.

Professor ATTFIELD said: The number of pupils who have worked in the laboratories during the past session is 107. This number is considerably above the average, indeed it has only twice been exceeded. These one hundred and seven students have entered for various periods amounting in the total to 482 months, or 4½ months per head. I will state the same fact in two other ways. Thus: First, if each of the 107 students had, during his whole period of study, worked 3 hours daily at practical chemistry, then the average period of study would have been 6 months per head. Or, secondly, if each of the 107 students had worked daily from 10 to 1 and 2 to 5, the average period of study would have been 3 months per head. I state the average period of attendance in these three ways for the following reasons. I give you the actual period, 4½ months per head, as the true basis for comparisons. I give you the period based on the assumption of attendance from 10 to 5 daily, because the latter is the maximum of attendance even for any exceptional pupil who might be working at practical chemistry only, and because councillors and professors have been in the habit of regarding such attendance as a sort of standard, terming it "full time." I lastly give the average period based on the assumption of attendance for 3 hours daily, because nearly all the pupils brought to the school by the Pharmacy Act, 1868, in other words, nearly all the pupils brought to the school by compulsory examination, work at practical chemistry for 3 hours daily. We have just as many whole-time, or "full-time" pupils as in the old voluntary days, just as many ten-month men, just as many men who are anxious to become good practical chemists and leaders in pharmacy; but the new men—the men who have sent up our sessional entries from under 50 to over 100, enter the laboratories for an average of 3 hours daily. Take the two classes of men together and you have an actual average period of study per head of 4½ months; assume that each works 3 hours daily, and you have an average period of study of 6 months per head; assume that each works daily from 10 to 1, and 2 to 5, and you have an average period of study of 3 months per head. I have nothing to say against "Juniors" for studying only 3 hours daily at practical chemistry. I am convinced that if men of limited means, and with a limited period of study at their disposal, are to give a proper share of their time to the respective subjects in which they are examined as candidates for the title of "Chemist and Druggist," they cannot, I say they cannot, give more than 3 hours a day to practical chemistry. And both the councillor and the professor or other friend of the school, must look upon such attendance as standard attendance for such men, under the existing conditions of examination. When an attempt has been made to induce these students to enter the laboratories from 10 to 5 daily, they have plainly stated that, while glad to embrace the opportunity which the Society has provided of getting real education, they must seek knowledge elsewhere, at the risk of that knowledge being superficial, rather than be compelled to give one branch of study an undue share of attention. I still have a few—a very few—pupils who work for a few months at practical chemistry from 10 to 5 daily, and afterwards give their whole days to the other subjects for a few months, and then go up for examination; but the great majority prefer to give a portion of each day to every subject. These students thus give just as much time as ever to the respective subjects, but work at each every day, instead of giving some months to part, and then a few months to the remainder of the subjects. Such a student, if he is working 3 hours daily at practical chemistry, does not like to be regarded as a half-time man; he considers that he is working full time, indeed considers that he is working more systematically than the man who is working for the so-called "full" time. "Major" or "Senior" students more generally work from 10 to 5 daily. I have treated this matter of *standard time of study* at some length, because it has for some years been forcing itself before me, and because it is forcing itself on the attention of the Council, and of all interested in real pharmaceutical education. Of the 107 students, then, 31 entered to work from 10 to 5 daily, and 76 for a portion of each day. Of the 76, a few entered for 4 hours daily, and a few for 2 hours daily, but nearly all for 3 hours daily. Only 18 students entered the laboratories for a single month. These one-month men belonged to the class of one-month men, respecting whom I reported to the Council in June, 1873, that is to say, nearly all had either previously worked at practical chemistry, or their one month was the first month of a longer period of study. Respecting the attention, diligence, general intelligence, and gentlemanlike behaviour, of the students of the past session, I can speak with the utmost satisfaction. I have not had one pupil who has avowed his desire to be merely prepared for examination; and I have had only one who was so lost to all sense of dignity and self-respect as to present himself for the Major examination before he was ready, on the chance, only, of passing—or, as he phrased it, "on spec." I always denounce anything of this kind. I tell my pupils that I teach them in order that they may know, not in order that they may pass; at the same time I tell them that when they do know, and know thoroughly, they will certainly pass any examination in what they know. And this one man learnt thoroughly all he was told to learn, he simply went "up" before he was ready; I am happy to say he was "plucked." He went up with twelve other candidates, all of whom passed. This leads me to allude to a feeling of discontent that obtained among the pupils of the school who passed the Major examination, at the absence of any award of "honours" or classification in the first division—especially considering that pharmacy proper is no longer required in the "Major." There is certainly no falling off in the ability or knowledge of the men; indeed, in my opinion, my best men ("Major" men) of the past session are better as a whole than the similar class of previous sessions. And, as I have said, the men of our school never having been specially "prepared" for the examinations, but having learnt everything, or at least having been taught everything, with the object of enlightening their understanding, training and disciplining their mind, and elevating their intellect, in a word having been *educated*, our men expect to stand a more severe and prolonged examination than the Society's "Major" examination. During the past session I have more than ever endeavoured, and I believe successfully endeavoured, to get my pupils to think well in addition to knowing thoroughly; hence I cannot understand why they do not get "honours" or what is termed, I think, a "first-class" certificate. I cannot, of course, satisfy them on this point, I can only report that some dissatisfaction exists. At the close of the session a competitive examination for the Council prizes was held. The questions and conditions of examination were as follows:—

Practical Chemistry.

Two days' Examination. Hours—10 to 5 on each day. (*Books and Memoranda permitted. Standard number of marks*, 100.)

1. Analyse the "Powder" given to you, and state your results.
2. Is there any lead in the so-called "Hair Restorer" supplied to you.
3. Examine the specimen of "Compound Camphor Liniment," and give an opinion on its quality.
4. How much resin is present in the "Scammony" placed before you?
5. Ascertain the probable proportion of added water in the accompanying sample of "Milk."

Note.—Manipulation as well as results will be scrutinized.

The following gentlemen obtained the positions indicated by the numbers attached to their names:—

Silver Medal	84	George Green.
Bronze Medal	78	Wm. Arthur H. Naylor.
	76	Thomas Slater.
Certificate of Honour	75	Henry Richard Arnold.
Certificate of Merit	70	John George Atkinson.
	65	Wm. Wales Edward.

In addition to these six gentlemen, four competed but obtained less than 60 marks. With regard to this competition I may state that a much larger number than 10 were anxious to compete but were excluded by the rule that competitors must have worked for not less than five months in the aggregate during the session—that is, five months daily from 10 to 5, or an equivalent length of time. These excluded candidates were quite satisfied with my reading of the rule, namely, that "five months" meant five months daily from 10 to 5—a reading in which, by the way, I was confirmed by the President and the Secretary. At the same time these students remarked that under that reading of the rule, the pupils who were allowed to compete for bronze medals in the lecture-classes were excluded from competition for bronze medals or even certificates in the laboratories. From what I have already stated in the former part of this report, members of the Society will be able to look at this matter from the students' point of view. Such students, as I am now speaking of, remain for a minimum of five months in the School. They divide their day into parts covering, 1st, the lecture-hour and the reading and studying in connection therewith;

2nd, three hours in the laboratories and the additional reading and studying connected therewith; and, 3rd the necessary reading and studying of other subjects; and they declare that this is the only practicable division of time that can be made under existing circumstances. From their point of view, three hours daily attendance in the laboratories is "full" time. At all events, they say, it is impossible for them to give more, and that, therefore, future students like themselves, though studying for (to them) the fullest possible time in the laboratories, must study there without the encouragement afforded by Council prizes, or at all events be content with lecture-room prizes. It will be seen that what these students cannot understand is the inequality, as it seems to them, of the encouragement they get in the respective departments of the School. I leave this matter in the hands of the Council. I should be sorry to see a Bronze Medal competed for in the laboratories at the end of every five months by these five-month students, for I am anxious that ten-month men should lose none of their present chances of a prize. Possibly, however, the competition at the end of the session might be thrown open to these five-month pupils, that is to those who have attended for three hours daily during five months (or an equivalent length of time), thus giving them a chance of taking a bronze medal if they can. I would not give such men the chance of taking the silver medal. The ten-month men would thus lose none of their chances of gaining a medal; indeed, would only be placed a little more on their mettle, while the five-month men would be as well off, or practically as well off, in the laboratories as in the lecture-classes. I may add for the guidance of the Council, that prior to 1873, students similar to those under consideration were allowed to compete for all laboratory prizes but the first; that is to say, up to two years ago the minimum period of qualification for all prizes but the first was three months of daily attendance from 10 to 5. This is much the same thing (considering the Saturday half-time) as five months of daily attendance for three hours. So that if the Council permitted these three-hour five-month men a chance of taking any sessional prize except the silver medal, the Council would be adopting a course not very different to that which obtained in the class of Practical Chemistry up to 1873. I add nothing more. I trust that I have anticipated the wishes of members respecting information connected with the laboratories. I, however, keep a book of fully posted laboratory statistics, and could, therefore, increase the length of this long report to any required extent.

These prizes having been distributed, Professor BENTLEY was requested to make his report on

THE BOTANICAL PRIZE.

Professor BENTLEY said that on the two previous occasions there had been but a limited competition, but this had not led him to speak in desponding terms, because he attributed it in great measure to the very high merit of the herbaria sent in previously, which acted somewhat as a discouragement to others. his year, however, there had been five collections sent in, at which he was much gratified, since it abundantly testified to the industry of the students. The student who collected a herbarium was generally a hard-worked apprentice, and had to collect his plants at an early hour in the morning, and a deal of energy and perseverance was required to collect, dry, name, preserve, properly mount, and arrange the various specimens. All the herbaria which were sent in were considered worthy of distinction, on which he congratulated the Society, and also more especially the collectors themselves. The best collection, which took the silver medal, was eminently worthy of distinction; it was contributed by Mr. Wheatly, and consisted of 614 specimens well named, and admirably preserved and arranged. The collection of Mr. Prebble, who took the bronze medal, was also a very meritorious one, and the others were also most creditable to their collectors. In concluding, he desired once more to impress upon all students the great benefit they would derive from studying botany in this practical manner, and at the same time they would find it a pleasurable and healthy relaxation from business.

The following is a list of the successful competitors:—

Silver Medal	Arthur William Wheatly.
Bronze Medal	John George Prebble.
Certificate of Honour	Thomas David Wright.
Certificates of Merit	Arthur Poulton. James Chapman Shenstone.

The Chairman having distributed these prizes, and heartily congratulated the successful candidates, reminded them that this was only the commencement of their career, and he trusted that by continued study they would become ornaments to pharmacy, as well as useful members of society.

THE JACOB BELL MEMORIAL SCHOLARSHIPS.

The Chairman then introduced to the meeting the successful competitors for the Jacob Bell Memorial Scholarships for the ensuing year—

HENRY GEORGE GREENISH.
JOHN LEAVER WEST,

and congratulated them also on their success, and spoke feelingly of his late friend Jacob Bell, in whose memory the Scholarships were founded.

The following were the questions:—

CHEMISTRY AND PHARMACY.

Time allowed: Two Hours.

1. What is the composition by weight and by volume of Atmospheric Air? State the best methods known to you for preparing its constituents in a pure state.
2. How are Nitric, Hydrochloric, and Phosphoric Acids respectively prepared? Explain the processes by equations or diagrams.
3. Write the symbols for Salt of Tartar, Glauber's Salt, Epsom Salt, Green Vitriol, Blue Vitriol, Caustic Potash
4. State all you know about the element *Carbon.*
5. How are the Extracts of Belladonna and Nux Vomica prepared.

BOTANY.

Time allowed: Two Hours.

6. Describe the various parts of the flower.
7. What is the difference between the fruit and the seed.
8. In what way do plants obtain their food?

LATIN, ETC.

Time allowed: Three Hours.

LATIN.

1. Minus habeo virium quam vestrum utervis. 2. Tempus erat quo prima quies mortalibus aegris incepit. 3. Unde venis? exclamat. 4. Omne quum Proteus pecus egit altos visere montes.

Also the following passage:—

Hoc primum in luco nova res oblata timorem
Leniit: hic primum Aeneas sperare salutem

Ausus, et afflictis melius confidere rebus.
Namque, sub ingenti lustrat dum singula templo,
Reginam opperiens, dum, quae fortuna sit urbi,
Artificumque manus inter se, operumque laborem,
Miratur, videt Iliacas ex ordine pugnas,
Bellaque. jam fama totum vulgata per orbem,
Atridas, Priamumque et saevum ambobus Achillem.

Grammatical Questions on the above :—

2. Give the case and construction of *vestrum*, *rebus*, *urbi*, *Atridas*.

3. State the present, perfect, supine, and infinitive of *incepit*, *oblata*, *leniit*, *ausus*, *confidere*, *videt*.

ARITHMETIC.

4. Divide 7380·964 by ·023 ; 6·5 by 3·42 ; 25 by 19 ; and prove the truth of the results by fractions.

5. Reduce 3 qrs. 19 lbs. to the fraction of a ton ; and $61\frac{7}{8}$ lbs. to the fraction of 4 ozs.

6. How many *grammes* are contained in an imperial gallon of water.

ENGLISH.

7. Analyse the following sentence, and parse the words in italics :—

> "*Not* a drum *was heard*, not a funeral note,
> *As* his *corse* to the rampart we *hurried* ;
> Not a soldier discharged his farewell *shot*
> *O'er* the grave *where our* hero we buried."

8. Write a short essay on *Culture*.

FRENCH AND GERMAN.*

9. Translate into English :

Connaissez-vous une certaine Pénélope, qui était la femme d'Ulysse, un roi grec très célèbre, dont on parle sur la terre depuis 3000 ans, grâce à un poète nommé Homère, qui lui a fait l'honneur de s'occuper de lui ? Le mari de Pénélope était parti depuis bien longtemps pour aller faire la guerre, et comme il ne revenait pas, on la pressait de se remarier. Pour avoir la paix, elle avait promis de la faire, quand elle aurait achevé une pièce de toile, à laquelle elle travaillait toute la journée. On croyait la tenir bientôt; mais en épouse fidèle, résolue d'attendre son mari jusqu'à la fin, elle défaisait pendant la nuit ce qu'elle avait fait pendant le jour. Je vous laisse à penser de combien la toile avançait dans un an.

Or translate the following into German :—

My Dear Papa,—I have been at Mr. M's this morning, where I have translated English into Latin, and Latin into English, and so well that at the end of my exercise he has written *optime*. I have likewise repeated a Greek verb pretty well. After this I ran home like a wild little boy, and played till dinner-time. This was a serious task for I ate like a wolf ; and by that you may judge that I am in very good health. Adieu.—*Letters of Lord Chesterfield to his Son.*

Mr. Charles Ekin, F.C.S., of Bath, then delivered—

The Inaugural Sessional Address.

Students of Pharmacy,—

Comparatively speaking, so recently is it that I was myself studying in order to pass my examinations, that my being honoured at this time with the invitation of the Council of the Pharmaceutical Society to say a few words of encouragement to you at the opening of this session of the Society's School, gives me the advantage of addressing you whilst my student's memories and sympathies are still fresh upon me, and it is therefore as from one of yourselves that I ask you to receive and listen to what I may have to say to you this evening.

You have come here with the intention of spending some months in study, the better to fit yourselves for the business of your choice, and to enable you to pass the examinations which have been prescribed by the Government of the land, as affording some guarantee of your fitness for the discharge of the responsible and somewhat onerous duties of a pharmacist; and it may not be out of place if, at the outset of my remarks, we endeavour to obtain a clear picture in our minds of what this business of ours really is, that we may be the better able to consider the best means of meeting and providing for its requirements.

I dare say most of us remember pretty vividly our impressions on entering upon our first term of pupilage or apprenticeship. We had perhaps thought little about what we had to expect, and as is so often the case, had drifted into, rather than deliberately chosen, the business we are engaged in.

We may have been partly influenced, some I know are so influenced, by learning that we should have examinations to pass, and a course of study to go through, which created in the minds of our guardians or parents, and in our own minds, a vague, ill-defined impression that our business was thereby invested with a semi-professional character, and that our status in society was by so much raised beyond that of a mere tradesman.

These impressions perhaps were somewhat rudely shaken during the period of apprenticeship, when we were brought face to face with the drudgery and petty details inseparable from ours as from most other callings, but they are likely to be renewed and strengthened during your students' life here, and it is for this reason that I allude to them now. Nothing can be more delightful than the life of a student. Many who have given hostages to fortune envy you, and would gladly share with you the advantages you are about to enjoy for the next few months. But with these advantages you have special temptations, and the one temptation to which I refer at present may be actually engendered by the very zeal with which you throw yourselves into your work. For a time you will be living in a very different world from that you have been accustomed to, and the tasting the sweets of acquiring knowledge may very naturally for a brief moment on your return to practical business life cause you to feel a distaste for it. I say for a brief moment only, for I have faith in your common sense, but it is because I have seen many instances where this distaste, becoming permanent, has unfitted men for business, that I raise a note of warning now. Of course there have been students here of ability, who have left the ranks of pharmacists to follow out some special line of study. I need hardly say that I allude to none of these. Much as we may regret their leaving us, pharmacy is content to be used even as a mere stepping stone to their advancement. I allude rather to those students who, owing to deficient education and sickly views of life, become what is called "above their business," and who, by their foolish pretensions and incompetence in practical details, bring discredit on the class to which they belong.

I think if you have not already made up your minds, a little thought and consideration will convince you that pharmacy is essentially a trade, not only in the mixed businesses which form the large majority, but even in the comparatively few devoted to what may be called pure pharmacy. But surely our position as tradesmen in general, and pharmacists in particular, is too honourable that we can afford to allow ourselves to be jostled in the crowd of would-be professionals. If our calling is a useful one, affording ample scope for the exercise of our mental faculties, we shall best consult our own dignity by making a firm stand for our real position, and respect ourselves first in order that we may gain the respect of others. Respect ourselves—not by aping and pretending to be what we are not, but by proving in our lives and in our persons, that in this respect professions own no monopoly, and that it is quite possible to be an educated man and a gentleman and yet engage in trade pursuits.

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* The Candidate is at liberty to choose either French or German, and is not required to show a knowledge of both.

And if ours, then, is a trade, it follows that the first requisite for a pharmacist, above all others, is business habits. It is of small moment if our grocer sends us soap for cheese, or our bookseller Tupper for Browning; but even the slightest mistake is of consequence to us, where carelessness and inattention may be fraught with the most serious consequences, and the slightest mistake must always tend to deprive us of the confidence of the public.

The scientific knowledge of our business, when it is coupled with sound practical business habits, renders the services of its possessor eagerly sought for, whether as an assistant, or in due time by the public as a principal. But if one has to choose on the one hand between the man who has a thorough knowledge of the practical details of his business without any special scientific knowledge, and on the other hand the Major associate, in honours it may be, without such practical knowledge, there can be no question that the former will be pronounced as the man who best fulfils his duties as a pharmacist.

You may say that this is too obvious even to be mentioned, much less insisted on, but I am persuaded that the matter at this stage in the career of the Pharmaceutical Society is worthy of your most careful and earnest consideration, and that any conclusions you come to respecting it will largely affect your future happiness and usefulness.

Judging from letters that appear from time to time in the *Pharmaceutical Journal*, and from what one hears and sees every day, it would seem that there are many young men in our ranks, I am far from saying a majority, but a sufficiently formidable minority to form the leaven that may rapidly leaven the whole lump, who are altogether sailing on a wrong tack, and who have formed an exaggerated and disproportionate estimate of their own position and consequence. Instead of presuming to dictate to and almost patronize the older members of our body, to whom let us remember we owe all the advantages we now enjoy, and which were fought for and won, not so much for themselves as for posterity, I think it would become us better to set ourselves to imitate their sterling business qualities, which have gone far to account for the present advancement of pharmacy, and to make possible a better future for us. To be candid, I think there never was a time when we had less cause for overweening self-confidence than the present. As a proof of this, to say nothing of those household and respected names of men who though happily still with us belong rather to the last generation than to ours, we have but to compare ourselves with the men who were students here some thirty years ago, at the first opening of this Society's school, and to ask ourselves, but to ask I fear in vain, where are the men of this our day who will take the same place as they have done?

Let us consider, too, the general education of those of us now entering the trade as tested by the Preliminary examination. The examination, putting aside the small modicum of Latin required, is in no whit more difficult than the sixth standard of the New Code, which standard boys can pass at the age of fourteen in our elementary schools, and yet we find that half the number of those presenting themselves for examination fail to succeed.

It is just this low standard of education which I believe is at the root of nearly all the misapprehension I have been alluding to.

The examinations, seen through the refracting medium of the mists engendered by deficient education, assume gigantic and distorted proportions, looming through the distance as lofty and inaccessible mountains, but when approached by the well-grounded pupil, marching with steady and even steps, they are found to be, if not veritable molehills, at any rate hills of but gentle ascent. It is an undoubted fact that the men who have had the best general education are the best able to devote themselves successfully to special studies, and it is much to be hoped that out of considerations of pure mercy to the youths now entering the business, the Council of this Society will soon see their way clear for making the Preliminary, that which it certainly is not now, a really test examination of a fair general education.

When that day comes we shall hear no more about the difficulty of passing the examinations, but until then, even if with some degree of shame, we take a lower place in our own estimation, it will have the healthy effect of causing us by renewed exertion to raise ourselves to a more perfect and just view of our merits and true position. We shall not then complain that we are not appreciated because we know so much, but we shall learn that in those cases where these plaints are heard, it is just because young men are in ignorance of how little it is they know, that they give themselves such airs. I know it to be the opinion of many people, that the requirements of the examinations cause young men to be educated above their business, and that after their course of studies here or elsewhere they never settle down again comfortably to the inevitable routine of a pharmacist's life. At first sight there may be some show of reason in this idea, but if we really go into the matter we shall find, I am convinced, that it is really want of education, not too much education, that is the cause of the evil. The examinations have been gradually increased in stringency up to their present standard, and if the Preliminary had been gradually increased too, to keep pace with the requirements of the Minor and Major examinations, the result would have been that boys entering the trade would be kept, if necessary, longer at school, and thus rendered better fitted to enter upon their special studies. My own experience, which so far as I can gather is a very general one, goes to show that almost invariably the most capable pharmacists, whether as assistants or principals, and by capable I mean the careful, accurate, painstaking men of business, are just those who have received the best education, an education not necessarily acquired at school, but often in spite of many disadvantages, such as leaving school early, acquired by diligent self-culture in after life.

Not to dwell longer on these general considerations, I have already referred to the advantages you are about to enjoy here, and I would earnestly impress upon you that any neglect of them will cause you to look back in after life with much regret on your wasted opportunities. This emphatically is your golden opportunity, and your use or abuse of it will colour and determine more or less your whole future.

This should be especially for you a time of self-denial. In this large city you are surrounded with numberless temptations to take you from study, many of them at another time innocent and legitimate enough in themselves, but now to be avoided and fled from as you value your welfare and realize the duty you owe to yourselves and those who sent you here. What I would ask you first to try to cultivate at this time, at a period of life when habits are most easily established, are habits of study. Many of you who have perhaps a natural disinclination for study, will be surprised to find how easily this may be overcome by determined resistance. As Butler says in his 'Analogy,' "By accustoming ourselves to any course of action, we get an aptness to go on, a facility, readiness and often pleasure in it. The inclinations which rendered us adverse to it grow weaker; the difficulties in it, not only the imaginary but the real ones, lessen; the reasons for it offer themselves of course to our thoughts upon all occasions, and the least glimpse of them is sufficient to make us go on in a course of action to which we have been accustomed. And practical principles appear to grow stronger, absolutely in themselves, by exercise, as well as relatively with regard to contrary principles, which, by being accustomed to submit, do so habitually and of course. And thus a new character, in several respects, may be formed; and many habitudes of life, not given by nature, but which nature directs us to acquire."

As for your success here much will depend upon the way you look at your examinations, whether you regard them as mere signposts by the way or as your ultimate goal. Nothing can be more fatal than the latter view. To strain every nerve, simply to pass, only to leave yourselves exhausted and unfit for further exertion! To gorge the mind, regardless of the fact that the mind surfeited with an ill-digested load of material, which it makes all haste to free itself from, conceives, it may be, for ever after an absolute distaste for wholesome nourishment! These be the reasons of the dyspeptic wails that from time to time find utterance in the correspondence columns of the Journal. The man who by dint of cram lands himself by one supreme effort on the other side of the "Major" finds to his dismay that the mere qualification and title which he set such store by avail him nothing, and that the habits and love of study, which he might have but has not acquired, would have set him on his way in life with every certainty of success. As with the body so with the mind, it is the moderate and daily portion of food, well assimilated, that stands us in good stead. It is of prime importance that you should think before you read, or at least whilst you are reading, and only so will you be able to grasp your subject. "Read, not to believe and take for granted, but to weigh and consider." Bacon tells us, "Studies serve for delight, for ornament and for ability," and much as "ability and judgment in the disposition of business" concern us, I verily believe that it is in the "delight" chiefly we reap our abundant reward.

It is at once, perhaps, an advantage and a disadvantage that whereas other tradesmen have to find their pleasure *out of* business, the hard-worked pharmacist who may be said to be always, more or less, at work during the *seven* days of the week, is able to find, and if he be wise, will find, much of whatever amount of pleasure falls to his lot in life during the hours he spends *in* his business. The better the chemist, botanist, and physicist he is, the more intelligently will he carry out the thousand and one little processes in which he is daily engaged, redeeming his work from the position of drudgery and investing it with the halo of interest which always attaches itself to the practical applications of science, even to its most remote ramifications. And if to maintain vigorous health and its accompanying high spirits, which are larger elements of happiness than any other things whatever, the pharmacist passes a large proportion of his hardly-earned hours of leisure in the open air, here, too, the special training of his calling follows him and transforms the monotony of mere constitutional walks into pleasurable excursions. Who can sum up the pleasures of exploring the flora of the district in which one lives and the delight which every discovery of a fresh plant always brings? To quote Bacon once more, he has pronounced a garden to be "the purest of human pleasures, the greatest refreshment of the spirits of man." And if this be true of the gardens which man plants, which are set out and arranged according to conventional rules, and often so artificially conceived as to lie open to the faults of stiffness and formality, how much truer must it be of the gardens of nature's planting, where the wild luxuriance of colour and the unrestrained freedom of growth, whether in the bright meadows, tangled bank, or dense wood, give a combination of charms nowhere to be found or enjoyed except amid rural scenery!

Nor in your study of botany are you confined to the flora of your own country. There is rarely in these days a large town to be met with that has not its arboretum, and the smallest country town must be very exceptionally situated if there is not a gentleman's seat near or gardens where one may find scattered here and there some of the acclimatized trees and shrubs of other countries. You will read with much more interest and profit books of travel if you are able from your own knowledge of some of the forms of vegetation named in them to realize and picture to yourselves foreign floras. And knowledge of this sort is of no little practical use as it enables you to advise as to the judicious planting of our towns and neighbourhoods, where, notwithstanding so much has been done and is being done in this direction, so much still remains to be learnt.

You cannot occupy a half holiday, during your stay in London, to a better purpose than by an occasional visit to Kew. In spite of the vivid and faithful descriptions by such naturalists as Bates and Wallace, the most fertile imagination fails to arrive at anything like a satisfactory conception of tropical scenery, and the delightful impressions in seeing for the first time in the palm house at Kew such trees we have so often read about, as the Banana, Screw Pine, Banyan, Date Palm, Cocoanut Palm, and Mangrove, are never to be forgotten.

But for hardier trees and shrubs, your own neighbourhood will amply furnish you with sufficient examples. To mention only a few of the many which I find from personal observation to be everywhere common, we may start from Canada, which gives us so many of our Coniferæ, with the Hemlock Spruce (*Abies Canadensis*), which, from its abundance and beauty, is frequently referred to by the American poets under the name of Hemlock.

To the United States we owe perhaps more than to any other part of the world, with the single exception of Japan, trees of great diversity and surpassing beauty. The Oaks and Maples, the Buckeyes (*Pavias*), the Locust Trees (*Robinias*), erroneously called Acacias in England, the *Catalpa syringæfolia*, the noble *Liriodendron tulipifera*, the Tulip Tree, the *Aralia spinosa* with its large bipinnate leaves and handsome spikes of flowers, the *Juglans nigra*, and various species of *Carya*, yielding the Hickory nuts and Butter nuts, etc., the mere mention of which recalls to us our early school-boy days, when we pored over 'Queechy' and the 'Wide Wide World;' the *Taxodium distichum*, the Deciduous Cypress, the prevalent tree in the swamps of the Southern United States and Mexico, the hiding place formerly of many a hunted slave, and interesting not only from its beautiful feathery foliage, but as being, in common with the *Sequoia sempervirens*, closely allied to fossil tertiary species which countless ages ago were spread over Europe, where no congeners are now indigenous. To California, besides, for some of our most valuable pines, such as *P. Sabiana* and *P. insignis*, we are indebted for the majestic but somewhat formal *Sequoia gigantea*, the Mammoth Tree of the Americans, and the Wellingtonia of our gardens, and for the equally majestic *Sequoia sempervirens*, the "red wood" of the timber trade.

South America gives us the *Araucaria imbricata*, and one or two species of *Libocedrus* from Chili; the *Araucaria Brasiliensis*, forming large forests in South tropical Brazil, and which is hardy in the warmer parts of England, and last but not least the beautiful *Berberis Darwinii*, now to be found in every garden, and discovered by Darwin during the famous voyage of the Beagle on the coasts bordering on the Straits of Magellan.

Leaving Europe, notwithstanding our considerable indebtedness to it, and hastening on as I must, just noticing the Cedar of Lebanon, the Horse Chestnuts of Asia, the *Cedrus Deodara*, *Abies khutrow*, and *Pinus excelsa* of the Himalayas, all Coniferæ of rare beauty, and leaving the *Caraganas* and *Spiræas* of Siberia on the North, we come through China, with its *Photinias* and thorny *Gleditschias*, to Japan. Owing to the general similarity of the climate of Japan to our own, we owe to it many of our most valuable introduced hardy shrubs and trees, without which our gardens and pleasure grounds would be shorn of half their beauty. In every cottage garden are to be found the evergreen Japan Euonymus, Privets and Honeysuckles, whilst even in the areas of our houses, in crowded streets, the Aucuba will flourish. Amongst the most striking of the Japan Coniferæ are the *Cryptomeria Japonica*, the Japanese Cedar, which forms a large proportion of the vast forests which clothe the slopes of the mountains there, *Thujopsis dolobrata* and *Retinisporas* of endless variety and beauty.

Then there are the charming miniature Maples. The Paper Mulberry (*Broussonetia papyrifera*), from the bark of which the tapa cloth of Polynesia is fabricated; the singular Maidenhair Tree or Gingko (*Salisburia adiantifolia*) with its fern-like leaves; the *Paulownia imperialis*, with its immense leaves and purple flowers; and the two noble trees *Sophora Japonica* and *Ailanthus glandulosa*, which latter now being generally planted on account of the great beauty of its glossy dark green foliage, and of which we have already in England some fine specimens, acquires additional interest from its being the food of the silk-producing insect (*Bombyx cynthia*), lately introduced into South Europe.

Not to weary you with a further list of names which must necessarily be uninteresting and uninviting, I hope I may have said enough to induce you to enlarge your botanical boundaries and search out for yourselves the treasures from other lands that are to be found at your doors, promising you that however dry it may be and is to read mere descriptions, the actual study of the trees themselves is full of interest.

What funds of interest, too, are to be found in what may be called the byepaths of botany, in examining into the history, etymology, and poetry of the common English names of plants.

I am tempted to give just one or two illustrations, for which I am indebted to the writings of Mr. Ellacombe, and to pick at hazard one of the commonest, and at the same time one of the prettiest flowers that grows, the daisy, the favourite flower of Chaucer, who thus gives the likeliest derivation of its name,—

> "The daisie, or else the eye of the day,
> The emprise, and the flour of flours all."

Some of you may be surprised to hear that the forget-me-not, at the beginning of this century, was known only by its old English name of mouse-ear, which is the exact translation of the pretty Greek name μυοσωτις, dating from the time of Dioscorides, 1800 years ago, and which the plant still bears as its generic name. It was not until the pretty German legend of the forget-me-not, which you all know so well, became popular in England some fifty years ago, that it bore its present name. Before that time the name was applied for very different and less romantic reasons to the ground pine (*Ajuga chamæpitys*) on account of its unpleasant and long-enduring taste. You may remember a similar idea in Shakespeare, where he makes Ophelia say—

> "There's rosemary; that's for remembrance.
> I pray you, love, remember."

Rosemary being emblematic of remembrance on account of its enduring taste and smell.

How the mere mention of culverkeys and lady-smocks recalls to us the delicious word-painting of Walton! And how eglantine and a host of other names bring back to us some of the choicest passages in the old poets! But I must not linger too long by the way, sufficient is it to say that there is hardly an English name of a plant that will not give you some instruction or suggest some pleasing history.

From botany the transition is easy to geology. You will have noticed in your country rambles that where there is the greatest variety of soils there will be found the greatest variety of plants, and that some plants are peculiar to certain formations. We have a curious instance of this near Bath. The foxglove (the glove of the folks, or fairies) is absent from all the oolitic and liassic strata of the neighbourhood, and is only to be found in the district on a small area of about a mile in circumference, caused by an outcrop of carboniferous limestone, and the plant, tolerably abundant within the charmed circle, is never found out of it.

You will be frequently consulted, if you render yourselves competent to advise, on matters connected with the water supply of your district, on the composition of soils in connection with agriculture, and on various other questions, where you will find a knowledge of geology of paramount importance; but here, again, it is not so much the practical use of the study of this science that I would insist on, as the delight it is capable of affording you.

There is many a country town where the young pharmacist just settled in business is often tempted to ask, of what use was the examination ordeal to him. He rarely sees a prescription, and he may think that the occasions when he is called upon to exercise any special knowledge are few and far between. With the utmost sympathy for his position I have tried, however imperfectly, to point out to him where his true solace lies, whilst he is wearily waiting for the time, surely though slowly coming, when the better educated medical men of the present day will become alive to the fact that there is ample scope for all their ability and energy in the legitimate exercise of their profession, without undertaking duties that properly belong to us. In the meantime he will find his happiness in pursuing the studies the foundations of which he laid whilst preparing for his examinations.

There is an ample field before him. You have only to turn to the interesting paper by Baron von Mueller, which was copied in the *Pharmaceutical Journal* for last June, to see what services pharmacists have rendered as scientific investigators. Since then, too, we have had still further evidence, if further evidence were needed.

At a lecture on a piece of limestone by Dr. Carpenter at the meeting of the British Association held the other day in Bristol, allusion was made by the lecturer in connection with his subject, to the labours of two men in these words: "The admirable researches of Mr. H. B. Brady have recently brought to light a vast Forameniferal fauna in our own limestones." And again, "the careful study which Mr. Stoddart has made of a particular bed of a Clifton limestone has shown it to be full of minute forms of animal life, notably fragments of polyzoa."

It is unnecessary for me to tell you that the men thus honourably mentioned are pharmacists. Men who, thorough and successful in business, so far from having neglected their mistress pharmacy, have been chosen rather as eminent in their devotion to her to fill the office of Presidents of the Pharmaceutical Conference, and yet who have been able to carry their researches so successfully into sciences not immediately connected with their calling.

For the many, however, it is not given to attain such excellence, and I would rather set before you a less ambitious standard to which all here, if so minded, may attain.

Besides the more immediate and manifest duties of the pharmacist, viz., the dispensing of medicines and the retailing of drugs, duties the proper discharge of which involves a special scientific training, he may be said to have an extra mission which is to diffuse and distribute to the people a knowledge of science in its practical applications.

Lytton says in one of his later novels something to the effect that if in a strange place he wanted information on any point he invariably applied to the pharmacist as the best informed member of the community. It may be perhaps well for us not to pause to inquire too nicely how far this remark was suggested by an experience of foreign pharmacy, but even if we do not arrogate to ourselves such a position, we, believing with George Herbert that

> "Who aimeth at the sky
> Shoots higher much than he that means a tree,"

may fairly aim to attain it.

Whilst we must seek to avoid the Scylla of too great an absorption in the pursuit of any one science to the neglect of our business, we have, on the other hand, even more strenuously to avoid being sucked into the Charybdis of superficiality, the bane of attempting too comprehensive a scheme of study, preferring rather to do a little thoroughly than to attempt too much.

I have sought to point out to you some of the pitfalls that beset your path; to warn you that if you intend to be a successful pharmacist, you must determine that your education, so far from being necessarily finished when you have passed your examinations, is then but barely begun; to portray for you the position you may and ought to take; to show you that your calling, if rightly followed, in spite of its many disadvantages (and what calling is free from drawbacks?), is capable of affording you much of the higher and more worthy of life's enjoyments, and I cannot more fitly close my remarks than by putting before you in the eloquent words of Professor Huxley the sort of education we, both as citizens and pharmacists, ought to seek after.

"Education," says he, "is the instruction of the intellect in the laws of nature, under which name I include not merely things and their forces, but men and their ways." "That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a cold, clear logic engine, with all its parts of equal strength and in smooth working order; ready, like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself."

At the conclusion of the Address a vote of thanks to Mr. Ekin was carried by acclamation, and after a vote of thanks to the Chairman the meeting terminated.

The next Evening Meeting of the Society will be held on Wednesday, November 3.

Parliamentary and Law Proceedings.

PROSECUTIONS UNDER THE PHARMACY ACT, 1868.

Robert Henson, of 29, Fowler Street, Sheffield, who was proceeded against, for the illegal sale of poisons, at the County Court, Sheffield, on the 25th of August last, when judgment was deferred until the October Court,* has now been sentenced to pay the penalty and costs.

Robert Lund Tempest, of 3, Rippenden Road, Oldham, has been proceeded against for carrying on the business of a chemist and druggist illegally. On the case being taken into court the defendant paid the debt and costs, £5 6s.

Samuel Humphrey, of 20, Church Street, Woolwich, who was being proceeded against for carrying on the business of a chemist and druggist illegally, has died suddenly.

POISONING BY AN EMBROCATION.

The *Times* reports the death by poisoning of Miss Charlotte Huntington, of Lichfield, a lady advanced in years, while staying at the residence of the Venerable Archdeacon Moore, of Wolverhampton. Miss Huntington had lately suffered from brain disturbance and rheumatism, and used laudanum and chloroform as an embrocation. Suffering more than usual on Saturday last, she walked into the garden, where she was found with the embrocation bottle partially emptied by her side. Medical assistance was obtained, but she died on Sunday. A coroner's jury found that deceased had died from taking poison while in an unsound state of mind.

POISONING BY ARSENIC.

An inquest was held at Liverpool, on the 17th ult., to inquire into the death of Margaret Hall, aged seven months. It appeared that the father, who is in the employ of the London and North-Western Railway Company as an engine driver, had purchased half a pound of arsenic at the shop of Messrs. Johnson, pharmaceutical chemists, Church Street, for the purpose of destroying vermin. He placed the powder on the highest shelf in the scullery of his house, but his wife shortly afterwards took down the parcel, and, after taking out a portion of the contents, put the remainder on the boiler in the back kitchen. The same evening she went upstairs leaving three children, one aged $3\frac{1}{2}$ years, one about 2 years, and the deceased, playing in the kitchen. During the absence of the mother, the eldest child seems to have climbed on to the boiler, and having obtained the arsenic, given a portion of it to her two sisters, telling them it was sugar, but she took none of it herself. A medical man was promptly in attendance, and administered emetics, but the youngest child died. The jury returned a verdict of "accidentally poisoned."

POISONING BY VERMIN KILLER.

An inquest was held on Tuesday at Guildford, before Dr. Stedman, borough coroner, touching the death of William Harris, aged 33, of Reading. From the evidence it appeared that the deceased arrived at Guildford on the previous Saturday evening, and engaged a bed at the Barley Mow inn. He went to bed and about twenty minutes afterwards a noise was heard proceeding from the bedroom. On the landlord going to the door he found it bolted. He spoke to the deceased, who said, "Go for a doctor, I have taken poison." The door was broken open, and meanwhile a constable was dispatched for a medical man. The deceased then said that he had taken four packets of Battle's Vermin Killer. Mr. Taylor, surgeon, arrived in about a quarter of an hour, administered an emetic and applied the stomach pump, but during the second application of the pump the deceased died. Nothing was elicited to show why he had taken poison, although witnesses said that of late he had been strange in his manner. The jury returned a verdict that the deceased had committed suicide by taking strychnine, while labouring under temporary insanity.

POISONING BY ARSENIC.

On Thursday, September 30, an inquest was held at Rotherham, before Mr. Dorsey Wightman, coroner, on the body of Thomas Robert Jenkinson, aged four years. From the evidence it appeared that on the 23rd ult., the child, with nine other persons, partook of some broth which had been prepared for dinner. All were soon afterwards seized with unmistakable symptoms of poisoning, and the child died the same day. The grandmother of the child stated that she prepared the broth, which was boiled in a tin saucepan, that had been used on the previous day for washing purposes. The mother of the deceased deposed that the tubs which had contained arsenic were frequently brought from the Rotherham Glass Works for use as water and washing tubs. The aunt of the deceased said one of these tubs was used for washing at her house on the day before the poisoning. The clothes were put into it along with soap and hot water. Most of them were then put into a large boiler, but as that would not hold all of them, the remainder were placed in the tin saucepan in which the broth was boiled the following day. After the washing was finished the pan was washed out with cold water.

Thomas Waller, formerly employed at the Rotherham Glass Works, stated that he purchased the tub there a few weeks ago for 9*d*. It was not quite empty of arsenic when he saw it, but he got a man to empty it, and then it was sold to him by the manager for the sum named. Witness washed it out with a little cold water before he took it home. When it had dried it was quite white inside from the traces of the arsenic. He afterwards gave it to the parties who were poisoned, who had asked him to get them a tub. He did not warn them.

Mr. William Baker, F.C.S., analytical chemist, of Sheffield, deposed that he analysed the broth, some of the vomit, and the contents of the stomach of the deceased. After straining the broth, of which there was $4\frac{3}{4}$ pints, he took a pint for examination. In one-fifth of that he found a quantity of yellow sulphide of arsenic which corresponded to 35 grains of white arsenic to a pint. In the broth that remained, therefore, there would be about 166 grains of arsenic, or sufficient to kill between 20 and 30 people.

Eventually the jury returned the following verdict and expression of opinion:—"That deceased died on the 23rd inst. from being poisoned by arsenic inadvertently administered in broth; and the jury are of opinion that the indiscriminate selling of casks which have contained arsenic by the firm of Messrs. Beatson and Co., is dangerous and should be discontinued."—*Standard.*

EXCISE PROSECUTION FOR SALE OF METHYLATED SPIRIT.

At the last Stonehouse Petty Sessions, Mr. Pelham C. Maitland, chemist and druggist, Chapel Street, was summoned for selling methylated spirits without a licence.

Mr. Bridgman prosecuted on behalf of the Board of Inland Revenue, and Mr. R. G. Edmonds defended. In June last the defendant's shop was visited by an Excise officer, who asked for some methylated spirit. The defendant told him he had none, but that he had what was called "finish" which was just the same. The officer purchased some, and it was sent to Somerset House for analysis.

Mr. Woodward, supervisor, stated that he afterwards saw the defendant, who stated that he was selling the spirit as "finish." Witness asked him whether he was satisfied that it was "finish," and he replied that he was, and produced his invoice. By Mr. Edmonds: Defendant gave him as much information as any chemist to whom application had been made.

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* See before, p. 179.

Evidence was then given to show that the spirit did not contain sufficient gum to make it "finish."

Mr. Edmonds, in defence, contended that the defendant was not morally guilty of any offence whatever, and said he saw no reason why he should not have been summarily dealt with, as other chemists had been, for according to the evidence of the prosecution, he gave as much information as those who had been let off with a fine of 10*s.* The spirit was bought by defendant as "finish."

The Bench said that the law had been infringed, and they had no alternative but to fine the defendant the mitigated penalty of £12 10*s.*, but they recommended that the fine should be further reduced.—*Western Morning News.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

Codice Farmaceutico Internazionale. Proposte indirizzate al Congreso Internazionale medico in Bruxelles pel 1875 dai signori dott. M. de Cristoferis e chimico L. Zambeletti.

Rückblicke und Vorblicke in Kampfe gegen Eisenbahnwillkür. Dresden: Gehe and Co.

Die Tarifwirthschaft der Deutschen Eisenbahnen und volkswirthschaftlichen Aufgaben der Eisenbahngesetzgebung. Dresden: L. Gehe.

Handels-Bericht vom Monat September, 1875, von Gehe and Co. in Dresden.

Notes and Queries.

SYRUP OF IODIDE OF CALCIUM.—The following formula for a Syrup of Iodide of Calcium has been published by Mr. Stanislas Martin (*L'Union Pharmaceutique*, xvi., 2):—

Calcium Hydrate	5 parts.
Iodine	2 „
Sugar	200 „
Distilled Water	100 „

The calcium hydrate is triturated in a porcelain mortar with 30 parts of sugar, the water is added a small portion at a time, and the whole is left in contact some hours, being occasionally stirred. The solution is then filtered with paper, the iodine is added, and, after this has melted, the remainder of the sugar. The syrup is clear and colourless, with an odour of iodine and malkaline taste. It may be flavoured with tincture of orange peel or orange flower water.

FRECKLE LOTION.—Mr. Hans Wilder publishes the following recipe for the above:—

Sulphocarbolate of Zinc	2 parts.
Glycerine	25 „
Rose Water	25 „
Cologne Water	5 „

TRANSPARENT POMADE.—The *Druggists' Circular* gives the following recipe for a transparent pomade:—

Spermaceti	2 ozs.
Castor Oil	5 „
Alcohol	5 „
Oil of Bergamot	½ drachm.
Oil of Portugal	½ „

[447.] GINGER BEER POWDERS.—"*Thirsty*" would be glad to receive a formula for Ginger Beer Powders—such as are sold in packets at 3*d.* or 4*d.* each—to be dissolved in boiling water and fermented with barm.

Obituary.

DR. JOHN HUGHES BENNETT.

For twenty-six years professor of the Institutes of Medicine in the University of Edinburgh, Dr. Bennett has bequeathed to his pupils an estimate of his talents and attainments by no means shared by those who know him only by his writings. Of the four or five really able men who for the last quarter of a century have sustained and extended the scientific fame of Edinburgh, Bennett was, in point of natural gifts, undoubtedly the least. He had nothing like the genius of Goodsir, the almost poetic generalizing power of Edward Forbes, the Wellingtonian judgment of Syme, the inventive resource of Simpson, or the trenchant analysis of Henderson. But yet, thanks to an iron will, indefatigable industry, and supreme self-confidence, he made himself master of one or two departments of physiology and pathology; left his mark upon them as an original investigator; and, above all, expounded their details with a clearness of method and an elocution so dramatic in its impressiveness, that his juvenile auditors were ready to follow him enthusiastically into regions where he was certainly an intrepid but by no means a trustworthy guide.

He was born in London in 1812; acquired a little Latin and less Greek at a school in Exeter; was apprenticed to a general practitioner in Maidstone, and left his employer rather suddenly to begin the study of medicine at the University of Edinburgh. Here he enjoyed the society of young men, nearly all of whom fulfilled the bright promise of their youth, and was member of the club which they denominated, with better ambition than Greek, the *ο. ε. μ.*—that is, *οἶνος, ἔρως, μάθησις.* In the usual course he graduated as Doctor of Medicine, taking honours in the department of physiology; and in the same year (1837) he proceeded to Paris, where he was founder and first president of the Parisian Medical Society, in which capacity he acquired a fluent if not very critical knowledge of French. He afterwards made the round of the German universities, at none of which, however, he felt so much at home as in the Parisian schools, till in 1842 he settled finally in Edinburgh.

Here he began as a lecturer on pathology and practice of medicine in the Extra-academical school, and soon established a reputation as an effective teacher. He was particularly careful in training his pupils to accurate diagnosis, and introduced several of the "aids" for some time in vogue at the Parisian hospitals. For the chair of pathology, which had become vacant in the university, he next came forward as a candidate, but was defeated by his much abler antagonist, Henderson. In 1848 he competed successfully for the chair of physiology, and thereby attained the summit of his ambition—the opportunity of delivering clinical lectures in the university wards of the infirmary. In this capacity he extended his already high reputation as a teacher, and made the lecture-theatre ring with the applause of young audiences, tickled as they often were with his effective, not to say histrionic, parodies of rival lecturers, and impressed with the clearness and confident tone of his graver exposition.

In 1855 the resignation of the practice of physic chair by its great and good occupant Professor Alison brought into the arena several very capable candidates, Dr. Alexander Wood, Dr. Thomas Laycock and Professor Bennett among the number; and after a prolonged and embittered contest it fell to the second of these. Dr. Bennett now gave himself more than ever to book-making; published a manual of Physiology for the use of his class (a work disfigured by many blunders, and since re-written), and a large octavo volume, numbering more than 800 pages, on the Principles and Practice of Medicine. This book is especially strong on that region of the body in the diagnosis of whose diseases he was a master, namely the thorax, the other and hardly less important regions for the exercise of the physician's art were but superficially handled, or not at all. Nevertheless the book went through many editions, and making no pretensions to the charm of style and comprehensiveness of exposition which will always keep Sir Thomas Watson's 'Lectures' popular, it had certain practical merits which secured its acceptance particularly with the student-class. Previous to this publication he had written several minor treatises, one as far back as 1841, on 'Cod Liver Oil,' a therapeutic agent which he had certainly the credit of bringing prominently before the profession; and in the same year another brochure on the Employment of the Microscope in Medical Studies. He wrote also on Cancer and Leucocythemia, the latter a form of disease, discovered about the same time (1852) by Virchow of Berlin, who put its pathology on a far sounder and more scientific basis. His last important work was an inquiry into the action of certain substances, more especially mercury, in the secretion of bile, an inquiry in which he entered a sweeping protest against the use of that drug in hepatic affections. His views however were not shared by the more cautious of his professional brethren, and mercury remains in the Pharmacopœia despite his efforts to put it on the Index Expurgatorius.

In 1874 he had to resign his professorship from rapidly declining health. Follicular disease of the pharynx had long impaired, if not impeded, his utterance as a lecturer; diabetes also had for some time betrayed itself; and in August last, Sir Henry Thompson, whom he consulted in London, found him suffering from stone. About six weeks ago he went to Norwich to undergo the operation of lithotomy at the hands of Dr. Cadge. The stone was successfully extracted, but he succumbed to the *sequelæ* on Saturday, the 25th ult. He was but sixty-three when he died, but he has left a considerable reputation behind him among his widely-scattered pupils, and in the city where he laboured so long he will be remembered for his indefatigable energy, his intrepidity, his research, his courage in controversy, and his substantial contributions to the educational, if not to the scientific, resources of the medical school.

Notice has been received of the death of the following:—

On the 31st of August, 1875, Mr. John Alfred Bomford, Chemist and Druggist, of High Street, Warwick. Aged 36 years.

On the 10th of September, 1875, Mr. Henry Francis Taylor, Chemist and Druggist, of Summerland Street, Exeter. Aged 23 years. Mr. Taylor had been an Associate of the Pharmaceutical Society since 1869.

On the 16th of September, 1875, Mr. John Colby, Chemist and Druggist, of Western Road, Brighton. Aged 74 years.

On the 19th of September, 1875, Mr. Henry Readman, Pharmaceutical Chemist, of Mortimer Street, W. Aged 50 years. Mr. Readman had been a Member of the Pharmaceutical Society since 1853.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Labelling of Poisonous Liniments.

Sir,—There are occasions when the poor hard working chemist and druggist who bows with humble submission to the compulsory regulations regarding the sale of poisons, has cause to blush for those who, unfortunately, are allowed to dispense the most active and deadly of medicinal agents without observing even the ordinary precaution of affixing a label of "caution" or "poison." I refer to "surgeons dispensing." Taking a lotion or a liniment as an instance. In all probability it would be sent out in a small plain draught, or large sized mixture bottle, Two bottles, one containing an internal medicine, for doubtless there would be one, the other the lotion or liniment, as the case may be, would stand side by side in the patient's room with no mark whatever to distinguish the one from the other with the exception of the small and a very often indistinctly written label similar to the one on the mixture, but, of course, differing in the actual directions; it may possibly have the additional distinctive mark of an insignificantly printed label, "the liniment" or "the lotion."

Such a case is reported in the Journal of Saturday last; the verdict by the jury is also there, and no one can read the report, even though he may entertain the greatest respect for the medical profession, without feeling that there is certainly much room for improvement and restriction regarding the dispensing and subsequent labelling of active medicines even amongst "qualified practitioners."

Justitia.

Manchester, October 5, 1875.

H. D.—We are unable to give any explanation of the peculiar action of a mixture of rum, water, and egg on tumbler glasses, as described in your former letter, and this was stated before on p. 120.

H. Mortimer.—The analysis was published in the *Lancet* for July 24, p. 147.

"*Quærens.*"—Two distinct plants belonging to two distinct families are referred to. *Helleborus viridus* is known in England as Green Hellebore, and *Veratrum viride* is known in America, of which it is a native, under the same name. Many American plants bearing the same names as English plants are not identical with them.

T. W. Jones.—We know of no better plan than to advertise your want.

J. G.—A candidate for admission as a "Fellow of the Linnean Society" must be proposed on a written certificate to be signed by three or more Fellows, from their personal acquaintance with him, or knowledge of his character or writings. Communications should be addressed to the Society's apartments, Burlington House.

"*Anemone.*"—*Anemone pratensis*, With., is *Anemone pulsatilla* of Linnæus. It is a local plant.

E. P. Philpots.—The determining cause of the effervescence in a mixture of glycerine, borax, and bicarbonate of soda appears to be the glycerine, which upon coming into contact with the borax, sets free sufficient acid (colouring turmeric paper yellow) to act upon the bicarbonate. The acid, which may be neutralized by the addition of more borax, does not cause effervescence with carbonate o soda.

F. B.—It is impossible to name ferns with any degree o certainty unless *entire* fronds in the fertile state are sent. The following are, as far as can be judged, the names o your specimens:—(1) *Pteris tremula;* (2) *Polypodium Pheyopteris;* (3) *Lastrea æmula;* (4) *Lastrea Thelypteris;* (6) *Woodwardia radicans.*

"*Amylum.*"—The use of water which has been shaken with sublimed sulphur and afterwards decanted, has been recommended for dandriff. Also see a recipe in vol. ii., p. 878.

"*Taraxacum.*"—No stamp is required for quinine wine when prepared according to the British Pharmacopœia and sold as such.

W. Brewster.—The pale coloured preparation contains ferrous salt, the dark contains ferric salt. The former is in our opinion, the preferable.

"*Cymro.*"—Such a preparation as you describe would not be sweet spirit of nitre, and we think its sale as such would render the vendor liable under the Sale of Food and Drugs Act.

S. Steele.—See Mr. Martindale's paper on Jaborand vol. v., p. 561.

Communications, Letters, etc., have been received from Professor Dymock (Bombay), Dr. Lackersteen, Mr. J. T. C Williams, Mr. F. Francis, J. T. S., "A Querist."

NOTE ON LINIMENTUM TEREBINTHINÆ ACETICUM.

BY WILLIAM H. SYMONS, F.C.S.

On the 18th ultimo a paper was published in this Journal on the "Combination of Glacial Acetic Acid with Oils," by Mr. J. B. Barnes. I endeavoured to verify the statements made there, but was surprised to find a great difference in our results.

Mr. Barnes gave among others :—		I found the following quantities fully sufficient:—	
Oil of Almonds	7 vols.	Oil of Almonds	4 vols.
Glacial Acid .	1 vol.	Glacial Acid .	1 vol.
Olive Oil . .	8 vols.	Olive Oil . .	4 vols.
Glacial Acid .	1 vol.	Glacial Acid .	1 vol.
Cod Liver Oil .	7 vols.	Cod Liver Oil .	4 vols.
Glacial Acid .	1 vol.	Glacial Acid .	1 vol.
Linseed Oil .	7 vols.	Linseed Oil .	4 vols.
Glacial Acid .	1 vols.	Glacial Acid .	1 vol.
Turpentine . .	1 vol.	Turpentine . .	in all
Glacial Acid .	2 vol.	Glacial Acid .	prop.
Oil of Lemon .	2 vols.	Oil of Lemon .	in all
Glacial Acid .	1 vol.	Glacial Acid .	prop.

The variations in our results were due to the acids used being of two different strengths. Mr. Barnes has kindly informed me that he used an acid solid at 48° F. (*i.e.* P.B.) I used an acid which remained solid up to 60°F. It struck me that this acid might be used with advantage in Linimentum Terebinthinæ Aceticum, and I found both the following formula answer perfectly:—

Oil of Turpentine	4 fluid ounces.
Glacial Acetic Acid (solid at 60°F.) .	1 fluid ounce.
Liniment of Camphor	4 fluid ounces.

This furnishes a liniment very similar in the proportion of its ingredients to the Pharmacopœia preparation, the quantity of acetic acid being the same, while both turpentine and camphor liniment are present in larger quantities, all water being excluded. The acetic acid would be easily dissolved by one-sixth the quantities of the two other ingredients. This liniment is only miscible with liquids of an oily nature; it maintains its transparency at a temperature of 15°F.

The following formula furnishes a liniment which is miscible with spirit, in the proportion of one to seven, and with oils in any proportion; it also retains its transparency at a temperature considerably below the freezing point of water.

Camphor.	240 grains.
Oil of Turpentine	2 fluid ounces.
Dissolve and if necessary filter, then add	
Castor Oil	2 fluid ounces.
Glacial Acetic Acid (solid at 60° F.) .	4 fluid drachms.

According to the Pharmacopœia an acid which becomes liquid at 48°F. contains 84 per cent. anhydrous acid, or over 99 per cent. real acid. What then can be the strength of an acid which is solid up to 60°F., when the P.B. acid is stated in Pereira's 'Elements,' page 114, to be the strongest procurable?* In conclusion, I have to thank Mr. W. Lincolne for having kindly confirmed my experiments.

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* The statement in Pereira's 'Elements' refers generally to glacial acetic acid, not to any particular kind. The P. B. glacial acid is only one of several kinds commonly met with.—Ed. Ph. Journ.

COTO BARK.*

A Reputed New Remedy for Diarrhœa, Rheumatism and Gout.

In February, 1874, the wholesale house of Rudolph Martens, in Hamburg, placed at the disposal of Dr. G. C. Wittstein about five pounds of a bark which had been forwarded from Bolivia, South America, by a correspondent, for the purpose of a pharmacognostical, chemical and medical investigation. Accompanying the bark was the following information: "This bark is from the so-called missions in the interior of Bolivia, where cinchona bark also is obtained, and it costs about the same price. It is recommended in the form of a powder or an alcoholic extract as a remedy against diarrhœa, colic, neuralgic toothache; also, in a tincture form, against rheumatism and gout." Dr. Wittstein himself undertook the chemical investigation; Professor Dr. Von Gietl kindly made numerous clinical experiments both with the bark and with a tincture prepared by Dr. Wittstein, and Professor Dr. C. Harz made a pharmacognostical and anatomical examination of the bark.

As nothing was said by Herr Martens respecting the botanical origin of the bark, Dr. Wittstein applied to him as to the possibility of obtaining a flower or fruit-bearing branch. Herr Martens, in reply, said that the tree belonged to the Cinchona genus; this, however, Dr. Wittstein thinks is decidedly contradicted by its physical, chemical and physiological properties, which point rather to a Lauraceous or Terebinthinaceous plant.† This however can only be decided by the aid of leaves, flowers and fruit, and these have not yet been received.

Dr. Harz describes the bark as being in flat or curved pieces, irregularly fractured, 0·2 to 0·3 metre long or shorter, differing in thickness, and varying between 8 to 14 millimetres in diameter. The colour is a cinnamon brown and mostly a darker brown on the inner side. The smell is very aromatic, recalling cardamoms, camphor and cajeput oil, and occasionally, to a less degree, cinnamon. The taste is aromatic and pungent, partly resembling pepper, partly camphor and cajeput oil, and slightly bitter; it is neither mucilaginous nor astringent.

Numerous scattered golden yellow points and small dots (sclerogenous and liber cells) can be seen in the section by the unaided eye. The microscope shows that the outer bark has a granular and rather short fracture, resembling that of the cocoa nut; the inner bark is coarse-fibred, tenacious, and has an uneven and jagged fracture. The outer side is rather flat, without any bork cells or corky formation; it resembles somewhat the bark of a moderately thick beech bough, and shows in isolated patches the perished epidermis. Under the microscope, the dry, very hard bark shows two layers of tissue, apparently sharply separated from one another; an outer, free from medullary rays, answering to the mesophlœum, and an inner or liber penetrated by medullary rays. The outer layer consists of large cells of equal diameter, the sides of which are thin and colourless, and between these occur a larger number of sclerogenous cells, apparently equal in size but of a golden-yellow colour, sometimes isolated, sometimes united in irregular groups or bands, the latter being frequently radial. These isolated groups are partly of equal diameter, partly, and this in a tangential direction, elongated; never, however, prosenchymatous.

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* *Archiv der Pharmacie*, vol. iv, p. 214.

† Probably the statement of Herr Martens was based upon the fact, that in the 'Systema Materiæ Medicæ Vegetabilis Brasiliensis' of Martius the name of Coto-coto is attributed to the *Palicurea densiflora*, Mart., a Rubiaceous plant used in Brazil for rheumatism.—Ed. Ph. Journ.

The inner layer is distinguished by the numerous liber bundles, consisting of from twenty to forty or more liber cells, which traverse it in straight lines. Somewhat less often isolated liber cells occur, and here and there also separated sclerogenous cells originating from the parenchyma cells. Lastly, not unfrequently liber cells are seen which become divided internally by the formation of a series of transverse partitions, the outline of the liber cell from which they originated being still clearly perceptible in them. The numerous medullary rays which more or less or quite traverse the liber are composed of one, three or four rows of cells. These cells, as is generally the case, are elongated in the radial direction. Very frequently they penetrate the liber bundles, and at the points of intersection may be observed the interesting fact that all the medullary ray cells occurring within a liber bundle are converted into sclerogenous cells, but retain their original shape. This is a peculiarity which Dr. Harz has never before met with.

The other portion of the liber appears to be composed of two kinds of parenchymatous cells, which alternate with each other to form bands that penetrate the medullary rays also in a tangential direction, and consist of from two to four rows of cells. One kind is elongated vertically and has clear cell contents; the other kind forms dark-brown bands consisting of smaller cells, either longer tangentially, or of equal diameter, and having dark-brown contents.

The membranes of the cells, the sclerogenous and liber cells only excepted, are coloured blue by iodine and chloride of zinc as well as by iodine and sulphuric acid; they consist, therefore, of pure cellulose. The cells are all apparently thin and delicately walled, and their contents are more or less brown coloured. This brown colour is removed by solution of ammonia or potash, and the colouring matter is separated from the alkaline solution by acids in the form of red-brown flocks. The colouring matter appears to be specially abundant in the before-mentioned bands of small parenchyma cells, which occur in the portion of the liber last described.

The sclerogenous and liber cells are, in their natural condition, of a golden-yellow colour, and are not coloured by momentary contact with iodine or rosaniline solution if followed instantaneously by washing with aqueous glycerine. They mostly contain only protoplasm. Their membranes are evidently composed of numerous concentric layers, which are perforated by many porous canals; they are woody, very hard, and, without special preliminary treatment, are not coloured blue by iodine and zinc chloride, or iodine and sulphuric acid. The parenchymatous cells with clear contents of the outer and inner bark contain a small quantity of a tannin, striking green with iron, which is more plentiful in the cells containing much colouring matter than in those containing less. It appears to be most abundant in the cells of the medullary ray, including those that have become sclerogenous, as may be recognized by treating with acetate of iron solution.

Almost all the parenchymatous cells of the inner bark contain a small quantity of starch which is somewhat more plentiful in the larger than in the smaller cells. The starch granules are small, simple or somewhat compound, and an usually more numerous in the centre of the cell. Besides the starch, and in the same cell formation, but much more plentiful, occur large drops (often quite filling the cell) or unctuous granules of a colourless or slightly yellow mixture of resin and essential oil, which is readily soluble in ether, absolute alcohol, chloroform, oil of turpentine and petroleum. After extraction by means of ether it appears, at ordinary temperature, as a thick fluid, but frequently solidifies during evaporation to colourless prismatic needles, having the appearance and odour of camphor. Drawings of sections of the bark are given in the original paper.

The results of Dr. Wittstein's chemical examination of coto bark are as follows:—

The principal constituents of coto bark are—

(1) A pale yellow *essential oil*, which is lighter than water and possesses a strong aromatic odour and a pungent peppermint-like aromatic taste.

(2) A *volatile alkaloid*, having a herring-like and urinous odour, and resembling propylamine or trimethylamine.

(3) A *soft* yellow brown aromatic-smelling *resin*, pungent to the taste, which remains pitchy and viscous after several weeks' exposure to the summer air. It is readily soluble in ether, chloroform, and alcohol; difficultly soluble in benzol; insoluble in carbon bisulphide; and constitutes about one-seventh of the entire weight of the bark.

(4) A dark-brown *hard brittle resin*, without smell or taste, which is easily soluble in alcohol (forming a bitter solution with an acid reaction); insoluble in ether, benzol, chloroform, and carbon bisulphide; readily soluble in alkalies, from which it is again precipitated by acids; and constitutes about one-tenth of the entire weight of the bark.

Dr. Wittstein suggests that a more exact examination of these four substances would furnish profitable work for a young chemist, and states that the Hamburg firm is in a position to supply a considerable quantity of the raw material.

The other constituents of the bark, generally occurring in small quantities, and not important to the medicinal use of the bark, are starch, gum, sugar, oxalic acid (as a lime salt), tannin (green with iron), formic acid, butyric acid, and acetic acid.

As only the essential oil and the soft resin are soluble in ether, and not the hard resin or the alkaloidal substance, whilst all four of them are taken up by alcohol, Dr. Wittstein considers an alcoholic tincture of the bark to be the most suitable pharmaceutical preparation, in the proportion of about one part of coarsely powdered bark to nine parts of rectified spirit.

The testing of the bark for mineral substances revealed nothing unusual. The bark left upon incineration 1·18 per cent. of ash, about three-fourths by weight of which consisted of carbonate of lime; besides which it contained potash, soda, magnesia, alumina, iron oxide, manganese, sulphuric acid, phosphoric acid, silicic acid, and chlorine.

The clinical experiments were made by Dr. von Gietl, in the General Hospital at Munich, upon sixteen patients (fifteen males and one female) suffering from different forms of diarrhœa. The drug was administered in two forms, as a fine powder and as an alcoholic tincture (1 in 10). The powder was given (in 0·5 gram doses four to six times a day) in eight cases; the tincture (10 minims every two hours) in seven cases; and both the powder and tincture in one case. In one case the use of the powder was not tolerated, it causing strong burning in the stomach and subsequent vomiting, and the same result followed the use of the tincture. The patient was phthisical. In another case also the powder was not tolerated, whilst the tincture caused no complaint. This patient was also phthisical. Professor Gietl considers that the results of the cases, details of which are given in the original paper, prove that in the new bark we possess a *specific against diarrhœa* in its most diverse modifications.

No experiments appear to have been made to test the reputation of Coto bark in the treatment of rheumatism and gout.

PIPER NIGRUM.*

BY A. WYNTER BLYTH, M.R.C.S., F.C.S., ETC.

Analyst for Devon.

Black pepper is the dried *immature* fruit of *Piper nigrum*, one of the Piperaceæ, or pepperworts. The pepperworts are a well defined natural order, confined to the hottest parts of the world, and delighting in low places, valleys, and the banks of rivers. Although neither the number of its genera nor of its species is great, yet the whole order is remarkable for a variety of active and useful plants,—*e.g.*, the aromatic black and long peppers, the astringent matico, the intoxicating *Macropiper methysticum*, the different varieties of cubebs useful in the treatment of inflamed mucous membranes, and several other plants possessing medicinal properties,† belong to the natural order, Piperaceæ.

Black pepper itself is a climbing plant, attaining the height of from 8 to 12 feet; the berries—or, botanically speaking, "drupes"—are at first green, then red, and, if left still longer ungathered, turn to black; but before this latter change takes place the berries are gathered by hand and dried in the sun,—the result being an entire change of appearance; instead of a red, smooth berry, a black or reddish black peppercorn, with the cortex contracted and shrivelled in such a manner as to form a veined network, is obtained. The plant is cultivated in various portions of the equatorial regions of the earth, the zone of cultivation being confined to the isotherms of 82°. It would not, however, be strictly correct to say that this high mean annual temperature was essential, or even necessary; for the fact is, that it is produced principally in the cooler valleys, where the mean annual temperature does not perhaps exceed 70° F.

The black pepper imported into this country principally comes from the islands of Malacca, Java, Borneo, and Sumatra. The commercial varieties are at least five, viz., Malabar, Penang, Sumatra, Trang, and Tellicherry, names indicating the localities from whence they are derived. The differences which these different varieties of pepper present *to the eye* are evident enough when the several samples are at hand for comparison, but it takes a very practised observer to identify a solitary sample; and if samples of each of the kinds named were mixed together, I doubt the ability of any person, however *habile*, to separate the berries again, identifying each sort with any correctness. The merchant indeed relies more upon the weight than the appearance; he takes a handful of peppercorns, and by long practice can tell in a moment whether it is a light or a heavy sample. Chevallier has determined the weight of what is technically called heavy, half heavy, and light pepper. A litre of the first weighed 530 grms.; of the second, 512 grms.; of the third, 470 grms. That there is considerable difference in weight in the different berries is certain, for I carefully weighed 100 berries of each kind, with the following result:—

		Grammes.
100	peppercorns of Penang weighed	6·2496
100	" Malabar "	6·0536
100	" Sumatra "	5·1476
100	" Trang "	4·5736
100	" Tellicherry "	4·5076

If then, quality is to be judged of by weight, Penang and Malabar may be bracketed together as standing first, Sumatra holding the second place, and Trang and Tellicherry bracketed together in the third. The general opinion of the trade is, I believe, that Malabar is really the heaviest, and possibly the samples of Penang which I possess are unusually fine. The whole of the ground peppers of commerce are mixtures of different kinds of pepper; there is no such thing to be found in the shops as a pure ground Malabar or a pure ground Penang. The principal varieties mixed for household purposes and retailed are Malabar, Penang, and Sumatra: the first of these is the dearest.

The usual mixture, according to Chevallier,* is—

33 per cent of Malabar to give weight,
33 per cent of Penang to give strength,
and 33 per cent of Sumatra to give colour.

The pepper thus mixed is either ground by the aid of large mill stones, or in an apparatus perfectly analogous to a coffee mill; the latter mode is far preferable to the former, as the friction of the stones developes considerable heat, and dissipates some of the aromatic principles. Pepper thus damaged by the heat of the mechanical operations is technically known as "burnt."

The microscopical structure of the black pepper berry has been accurately delineated and described by Dr. Hassall, and therefore needs no notice, as there is really nothing new to add. There is hardly anything the analyst has to examine which has a more decided and distinct microscopical structure, and all organic adulterations can be detected by a practical observer with the aid of the microscope.

The chemistry of pepper is still in a very imperfect state. Pelletier has recognized and separated piperine ($C_{17}H_{19}NO_3$), a volatile oil ($C_{10}H_{16}$), gum, bassorin, starch, an acrid resin, malic and tartaric acids, salts, extractive, and woody fibre; but there is no quantitative analysis of the whole of the known constituents. The object of this paper is to lay before the Society of Public Analysts some observations, a portion of which has already appeared in the *Chemical News*† and in *Les Annales d'Hygiène*.‡ On (1) the hygroscopic moisture; (2) the ash, its percentage and composition; (3) the nitrates in pepper; (4) the alcoholic; and (5) the aqueous extract.

1. *The Hygroscopic Moisture.*—This was determined by weighing about 1 gramme of the very finely powdered substance and drying in a water-bath in the usual way. Without doubt pepper dried at this heat retains a considerable quantity of water, but the very strong odour which all aromatic substances evolve at 100° C. sufficiently shows that volatile principles are, during the whole evaporation, given off; it therefore is very questionable whether it is advisable to dry at a higher heat than 100° C.

The percentage of moisture is as follows:—

Penang	9·531
Tellicherry	12·908
Sumatra	10·103
Malabar	10·548
Trang	11·664

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* Reprinted from the *Chemical News*.

† The *Artanthe eucalyptifolia* is used in Brazil in case of colic. *Piper parthenium* is used in menstrual disturbances. *Chavica Betle* and *Siriboa* cause salivation and decrease the function of the skin. Besides these, *Acrocarpidium hispidulum*, *Coccobryon capense*, *Artanthe adunca*, *Chavica adunca*, and others, possess active and useful properties.

* 'Du Poivre,' par A Chevallier, *Annales d'Hygiène Publique*.

† *Chemical News*, October, 1874.

‡ 'Etude Chimique sur les Poivres du Commerce,' par le Dr. A. Wynter Blyth. *Annales d'Hygiène Publique*, July, 1875.

The highest percentage, then, is 12·9, the lowest 9·5, the mean of the whole 10·95.

2. *The Ash.*—In the determination of the ash about 2 grammes were placed in a large platinum dish and burnt down at a low red heat, until the residue was of an equally colour and ceased to lose weight; it was then weighed grey as quickly as possible, the result expressed as total ash. The ash was then dissolved in boiling water, the solution filtered, evaporated down, gently ignited, and the result expressed as soluble ash.

	Pepper dried at 100° C.		Pepper as sold.
	Soluble Ash. Per cent.	Total Ash. Per cent.	Total Ash. Per cent.
Penang . . .	2·212	4·189	3·843
Tellicherry .	3·380	5·770	5·346
Sumatra . .	2·626	4·316	3·334
Malabar . .	3·453	5·195	4·674
Trang . . .	2·538	4·775	4·211

In all inquiries of this kind the extreme numbers are those which have the most value, the least amount of ash or the greatest amount of ash ever found in genuine samples. Now the smallest percentage of ash derived from a ground black pepper taken in its undried state that I can give is 3·3 per cent.; the greatest amount is 5·3 per cent., and invariably a little more than half of this ash is soluble; it is useful to compare with these numbers those obtained by Dr. Hassall, and published in 'Food, Water, and Air.'

Whole Black Pepper (HASSALL).

Sample 8	Ash 4·03	per cent.
9	„ 4·33	„
10	„ 3·90	„
11	„ 4·61	„
12	„ 4·01	„
13	„ 3·67	„

Thus the greatest percentage of ash given by Dr. Hassall is 4·33 per cent., the lowest 3·9, the mean of the eleven numbers derived from the two sets of independent observations gives us the ash of a genuine black pepper, 4·17 per cent., and the conclusion is inevitable that in no case should a ground black pepper *as sold* give an ash of 5½ per cent. That the ground black peppers of commerce do give very high percentages of ash, and are therefore much adulterated, is evident from the fact that, in 16 samples of ground black pepper examined by Dr. Hassall, only one was under 5 per cent., the percentages of the other fifteen being distributed as follows:—

One	gave between	5 and 6	per cent. of ash
Three	„ „	6 „ 7	„ „
Three	„ „	7 „ 8	„ „
Seven	„ „	9 „ 10	„ „
One	„ „	11 „ 12	„ „

Now, if these peppers were properly burnt, as without doubt they were, fifteen out of the sixteen were adulterated.

With regard to the composition of the ash of black pepper, the following is an analysis of the ash of Tellicherry pepper:—

	100 grammes of ash.
Potash	24·380
Soda	3·226
Magnesia	13·000
Lime	11·600
Iron	0·300
Phosphoric acid	8·470
Sulphuric acid	9·613
Chlorine	7·570
Carbonic acid	14·000
Sand	6·530

Of all of these constituents, the sand is the most variable. The highest determination of sand which I have as yet met with occurred in a sample of Penang pepper, which gave 9 parts of sand in every 100 of ash; but if we allow that a pepper ash may contain 10 parts of sand, in every 100, how can we account for, on any theory except wilful adulteration, the fact of the ground peppers of commerce yielding to the analyst an ash one-third or one-half of which is very commonly found to consist of sand. The iron, part of which is magnetic, the alkaline earths, the chlorine, the alkalies, all vary somewhat; but there is one constituent which is extremely constant, and may be of technical utility, and that is the phosphoric acid. The phosphoric acid I find to average 8·5 per cent. of the ash. I do not believe that it varies more than half a percentage either way; its determination is therefore of some value.

I may here remark that it would be of great physiological interest to bring into one view the varying amounts of phosphoric acid found in those fluids or substances which bear the name or take the place of milk. It must be remembered that the albumen of the seed, the albumen of the egg, and the milk of mammals, though so widely different in their appearance, yet all agree in one thing, that each is destined to nourish, to form materials for the growth of the embryo or very young animal or plant; hence, on theoretical grounds alone, it might be predicated that such substances and fluids would be remarkably constant in their chemical composition; and I believe that with regard to seeds generally, published analyses bear this out, the element of variability that some exhibit perhaps residing in the covering portions of the seed, the cortex, and not in the seed proper, that is in the albumen and embryo. However this may be, the amount of phosphoric acid in seeds is so constant that we can hardly allow that it is stored up by mere physical agencies, but that it is the result of a vital selection of the living matter of the seed cells, whilst the lime, the sand, the magnesia, and the iron certainly show sufficient variability to suppose that a portion of these constituents is as it were accidental and not essential. It would also appear that potash or soda may to a certain extent be replaced by each other.

With regard to the arrangement and combination of the different elements found upon incineration there is much to be learnt. That the carbonic acid has no relation whatever, nor is any guide to a knowledge of the amount of carbonates existing as such in the plant, is well known and may be proved. Thus numerous analyses of pepper ash have given me from 12 to nearly 15 per cent. of carbonic acid calculated upon the ash; but pepper itself has very minute quantities of carbonate; for I have finely powdered Malabar pepper, treated it with acid, and placed it in an absorption apparatus connected with an aspirator, and drawn through the solution perfectly dried carbonic acid free air, and found that 100 grammes yielded only 0·657 milligramme of CO_2, or about 0·143 per cent. of the ash; hence the 10 or 11 per cent. must be produced from the organic salts, etc.

Nitrates and Nitrites in Pepper.—Comparatively few observations of the amount of nitrates and nitrites in organic substances are on record: it is a subject of some scientific interest, especially since it has been observed that nitrates and nitrites are decomposed in the presence of free oxalic acid. Whether the determination of nitric acid will be of service or not to the food analyst is unknown: it certainly may be so, if it be found that a substance rich in nitrates is fraudulently mixed with one poor in nitrates.

			Calculated as Nitric Acid. Gramme.
100 grms. of undried	Penang	pepper yield .	0·04470
„ „	Malabar	„ .	0·03858
„ „	Tellicherry	„ .	0·08860
„ „	Sumatra	„ .	0·06560
„ „	Trang	„ .	0·11870

The Alcoholic Extract, obtained by exhausting a weighed sample of the dried substance by repeated quantities of boiling alcohol in a flask attached to an inverted condenser, is a fair index of the quality of a pepper, for the extract so obtained consists almost entirely of piperine and resin, the two constituents on which the qualities of pepper almost exclusively depend; nor do I believe that the advantage of separating these constituents sufficiently compensates for the extra trouble and time.

One hundred grms. of the substance dried at 100° C.:—

	Grammes.
Penang	7·650
Malabar	6·375
Sumatra	6·450
Tellicherry	7·896
Trang	6·300

The extract, then, varies from 6·3 to 7·8 per cent.

The Aqueous Extract, containing extractive and colouring matter, soluble salts, gum, starch, and small quantities of piperine and resin, was determined by thoroughly exhausting a *small* weighed portion of pepper by a *large* quantity of boiling distilled water, and found to vary from 18 to 20 per cent.

One hundred grms. of the dried substance taken:—

	Aqueous Extract. Grammes.
Penang	18·335
Malabar	20·375
Sumatra	17·500
Tellicherry	16·500
Trang	18·175

The amount of starch in the five samples is very nearly the same—a fact easily proved by making a decoction of each, of exactly similar strength, decolourising by charcoal, then placing in Nessler cylinders, and adding an equal quantity of iodine to each; the gradations of colour are so faint that there can be hardly the difference of a percentage in the whole five; it is, however, shown in this way that Sumatra has most starch; next in order comes Penang, then Malabar, Tellicherry, and Trang, the last three containing identical quantities of starch.

Adulterations of Pepper.—Pepper has been adulterated for at least two centuries and a half, for Pierre Pomet,[*] writing in 1614, says:—"As the greatest part of pepper, white as well as black, is sold 'battu' (that is to say, powdered), it should only be bought of honest merchants, because all the pepper the retailers sell is no other thing, for the white, than '*des epices d'Auvergne blanches*,'[†] or rather black pepper whitened with ground rice; the black is only the dust, either of the crust of bread, grey Auvergne spices, or manignette."

The list of the adulterations enumerated by authors is an extraordinary one. Linseed meal, rice, pepper leaves, mustard, wheat flour, sago, woody fibre, chillies, rapeseed, potato, spices, capsicum, manignette (otherwise known as guinea pepper), chicory, rye, powdered leaves of the laurel which have been previously used to wrap round extract of liquorice, the stones from olives, bone dust, marine salt, and various mineral adulterations, are all said to have been selected.

However various may be the adulterations in France, where Chevallier tells us that in Paris alone he is acquainted with a manufactory producing 12 to 15 hundred kilogrammes annually of a mixture sold solely for the purpose of adulterating pepper, the only common adulterations of this country are what is known in the trade as P.D., H.P.D., and W.P.D., abbreviations for pepper dust, hot pepper dust, and white pepper dust; the first, or P.D., used to be principally composed of the faded leaves of autumn, but linseed meal is now preferred; H.P.D. is chiefly the husks of mustard; and W.P.D. is ground rice. To all these we must add sand, which is most certainly added; whether derived from the sweepings of the shops, or whether added as sand, is not at all clear.

Besides the formidable list of adulterations just given as found in powdered pepper, the berry itself is not free from manipulation, for as the merchant judges by the weight of the sample, means are taken to render the lighter sorts equal in weight to the heavy Malabar and Penang, and in order to do this they are macerated in tubs of brine for 24 hours, and thus impregnated with salt and water find their way into the market as Malabar; but such samples are quickly recognized by the astute merchant, and the high chlorides, the high ash, the great amount of humidity, could hardly fail to reveal their nature to the analyst.

As coffee has been cleverly imitated by chicory pressed into the shape of the coffee berry, so by pressing various pastes into the shape of the pepper berry has pepper been imitated. Of this adulteration there is the most undoubted evidence. Accum noticed artificial peppercorns made of oil cake, common clay, and cayenne pepper, and Chevallier in a recent paper states that in 1843 he was requested to examine a sample taken from 40 bales, in which he found from 15 to 20 per cent. of artificial pepper, composed of pepper dust, bran, and other matters.

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THE SALTPETRE DEPOSITS OF PERU.[*]

By George Fitzroy Cole, *Assoc. Inst. C.E.*

(Late District Engineer Iqique and La Noria Railway.)

(*Concluded from page* 264.)

As regards the extent of land supposed to contain saltpetre, no formal measurement or survey has been made, and frequently land is supposed to contain nitrate which, on being opened, proves to be barren in that mineral.

The lands round about La Noria were those first worked, and there remains very little "virgin land" left in that quarter. There are large spaces, however, left untouched on the Pampa di Tamarugal, and nitrate is supposed to exist all along the southern border of the pampa, between the points known as Pozo di Almonte and Sal de Obispo, which are marked upon the map.

Numerous deposits are reported to exist in the south, where some officinas have been opened, and a railway made to them from the port of Patillos, but for the reasons before stated, namely, for the want of a geological survey, it would be impossible to give any definite opinion as to the area of land containing saltpetre or its quality. Large portions of land in the south are said to contain nothing but beds of common salt.

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[*] Pomet 'Histoire Générale des Drogues,' 1735.

[†] "Depuis un temps immemorial le poivre en poudre sous le nom d'epices d'Auvergne, et compose de pain de cheneirs et de tourteaux de faine et souvent aussi avec de la terre pourrie."—Soubeiran, 'Dictionnaire des Falsifications,' Paris, 1875.

[*] Abstract of paper in the *Journal of the Society of Arts*; Sept. 10, 1875.

Mr. Markham, in his 'Travels in Peru and India,' says: "It is calculated that the nitrate grounds in this district (Tarapaca) cover 50 square leagues, and, allowing 100 pounds weight of nitrate for each square yard, this will give 63,000,000 tons, which at the present rate of consumption will last for 1393 years." The author does not agree with Mr. Markham that the deposits cover so large an area as 450 square miles, but that the area might amount to 100, though that could only be a supposition, and no opinion could be made in reference to the quality of the nitrate. The estimate of one quintal to the square yard he considers to be too low, as two specimens of caliche gave on analysis:—

1*st Specimen* (*White*).

	Per cent.
Nitrate of soda	48
Common salt	40
Insoluble matters	12
	100

2*nd Specimen* (*Yellow*).

Nitrate of soda	55
Salt	35
Insoluble matters (containing sulphur)	10
	100

The mineral is found in layers of from a few inches to three yards in thickness, and the author thinks three quintals per yard of surface a fair average for land containing nitrate in sufficient quantities to repay its working. Provided those lands in the south prove to be good, a total area of 100 square miles may be assumed; but otherwise, excluding these, it would not be safe to count upon more than one-third of that area, 100 square miles at three quintals per square yard would give 42,240,000 tons, which at a consumption of 3,000,000 quintals per annum would last over three centuries. All these grounds have been claimed under the mining laws of the country by private individuals.

The following are the physical features of the country upon which the author bases his suppositions as to the origin of these deposits. Ascending from the seaboard the cuttings in the railway bring to view rocks of porphyritic formation. Granite is seen in a state of decomposition crossed with veins of quartz, and in other places are beds of coal and sandstone. At the summit the railway cuts through a bed of white limestone resembling marble by the polish it will take, and for which rock it has been mistaken by many. To this coast range succeeds the vast plain of Tamarugal with its alluvial coating, and which extends some thirty miles to the foot of the second range of mountains, chiefly composed of sandstone, and among which extinct volcanoes have been recognized. Another level plain intervenes between these latter and the range of mountains known as the Cordillera proper, among which is situated the famous volcano "Isluga."

Returning to the Pampa of Tamarugal, a group of hills, ranging from 200 to 500 feet above its level, borders its western extremity. On the slope of these hills lie the deposits of saltpetre, and in no case has that mineral been found on the pampa itself. On its eastern side stands the second range of mountains already mentioned. These mountains are pierced at frequent intervals by deep ravines, at the bottom of which small streams find their bed, but the uniform layers of boulders packed up on each side of the ravines leads the imagination to picture the large rivers, which at one time, no doubt, travelled down these channels on their way to water the wooded plains of the pampa. Upon entering the ravine of Tarapacá, two leagues of ground covered with boulders have to be traversed, and a deep gully still can be traced in the neighbourhood which points out the course taken by a pre-historic river.

By one of those revolutions in nature, the occurrences of which are proved by the researches of the geologist, the rains ceased to fall with their accustomed abundance, and have left, where formerly were forests and grassy plains, nothing but an immense arid desert. But though the rains are now insufficient to form themselves into rivers, they fall with regularity, and being absorbed by the earth, they percolate through porous strata, to empty themselves into the natural reservoir beneath the surface of the pampa. Thus water may be seen jetting out in springs at the foot of the eastern range of mountains, where it is obtained in large quantities by the natives, by driving tunnels into the yellow sandstone which forms the foundation of the slope. The crust at this point is chiefly sand and a limestone having a very washed appearance, from which water is also obtained, but it does not repay the working, as it is soon dried out.

At Pica there are two basins supplied with water in this manner, the one placed some fifteen feet above the other. The top one receives from its tunnel supplies of cold water, whilst the bottom receives warm water (90° Fah.). At a point a quarter of a mile up the hill, and (perhaps) at an increased elevation of 100 feet, another basin receives warm water; thus the anomaly is presented of a cold stream running between two hot streams.

Following the section of the pampa westwards for about ten miles, water is found beneath the surface at a depth of three yards. In this latitude a novel kind of cultivation is practised, namely, the capillary attraction which some plants possess to an inordinate degree is utilized by making them suck up the water through several feet of earth. The upper crust of the saliferous sand is cleared away to a depth of some three feet, until the alluvial soil is encountered. A trench is thus formed, measuring fifty feet wide and several hundred feet long, and the excavated material is packed up on its borders. Alfafa, vegetables, and different cereals thrive well in these pits, and the cultivation proved so successful that the Government, who in that country must have a finger in every pie, established an agency to collect rents and to plant a farm on their own account, with the object of supplying the soldiery with vegetables.

Resuming a westerly course at the termination of another eight miles, the water is encountered at a lower depth, namely, at about six or eight yards below the surface, but is still sweet to the taste. Another eight miles in the same direction and the western hills are arrived at, where the water is found only at depths of from 40 to 100 yards, and, with only a few notable exceptions, so strongly impregnated with saliferous matter, that it is unfit for the use of animals. Thus the pampa may be compared to a cup, slightly tilted up at one end and filled with a fluid, the surface of which is depressed from the natural level by the weight of a covering whose depth increases in proportion to its distance from the raised end. This subterranean reservoir is supplied directly from the rainy district, and as a proof of the free connection which exists between itself and its sources, it is only necessary to refer to the fact of the simultaneous rising of the water in the wells almost immediately after the commencement of the rainy season. Taking into consideration the facts above enumerated, the position of the deposits beneath the surface of a lee-shore, the proximity of numerous volcanoes probably uniting with their lava large quantities of salts, soda, sulphur, and other substances, and lastly, the direct communication maintained by the rivers between the volcanoes and the nitrate grounds, the author asks would it not be reasonable to suppose that these deposits derive their origin from volcanic discharge? Is it not probable to suppose the lava discharged during eruptions, and falling into the ravines, was snatched up by the rivers in the latter, and whilst its heavier particles were deposited in the neighbourhood, the lighter, consisting of the salts, were conveyed across the desert and thrown upon the opposing shore, which became coated with the deposits on the withdrawing of the waters in the dry season? With the arrival of the fogs in the winter, this coating of soda would experience rapid liquefaction through the condensation of the fogs, and the product would be absorbed by the porous soil of the formation.

It would seem that no suitable place offered itself for the accumulation of the deposits on the eastern side of the pampa, where they would have been rapidly dissolved and washed off by the rains, and, indeed, where the hardness of the formation would not have permitted of their percolation.

Bolleart, in his "Antiquities of Peru, &c.," whilst opposing Darwin's opinion, that the pampa was formerly an inland sea, and obtained its salt thereby, says:—"As to iodic salts, we need not look for them to the sea, as iodine and bromine exist in the minerals of the regions;" and in another part he hints at the probability of their being derived from volcanic sources. If Darwin were right, would not the greater part of the pampa be covered with salt on the evaporation of the sea-water? But it is not so, as no beds of salt on the pampa have been discovered after boring for a considerable depth. It lies only on the slope of the western shore.

The heavy fogs alluded to appear between the months of March and October, and on condensing leave a thin coating of chloride of sodium on projecting rocks and stones, or any impediment which seems to arrest their course.

Humboldt ("Travels in South America," vol. iii., p. 397) says:—"The enormous masses of muriate of soda recently thrown up by Vesuvius; the small veins of that salt which I have often seen traverse the most recently ejected lavas, and of which the origin (by sublimation) appears similar to that of ologist-iron deposited in the same vents; the layers of gem salt and saliferous clay of the trachyte soil of the plains of Peru, and around the volcanoes of the Andes of Quito, are well worthy the attention of geologists who would discuss the origin of formations." The grounds are nearly everywhere covered with flat pieces of clinkstone or phonolite, averaging in size from a few inches to a square foot. A strong opinion is entertained by the natives that these blocks of stone are aerolites. As they belong to the trachytic family, it is probable to suppose their having been washed down from the volcanic mountains, and to account for their being found on the top of hills of moderate height, an upheaval might have occurred subsequently to their being deposited.

If Humboldt's view be admitted as regards the disposal of materials discharged from volcanoes, the origin of the saltpetre deposits will have been almost proved to demonstration, for the volcanoes would supply the materials which would be conveyed by the hydraulic agency described, to the site they now occupy, where, after being dissolved by the fogs and absorbed by the earth in union with nitrogen derived from the atmosphere, they are dug out as nitrate of soda.

BENZOIC VERSUS SALICYLIC ACID.*

BY R. ROTHER.

In spite of the tremendous *furor* that a number of interested writers are making about salicylic acid, the star of this novel and noteworthy substance is even now declining. Most of the glowing reports extolling its wonderful powers were baseless exaggerations, to say nothing of the pure fictions that were manufactured and circulated regarding the disinfecting properties of salicylic acid. The writer had been using benzoic acid as an antiseptic and preservative of certain decomposable solutions with most satisfactory results, as, for instance, in solution of magnesium citrate, both in the form of a concentrated stock solution, four times the officinal strength and the ordinary officinal state; then the "cream syrup" for soda water, also a concentrated coffee syrup, one to sixteen for soda-water, solutions of citric and tartaric acids, and several fermentable officinal syrups. The first application the writer made of salicylic acid was in the preparation of syrup of althæa. An excess of salicylic acid was employed, more than the water could dissolve. In less than a week the syrup was covered with an extra heavy and exuberant growth of mould, and several days later it passed into active fermentation. The next trial was with red raspberry juice. After the bruised berries had fermented twenty-four hours one drachm of salicylic acid was added to a quantity of berries representing three gallons of juice; six hours later the magma was pressed, and then the fact became apparent that the fermentation was still active; in fact, from the profuse evolution of carbonic acid, it seemed now to be in its most energetic condition. Another drachm of salicylic acid was now added, but six hours later fermentation had not ceased; and, moreover, from the very perceptible acetous odour, the inference was at hand that the acetic fermentation had also begun. One drachm more of salicylic acid was then added, which either stopped the alcoholic fermentation or this ceased simply from the exhaustion of fermentable material. But twelve hours afterwards it was found that the acetic fermentation was raising havoc with the juice, and an additional drachm of salicylic acid was incorporated. It, however, soon became evident that even now the juice was rapidly spoiling, and the writer, in order to save it in its already deteriorated condition, speedily mixed a part of it with four per cent. of alcohol, and converted the remainder into a dense syrup by the addition of sugar.

The writer found that neither salicylic nor benzoic acid will preserve milk, unless added in excess of the natural alkalinity; a comparatively large amount of either will then be required. A mixture of one pint of milk, one pound of granulated sugar, one fluid drachm of tincture of vanilla, and five to ten grains of benzoic or salicylic acid, makes a very permanent "cream syrup;" in fact, such a mixture will remain "sweet" for several days, even in the hottest weather, and the writer has not had a single case of "sour cream" during the whole season. It was, however, found that a small remnant of milk or "cream" remaining in a large bottle became putrid within the space of a week, and, although salicylic acid was added, equal in quantity to the decomposing mass, the offensive effluvium was not diminished in the least, however prolonged the contact might have endured. This circumstance is ample illustration that salicylic acid is by no means a disinfectant.

The conversion of lactin into lactic acid, then into butyric acid, and ultimately into the more odorous products of putrid fermentation, is either checked or entirely obviated in the presence of a perfect antiseptase—that is, any agency which counteracts the effects of septism, and during which action the antiseptase remains indefinitely intact; but an antiseptase, which is also a disinfectant, must finally disappear entirely when placed into an already decomposing body, since the process of disinfection consists partly and importantly in a chemical disintegration of the various elements concerned. Hence, as salicylic acid does not itself decompose in a putrescent mixture, it cannot consequently be a disinfectant, even if it is to a certain extent an antiseptase.

Professor Salkowsky, of Berlin, has quite recently demonstrated that salicylic acid, in *concentrated* aqueous solution, will temporarily suspend the appearance of putrefaction, but *cannot prevent* its occurrence, and that it has no deodorizing qualities whatever. If decaying fluids are mixed with salicylic acid the odour still remains entirely unchanged. There is really no apparent reason why salicylic acid should possess deodorizing properties, since such action can manifest itself in three different ways, namely: (1) by a destruction of the volatile products of the decaying substance, as, for instance, through the action of potassium permanganate, chlorinated lime and sulphurous acid; (2) by absorption, as with charcoal, and in less degree by various other porous materials, to which also belong bodies producing precipitates in albuminous fluids; (3) by concealing the putrid odour, as with carbolic acid. Salicylic acid is not possessed of strong chemical affinities, neither does it produce precipitates, nor has it an inherent odour. The action of salicylic acid does not originate in a splitting up into carbolic and carbonic acids, as Kolbe supposed. The inadmissibility of that presumption is apparent from the fact that salicylic acid acts in weaker concentration than carbolic acid. Furthermore, salicylic acid may be recovered from putrid mixtures by means of ether, but carbolic acid is not traceable under the same conditions. *Benzoic acid is a much more powerful antiseptic than salicylic acid.* Raw meat chopped up fine or in larger pieces, when placed into concentrated solution of benzoic acid, remained perfectly fresh during a period of three months, the liquid remaining perfectly clear and retaining the odour of benzoic acid. The preservation was apparently absolute for any period. There is no difference between the effectiveness of natural and artificial benzoic acid.

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* From the *Tennessee Pharmacal Gazette*, Sept. 8.

Kolbe had stated, among numerous other myths about salicylic acid, that it is a much superior antiseptic to benzoic acid. The spirit of pecuniary enterprise is getting a fast hold upon the German chemists. Every new wrinkle is twisted into proportions of wonderful importance, and directly a factory is started, by means of which, and elaborate puffs, the general market is flooded with a worthless, or nearly worthless, substance. About the time the enthused multitude returns to sober second thought, the great scientist is enabled to retire from business to the more secluded pursuits of pure science, with a handsome gain. Kolbe's notorious pamphlet ridiculing the new notation and nomenclature simply because it was of French origin, and because Wurtz, in excessive eulogy,' pronounced chemistry a French creation, founded by Lavoisier, is a pretty sample of what can be achieved on the field of pure science.

CUCURBITACEOUS ANTHELMINTICS.

The *Lancet* states that some investigations have recently been made by M. Heckel respecting the active part of pumpkin seeds. These seeds have been much used of late for the expulsion of the tapeworm, for which purpose they were employed in the early part of the last century. The mode of their administration has hitherto been to give the bruised seeds in large quantities suspended in water, the outer envelope only having been removed. About two ounces of the seed was the ordinary dose. It is probable that so large a quantity contains much inert matter. Some recent observations apparently indicate that the active principle is contained only in the embryo. To ascertain whether this is the case was the chief object of M. Heckel's observations. He first administered, in two cases of tænia, about six ounces of the perisperm, tegumentum and testa, a purgative of castor oil having first been administered. The tapeworm was not expelled in any case. In two other cases the membrane surrounding the embryo was given—about half an ounce,—preceded and followed by a dose of castor oil. In each case the tapeworm was expelled entire. Subsequent experiments yielded the same result. This membrane was then carefully examined, and found to consist of two membranes separable by maceration in water. The outer membrane contained a resin in small quantities (one in seventeen), which M. Heckel believes to be the active agent. He believes that the castor oil acts not only by its purgative effect, but by dissolving the resin and rendering it active. The second membrane contained more chlorophyll than resin. It must not be forgotten that these seeds contain a fixed oil, to which their qualities have been ascribed, and which may be obtained by cold expression from the seeds in the proportion of half an ounce to a pound. This oil has been used with success, in repeated half-ounce doses, in cases of tænia.

THE TRUE METHOD OF SCIENTIFIC RESEARCH.

The following interesting account of one of the earliest investigations of modern chemistry is quoted in the *Journal of the Society of Arts*, from an address on "Scientific Culture," recently delivered by Professor Josiah P. Cooke, at the Harvard University:—

"A still more striking illustration of the same method of questioning nature is to be found in the investigation of Sir Humphry Davy on the composition of water. The voltaic battery which works our telegraphs was invented by Volta in 1800; and later, during the same year, it was discovered in London, by Nicholson and Carlisle, that this remarkable instrument had the power of decomposing water. These physicists at once recognized that the chief products of the action of the battery on water were hydrogen and oxygen gases, thus confirming the results of Cavendish, who in 1781 had obtained water by combining these elementary substances; oxygen having been previously discovered in 1775, and hydrogen at least as early as 1766. It was also very soon afterwards observed that there were always formed by the action of the battery on water, besides these aëriform products, an alkali and an acid, the alkali collecting around the negative pole and the acid around the positive pole of the electrical combination. In regard to the nature of this acid and alkali there was the greatest difference of opinion among the early experimenters on this subject. Cruikshank supposed that the acid was nitrous acid, and the alkali ammonia. Desormes, a French chemist, attempted to prove that the acid was muriatic acid; while Brugnatelli asserted that a new and peculiar acid was formed, which he called the electric acid.

"It was in this state of the question that Sir Humphry Davy began his investigation. From the analogies of chemical science, as well as from the previous experiments of Cavendish and Lavoisier, he was persuaded that water consisted solely of oxygen and hydrogen gases, and that the acid and alkali were merely adventitious products. This opinion was undoubtedly well founded; but, great disciple of Bacon as he was, Davy felt that his opinion was worth nothing unless substantiated by experimental evidence, and accordingly he set himself to work to obtain the required proof.

"In Davy's first experiments the two glass tubes which he used to contain the water were connected together by an animal membrane, and he found, on immersing the poles of his battery in their respective tubes, that besides the now well-known gases, there were really formed muriatic acid in one tube and a fixed alkali in the other. Davy at once, however, suspected that the acid and alkali came from common salt contained in the animal membrane, and he, therefore, rejected this material and connected the glass tubes by carefully-washed cotton fibre; when, on submitting the water, as before, to the action of the voltaic current, and continuing the experiment through a great length of time, no muriatic acid appeared; but he still found that the water in one tube was strongly alkaline, and in the other strongly acid, although the acid was, chiefly at least, nitrous acid. A part of the acid evidently came from the animal membrane, but not the whole, and the source of the alkali was as obscure as before. Davy then made another guess. He knew that alkali was used in the manufacture of glass; and it occurred to him that the glass of the tubes, decomposed by the electric current, might be the origin of the alkali in the experiments. He, therefore, substituted for the glass tubes cups of agate, which contains no alkali, and repeated the experiment, but still the troublesome acid and alkali appeared. Nevertheless, he said, it is possible that these products may be derived from some impurities existing in the agate cups, or adhering to them; and so, in order to make his experiments as refined as possible, he rejected the agate vessels, and procured two conical cups of pure gold; but on repeating the experiments the acid and the alkali again appeared.

"And now let me ask who is there of us who would not have concluded at this stage of the inquiry that the water and alkali were essential products of the decomposition of water? But not so with Davy. He knew perfectly well that all the circumstances of his experiments had not been tested, and until this had been done he had no right to draw such a conclusion. He next turned to the water he was using. It was distilled water, which he supposed to be pure; but still, he said, it is possible that the impurities of the spring water may be carried over to a slight extent by the steam in the process of distillation, and may, therefore, exist in my distilled water to a sufficient amount to have caused the difficulty. Accordingly he evaporated a quart of this water in a silver dish, and obtained seven-tenths of a grain of dry residue. He then added this residue to the small amount of water in the gold cones, and again repeated the experiment. The proportion of alkali and acid was sensibly decreased.

"You think he has found at last the source of the acid and alkali in the impurities of the water. So thought Davy, but he was too faithful a disciple of Bacon to leave this legitimate inference unverified. Accordingly he repeatedly distilled the water from a silver alembic until it left absolutely no residue on evaporation, and then with water, which he knew to be pure, and contained in vessels of gold from which he knew it could acquire no taint, he still again repeated the already well-tried experiment. He dipped his test-paper into the vessel connected with the positive pole, and the water was still decidedly acid. He dipped the paper into the vessel connected with the negative pole, and the water was still alkaline.

"You might well think that Davy would have been discouraged here. But not in the least. The path to the great truths which nature hides often leads through a far denser and a more bewildering forest than this; but then there is not infrequently a blaze on the trees which points out the way, although it may require a sharp eye in a clear head to see the marks. And Davy was well enough trained to observe a circumstance which showed that he was now on the right path and heading straight for the goal. On examining the alkali formed in this last experiment, he found that it was not, as before, a fixed alkali, soda or potash, but the volatile alkali ammonia. Evidently the fixed alkali came from the impurities of the water, and when, on repeating the experiment with pure water in agate cups or glass tubes, the same results followed, he felt assured that so much at least had been established. There was still, however, the production of the volatile alkali and of nitrous acid to be accounted for. As these contain only the elements of air and water, Davy thought that possibly they might be formed by the combination of hydrogen at the one pole and of oxygen at the other with the nitrogen of the air, which was necessarily dissolved in the water. In order, therefore, to eliminate the effect of the air, he again repeated the experiment under the receiver of an air-pump from which the atmosphere had been exhausted, but still the acid and alkali appeared in the two cups.

"Davy, however, was not discouraged by this, for the blazes on the trees were becoming more numerous, and he now felt sure that he was fast approaching the end. He observed that the quantity of acid and alkali had been greatly exhausted by diminishing the air, and this was all that could be expected, for, as Davy knew perfectly well, the best air-pumps do not remove all the air. He, therefore, for the last experiment, not only exhausted the air, but replaced it with pure hydrogen, and then exhausted the hydrogen and refilled the receiver with the same gas several times in succession, until he was perfectly sure that the last traces of air had been, as it were, washed out. In this atmosphere of pure hydrogen he allowed the battery to act on the water, and not until the end of twenty-four hours did he disconnect the apparatus. He then dips his test-paper into the water connected with the positive pole, and there is no trace of acid; he dips it into the water at the negative pole, and there is no alkali; and you may judge with what satisfaction he withdraws those slips of test-paper, whose unaltered surfaces showed that he had been guided at last to the truth, and that his perseverance had been rewarded.

"The fame of Sir Humphry Davy rests on his discovery of the metals of the alkalies and earths which first revealed the wonderful truth that the crust of our globe consists of metallic cinders; but none of these brilliant results show so great scientific merit or such eminent power of investigating nature as the experiments which I have just detailed. I have not, however, described them here for the purpose of glorifying that renowned man. His honoured memory needs no such office at my hands. My only object was to show you what is meant by the Baconian method of science, and to give some idea of the nature of that modern logic which within the last fifty years has produced more wonderful transformations in human society than the author of Aladdin ever imagined in his wildest dreams. In this short address I can, of course, give you but a very dim and imperfect idea of what I have called the Baconian system of experimental reasoning. Indeed, you cannot form any clear conception of it until in some humble way you have attempted to use the method, each one for himself, and you have come here in order that you may acquire such experience. My object, however, will be gained if these illustrations serve to give emphasis to the following statements, which I feel I ought to make at the opening of these courses of instruction—statements which have an especial appropriateness in this place, since I am addressing teachers, who are in a position to exert an important influence on the system of education in this country.'

NEW MEDICAL SCALE FOR PASSENGER SHIPS.

The annexed scale of medicines, medical stores, and instruments for ships clearing under the Passengers' Acts, other than steam ships engaged in the North Atlantic trade, has been issued and caused to be published by the Board of Trade, and is intended to supersede the scales hitherto in force.

The quantities mentioned in the scale are for every 100 passengers, when the length of the passage, computed according to the Passengers' Act, is 100 days and upwards. Half the quantity of the medicines indicated, but the same kind and quantity of medical stores should be taken when the passage is less than 100 days.

N.B.—There is a separate scale for North Atlantic steam passenger ships.

The medicines are to be prepared according to the British Pharmacopœia, to be plainly labelled in English, and the average doses for an adult stated, according to the British Pharmacopœia. All bottles are to be stoppered, and all medicines indicated thus (*) are to be marked with a red poison label. All fluid quantities are to be measured by *fluid* lbs., ozs., or drs.

		Lbs.	Oz.	Dr.
	Acid: Acetic	0	6	0
*	„ Carbolic	0	1	0
*	„ „ A powder containing not less than 20 per cent. of pure Carbolic or Cresylic Acid	112	0	0
	„ Citric	0	3	0
	„ Gallic	0	1	6
*	„ Hydrocyanic Dil.	0	0	4
*	„ Nitric	0	1	0
*	„ Sulph. Dil.	0	6	0
	Æther	0	1	0
	Alumen	0	1	0
	Ammon. Carb.	0	6	0
	Amylum	1	0	0
	Argent. Nit. (Stick)	0	0	2
	Calx Chlorata	7	0	0
	Camphor	0	6	0

Charta Epispastica . . . 4 square ft. in case.

	Lb.	Oz.	Dr.
*Chloride of Zinc (Burnett's Solution of)	16	0	0
*Chloroform	0	8	0
Copaiba	0	8	0
Creasote	0	0	2
Cupri Sulph.	0	1	0
Empl. Cantharidis	0	1	0
Ferri et Quiniæ Citr.	0	1	0
„ Sulph.	0	0	4
Glycerine	0	6	0
„ Acid. Tannic.	0	4	0
*Hydrat. Chloral.	0	1	6
Hydrarg. cum Cretâ.	0	0	4
„ Subchlorid.	0	0	4
Lini Farina	6	0	0
Lin. Camph	0	8	0
* „ Opii	0	2	0
„ Saponis	1	0	0
*Liq. Atropiæ	0	0	1
„ Calcis	1	0	0
* „ Morphiæ Acetatis	0	1	0
* „ Plumbi Subacetatis	0	2	0
„ Potassæ	0	2	0
* „ „ Permanganatis (B.P. or Condy's Crimson Fluid)	3	0	0
Magnes. Sulph.	4	0	0
Mist. Sennæ Co. (omit Extract of Liquorice and substitute Aromatic Spirit of Ammonia, 1 oz. to 1 pint of the mixture)	3	0	0
Ol. Croton	0	0	1
„ Lini	0	8	0
„ Menth. Pip.	0	0	2
„ Morrhuæ	3	0	0
„ Olivæ	1	0	0
„ Ricini	2	0	0
„ Terebinth.	1	0	0
*Opium	1	0	0

All pills to be made and marked 5 grains.

Pil. Aloes cum Myrrhâ	2 dozen.
„ Col. c. Hyosc.	4 „
„ Hydrarg.	3 „
„ Ipecac. c. Scillâ	5 „
„ Quiniæ	6 „
„ Sapon. Co..	6 „

	Lb.	Oz.	Dr.
*Plumbi Acetatis	0	1	0
Potassæ Bicarb. Pulv.	0	4	0
Potassii Iodid.	0	2	0
Pulv. Antimonialis	0	0	3
„ Astringens (double the quantity indicated to be taken to all tropical ports: Pulv. Catechu Co., Pulv. Cret. Arom. c. Opio—equal parts)	1	0	0
„ Cretæ Arom. cum Opio	0	2	0
„ Ipecac.	0	2	0
„ „ Co.	0	2	0
„ Jalapæ Co.	0	3	0
„ Potassæ Nitratis	0	4	0
„ Rhei Co.	0	4	0
„ Scammon. Co.	0	0	6
Quiniæ Sulph. (double the quantity indicated to be taken to all tropical ports)	0	1	0
Sodæ Bicarb.	1	0	0
Sp. Æther. Nitrosi	0	8	0
„ Ammon. Arom.	0	8	0
„ Rectif.	0	4	0
Sulphur. Sublimatum	3	0	0
Syr. Ferri Iodid.	0	4	0
*Sol. Morph. Acetat. (a neutral solution containing 4 grains in a dram, and so marked. To be labelled—*For hypodermic injection*)	0	0	4
Tr. Arnicæ	0	6	0
„ Camph. Co.	0	8	0
* „ Digitalis	0	0	6
„ Ergotæ	0	6	0
Tr. Ferri Perchloridi	0	4	0
* „ Opii	0	6	0
„ Scillæ	0	2	0
„ Valerian. Ammon.	0	3	0
Ung. Cetacei	1	0	0
„ Hydrarg	0	2	0
„ „ Ox. Rub.	0	1	0
„ Sulphur.	1	0	0
„ Zinci	0	2	0
Vinum Colchici	0	1	0
„ Ipecac.	0	1	0
Zinci Sulphat.	0	1	0
Desiccated Soup	4	0	0

Medical Stores.

Lint	10 ozs.
Tow	1 lb.
Adhesive Plaster	3 yards.
Male Syringe	1.
„ Glass	1.
Female „	1.
„ „ Glass	1.
Phials (assorted)	2 dozen.
Phial corks	6 dozen.
Sponges	3.
Bed Pan	1.
Paper of Pins	1.
Hernia Truss, 36-inch reversible	1.
Paper of Pill Boxes	1.
Gallipots	6.
Leg and Arm Bandages	6.
Calico	3 yards.
Flannel Bandages, 7 yds. long, 6 ins. wide	2.
Flannel	2 yards
Triangular Bandages, base 48 in., sides 33 in. ea.	2,
†Minim Measures	2.
†1 oz. „	1.
†2 oz. „	1.
†Set of Splints	1.
†Waterproof Sheeting	4 yards.
†Oiled Silk	1 yard.
†Enema Syringe and Stomach Pump	1.
†Box of Small Scales and Weights	1.
†Wedgwood Mortar and Pestle	1.
„ Funnel	1.
†Spatulas	2.
†Authorized Book of Directions for Medicine Chests	1.
†British Pharmacopœia	1.

Instruments.

In Pocket Case.

1 Tenaculum
1 Artery Forceps
1 Operating do.
1 Finger Knife
1 Curve Bistoury Probe Point
1 Curve Bistoury Spear Point
2 Probes
1 Silver Director
1 Caustic Case
1 Scissors
1 Spatula
12 Needles
1 Skein Ligature Silk
3 Lancets

1 Amputating Saw
2 „ Knives
1 Bone Forceps
3 Tooth „
1 Skull „
1 Trephine
1 Elevator
1 Hey's Saw
1 Trephine Brush
2 Scalpels
1 Hernia Knife
2 Trocars and Canulas
1 Aneurism Needle
1 Hernia Director
1 Tourniquet
2 Silver Catheters (Nos. 4 and 8)
4 Elastic Gum Catheters (Nos. 3, 5, and 7)
1 Clinical Thermometer
1 Hypodermic Syringe
1 dozen charged Tubes for Vaccination
1 Set of Midwifery Instruments

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† One set only of these articles required, irrespective of number of passengers.

N.B.—Only one set of instruments required, without regard to the number of surgeons, passengers, or the length of the voyage.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 16, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

"HYGEIA" AND THE ALKALI DISTRICTS.

IN the capacity of President of the Health Section of the Social Science Congress held at Brighton, Dr. RICHARDSON has during the past week been instructing—and amusing—an audience by a fancy sketch of a city where hygiene reigns paramount. In this wonderful place infantile diseases are to be almost unknown, typhus and typhoid fevers and cholera are to be incapable of existing, except temporarily, and many other ailments that affect ordinary populations are to be effaced, and consequently the death rate is not to exceed five per thousand. Probably Dr. RICHARDSON himself does not consider the standard he has set up to be quite attainable, and even if it were, we are not quite sure that Lord ABERDARE'S insinuation that its intricate sanitary regulations would render " Hygeia " too expensive for any but the rich to live in, might not justly be supplemented by a suggestion that they would also render it too uncomfortable for them. Still far be it from us to disparage the service rendered by holding up such an ideal.

But some words written by Dr. R. ANGUS SMITH in his new report as Inspector under the Alkali Acts bring us face to face with hard facts that would seriously interfere with the realization of Dr. RICHARDSON'S dream. Dr. SMITH, of all men, cannot be suspected of under-rating the importance of restrictive regulations respecting the contamination of air. But he is apparently of opinion that as regards that form of it which comes more particularly under his notice we have nearly reached the ultimate point of mitigation, and that, notwithstanding legislation on the subject is as yet in a very infantile state, if chemical manufactures continue to increase in numbers and magnitude as they have done, it will not be possible to do more than to keep pace with them and prevent an increase of mischief.

Like all Dr. SMITH'S reports, his latest is very suggestive. The time has gone for ever when torrents of gases like those that once escaped from the shafts of alkali works would be allowed to roll over the country, and were it allowed manufacturers are now sensible of the waste involved in such a practice. But, as Dr. SMITH remarks, vegetation may be destroyed without torrents of gas. A gentle flow rom a chimney or other vent, that scarcely causes annoyance, may in time cause destruction to trees and perennial plants, whilst a slight increase, causing only occasional inconvenience, may still destroy animals and obliterate grass. So far as regulation is concerned, Dr. SMITH considers " that it is not safe to allow even as much of sulphur gases as we have in Manchester and other large towns ; " if more be allowed, trees disappear.

Incidentally it is interesting to have the opinion of so accomplished a chemist as to the manner in which these gases act upon vegetable life. Dr. SMITH thinks that probably in small quantities the effects of sulphurous and sulphuric acids are about the same ; that sulphuric acid does more immediate harm, but that sulphurous acid may do more ultimate injury, by acting, first, as a deoxidizer, and afterwards as sulphuric acid, into which it would be converted.

So little is yet known as to the actual extent to which acid gases, as given out by chemical works, are prejudicial to human health, that Dr. Smith is very guarded in expressing an opinion. But he considers it may be taken for granted at present that man is uninjured by them where trees flourish. His general conclusion is that these gases " are hurtful to the health, but are neither the worst causes, on the one hand, nor are they the disinfecting or curative agents which some have supposed, on the other." Carefully guarding against too much importance being attached to meagre statistics, he turns to Widnes, a district peculiarly exposed to fumes from alkali works, and compares the number of deaths due to certain diseases out of 1000 deaths there during five years ending September, 1873, with the same number in all England, from 1869 to 1872. Deaths from pneumonia were exceptionally high at Widnes during that period, being about twice the average of all England, as also were those from laryngitis and lung disease. On the other hand, the deaths from phthisis, bronchitis, asthma, and small-pox were below the general average, the two latter considerably so. But, as illustrating the uncertainty that exists on the subject, Dr. SMITH points out that the mortality at Widnes from scarlet fever, which the gases might be supposed to counteract by their disinfecting influence, was very high, whilst that from whooping cough, which the gases, when strong, are supposed to cure, was low.

With respect to the best means of establishing a satisfactory standard of purity for the air of towns, Dr. SMITH is inclined to revert to a former proposition of his own, that the already existing condition of the air of a place ought to be taken into consideration before allowing a fresh chemical works to be established there. He points out the obvious fact that where a number of works occur within a limited area, although from each individual establishment the smallest possible amount of gas is emitted, the gross vitiation of the air might easily exceed that which occurs in a district where only one or two much less carefully conducted works are situated. If it be determined to enforce a certain standard for the purity of air in towns, then not only must the works be kept within a certain standard, but they must not be allowed to exceed a certain number. At present we have only got so far as enforcing a standard for individual works, but Dr. SMITH thinks, and most persons will agree with him, that this is not of so much importance as a standard for a district. So that our sanitary legislators have still much hard work to accomplish in this direction.

PHARMACY AT THE BRUSSELS CONGRESS.

IN accordance with the published programme, the question whether it is advisable to employ only active chemical principles in medicine, and therefore to introduce more preparations of them into Pharmacopœias, was brought before the pharmaceutical section of the general medical congress which commenced at Brussels on the 19th ult. Resolutions were proposed taking the affirmative view, and recommending that the use of isolated active principles should be gradually substituted for that of crude vegetable matters. Further, it was suggested that the most suitable preparations of such active principles were, for internal administration, the "*grain*" and the *granule*, containing one milligram of the active substance; and for external use, an alcoholate of 1 in 50 strength, and corresponding closely to one milligram per drop. The resolutions, however, were strongly opposed as being too subversive, and although some modification of them was suggested, the matter was eventually allowed to remain *in statu quo*.

The next question discussed was that of an International Pharmacopœia, which was raised by some proposed resolutions requesting the Russian Government to take the initiative in the formation of an international commission, composed of medical men, veterinarians, and pharmacists, charged with the formation of such a work. At present it was proposed that its scope should be limited to including the more powerful medicines, leaving to each country to complete it afterwards according to its own particular requirements; but that so far as it went it should be constructed upon the basis laid down by the St. Petersburg International Pharmaceutical Congress of last year. These resolutions, also, were vigorously disputed, upon the ground that the difficulties in the execution of such a work would be insurmountable. It was urged that the idea of a universal pharmacopœia was a Utopian idea that had been running about the world for several years past, but like Misery, was unable to find an asylum. A Danish pharmacist having stated that a draft of a universal pharmacopœia was on the point of being issued from St. Petersburg, it was decided to await the course of events, and this discussion also terminated without any definite result.

Other discussions turned upon the tinning of culinary utensils, the adulteration of food and the dissemination of information as to methods for its detection, and the antiseptic action of salicylic acid, the latter being the only strictly scientific subject brought before the section. Considering the absence of results at all proportionate to the amount of linguistic power put into action we are not surprised to find that one of our Belgian contemporaries describes the meeting as "*une de ces exhibitions à grand orchestre.*"

THE GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

THE Council of the Glasgow Association announces that arrangements are in progress with Dr. A. T. MACHATTIE, F.C.S., to commence a class for the study of Practical Pharmaceutical Chemistry, to be held on Thursday evenings at 8·30, commencing the second week in October, provided that not less than thirty students come forward to join it. The class will meet weekly during six months, and the fee for the course is to be one guinea. Applications for tickets should be made to the Hon. Secretary, Mr. J. M. FAIRLIE, 17, St. George's Road, Glasgow.

The Association commenced its meetings for the Session on Wednesday evening last, and the opening meeting of the Assistants' Section will be held on Wednesday, the 27th of October.

NEW PHARMACEUTICAL JOURNALS.

WE have to welcome the first numbers of two new exponents of continental pharmacy, that have made their appearance during the present month. One, the *Journal de Pharmacie*, which is to be published fortnightly at Geneva, is written in the French language, and is intended to supply a want thought to exist through the only other Swiss pharmaceutical journal, the *Schweizerische Wochenschrift*, being the organ of a Society, and written in the German language. The second, *De Pharmaceut*, is to be published at Groningen, in Holland, as a "Weekblad voor Pharmacie en verwante wetenschappen." Each of the new journals consist of four small quarto pages, and already evidence in their promoters a keen appreciation of the assistance advertisers may render to the progress of pharmacy.

POISONING BY ARSENIC.

AN Edinburgh correspondent who believes that he was instrumental in bringing about the provision in the Arsenic Act, by which it was made illegal to sell arsenic as a poison without its being coloured, writes to point out that since that time poisoning by arsenic has become of rare occurrence. He asks, "how it comes that Messrs. JOHNSON, Pharmaceutical Chemists, of Liverpool, sell to the man HALL half a-pound of white arsenic for destroying vermin (presumably uncoloured or it could not be mistaken for sugar), causing the death of a little girl, MARGARET HALL, as reported in last week's Journal." He thinks that an explanation of this should be given.

EXTINCTION OF FIRES IN SHIPS.

THE Council of the Society of Arts offer the Fothergill Gold Medal for an effective means of preventing or of extinguishing accidental fires on board ships. Communications on the subject must be sent in to the Society not later than the 31st of December next.

Provincial Transactions.

PHARMACEUTICAL SOCIETY OF IRELAND.

At the last meeting of the Council of this Society, held at the King and Queen's College of Physicians, Dublin, the following gentlemen were elected Examiners for one year, ending 30th September, 1876, subject to the approval of the Lord Lieutenant and Privy Council :—

E. W. Collins, M.D. and Examiner, Medical School, Trinity College, as Examiner in Latin, English, and Arithmetic.

W. G. Smith, Examiner Q.U.I., as Examiner in Materia Medica and Botany.

H. N. Draper, F.C.S., as Examiner in Pharmaceutical and General Chemistry.

R. Montgomery, L.A.H., Dublin, as Examiner in Practical Pharmacy.

NORWICH CHEMISTS' ASSOCIATION.

The annual meeting of the above Association was held at the rooms, September 23, 1875, the President, Mr. O. Corder, in the chair.

After briefly alluding to the past session, the President stated (owing to their Treasurer and their Secretary being unavoidably absent), that the first business of the evening was the election of Officers and Committee for the ensuing year. The following was the result of the ballot :—President, Mr. O. Corder ; Vice-President, Mr. W. H. Symons ; Treasurer, Mr. W. J. G. Butler ; Secretary, Mr. Hindle Cooke ; Committee, Mr. J. Cossey, Mr. H. E. de Carle, Mr. W. Lincolne, Mr. W. G. Piper, Mr. G. A. Thompson, Mr. J. Watson, and Mr. J. Robinson.

After some conversation it was decided to canvas the city to ascertain the number of students likely to attend the classes during the ensuing session.

The reports of the classes held during the past session were then read.

The Chemistry Class.—Mr. William H. Symons reported that the winter class had met twenty-five times between October and May. There were thirteen names in the class book, and the average attendance was 8·4, or about two-thirds of the class. The inorganic elements and simple analysis were the subjects of the study. The summer class had met thirty-five times between May and September. There were twelve regular students, and the average attendance was 8·9 or nearly three-fourths of the class. Practical analysis of mixtures of bases and the preparation of Pharmacopœia salts constituted this course. On the whole Mr. Symons was pleased with the progress made, and he believed that the classes had answered the purpose for which they were intended.

Botany Class.—Mr. W. Piper reported that at the commencement of the last session thirteen students joined the botany class. The class had met nearly forty times and the average attendance had been eight.

A discussion then followed on the advisability of making the teaching more strictly pharmaceutical, and after a warm debate it was decided to sever the connection of the chemistry class with South Kensington.

The meeting then adjourned to Tuesday, October 5.

At the adjourned meeting held in the rooms, Tuesday evening, October 5, the President again occupied the chair.

The President at once called upon the Treasurer to read his report.

Treasurer's Report.

Dr.

	£	*s.*	*d.*
Balance in hand	12	15	2
Thirty-four Members' Subscription	17	17	0
Three Members' half-quarter Subscriptions	0	16	6
From S. and A. Classes	10	0	0
From W. H. Symons for use of rooms	1	7	0
	£42	16	5

Cr.

	£	*s.*	*d.*
Rent	10	0	0
Rates	3	4	0
Gas	2	12	2
Firing	1	0	3
Cleaning	3	1	6
Chemicals	1	18	3
Printing and Stationery, etc.	1	12	1
Water Rate	0	16	6
Carpenter for fixing Sink, etc.	5	18	0
Gas Fittings, etc.	2	2	8
Sundries	0	3	8
Balance in hand	10	7	4
	£42	16	5

Examined with vouchers and found to be correct.

Francis Sutton } Auditors.
Walter Stebbing }

October 11, 1875.

After the Treasurer had read his report Mr. Corder presented him in the name of the Association with two handsomely bound volumes of Dante's 'Inferno,' and 'Purgatorio and Paradiso,' illustrated by Doré, as a tribute to his perseverance in promoting the interests of the Society, he having been connected with it as treasurer from its foundation. Mr. Butler acknowledged the gift in suitable terms, thanking the members for this unexpected proof of their esteem.

A letter was read from Mr. Hindle Cooke, stating that he was unexpectedly leaving Norwich, and, therefore, was compelled to resign the office of secretary. Great regret was expressed by all present, and they wished Mr. Cooke success in his future career. This came upon the Association so suddenly that it was decided to leave the office of secretary open, and Mr. Butler consented to take it *pro tem.*

It was then resolved to form a materia medica class to be conducted by Mr. G. A. Thompson; a pharmaceutical chemistry class, to be conducted by Mr. W. H. Symons; and a botany class, to be conducted by Mr. W. G. Piper. A class in pharmacy and theoretical chemistry, to include some lessons in the art of dispensing, is to be conducted by Mr. W. H. Symons.

An Educational Committee was then formed to arrange a programme for lectures, classes, etc., during the winter session. Eight prizes are promised for competition amongst the students at the end of the session by private members of the Association. Several gentlemen have promised to deliver lectures during the winter months as follows :—

October 12, Address to Students, Mr. F. Sutton, F.C.S.; December 13, Lecture on Vinegar, Dr. Archbold, F.C.S.; January 10, 1876, Lecture on British Medicinal Plants, Mr. W. G. Piper; February 14, Lecture, Plant Life, Mr. O. Corder ; March 13, Paper Stereotyping and Electrotyping, practically illustrated, Mr. W. H. Symons. Chair to be taken each evening at 8·15 p.m.

LIVERPOOL CHEMISTS' ASSOCIATION.

The annual meeting, twenty-sixth session, was held at the Royal Institution, September 30, 1875. The President, Mr. A. H. Mason, F.C.S., in the chair.

After the reading of the minutes of the previous meeting and other routine business, the Secretary read the report of the Council for the past session—

Report of the Liverpool Chemists' Association.

TWENTY-SIXTH SESSION.

The report of the proceedings of the Liverpool Chemists Association for the past session presents, for the most part, the usual features of moderate progress. Although at the commencement there were unfortunately some adverse circumstances, as the session progressed harmony was restored, and your Council trust that, with its aims and scope more clearly defined, your Association has before it a future of usefulness and influence.

During the past session two honorary members, Messrs.

Thomas Morson, F.C.S., and Louis Siebold, F.C.S., nine members and three associates, were elected; the number at present on the books being 157, comprising: honorary members, 16; members, 124; associates, 18.

There have been eight evenings devoted to the reading of papers and discussion, four conversaziones, and one lecture.

The lecture by Mr. L. Siebold, F.C.S., was numerously attended, and was a most successful demonstration of a difficult subject. The papers read have been fully equal in interest and importance to those of former sessions.

The conversaziones have been more numerously attended than in the previous session, attracting as large a number of members as the meetings devoted to papers. Your Council propose to continue them on the alternate meetings, and earnestly invite members to assist by bringing microscopes, new drugs, new apparatus, and generally anything novel relating to chemical or pharmaceutical science. On these evenings short papers or lectures will be acceptable. Some of the meetings have been held in the Gallery of Arts, and have afforded the members an opportunity of enjoying the valuable art treasures which it contains.

The disordered state of the museum has long been a source of regret to your Council, and they are glad to be able to state that a plan for rearrangement has been agreed upon, and a beginning made by arranging the furthest case, which contains products of the animal kingdom on one side, and on the other numerous fine specimens of vegetable alkaloids and other organic products, and a collection of rare organic chemicals; numerous specimens of essential oils which were unnamed have been examined and labelled. Several valuable donations have been presented during the past session, among which may be specially mentioned a portrait of Mr. Thomas Newborn Robert Morson, F.C.S., given by his son.

The library has been used to about the same extent as in former years, 204 volumes having been taken out. The state of the funds of the Association has not permitted the purchase of books, but the supply of periodicals has been kept up. The question box has not been used as much as your Council hoped, and they would call the attention of members to this means of obtaining a solution of any difficulty which they may meet with in their studies or in practical work.

After several unsuccessful attempts a class for the study of chemistry was formed, and a complete course of lectures on "Inorganic Chemistry" delivered. At the same time the number of students was so small that your Council do not feel themselves justified in continuing to supply instruction on this important subject until there is more evidence of a desire on the part of students to avail themselves of it.

Messrs. Armstrong, Mason, Redford, and Shaw were appointed delegates to the Pharmaceutical Conference.

The following members of Council retire by rotation, but are eligible for re-election:—Messrs. Hallawell, Jones, Mason, and Tanner. The new law in relation to the election of members of Council comes into operation this year, and your Council trust that by means of it a more perfect representation of the views of the members will be obtained.

The report of the finances of the Association, as presented by your Treasurer, shows £5 3*s.* 1*d.* due to the Treasurer.

The Treasurer, Mr. J. Shaw, read the Financial Statement, which showed a balance due to the Treasurer of £5 3*s.* 1*d.*, being about the same as in the previous session.

The President moved—

"That the reports as read be adopted, and together with the list of members be printed and circulated among the members."

He thought that they showed a satisfactory state of things, and that during the past session the papers read had maintained the character of the Association.

Mr. Parkinson seconded the motion, which was carried unanimously.

The meeting then proceeded to the election of four members of Council. Messrs. Hallawell, Jones, Mason, and Parnell were duly elected.

Mr. Mason moved the alteration of law 8, in order to conclude the general meetings in April instead of May. He said that the Association continued its meetings to a later period than other societies, and that in consequence the last meetings were badly attended.

Mr. Parkinson seconded the motion, which met with unanimous support.

Mr. Davies then moved the alteration of law 5 as follows:—

> "*The President shall be elected at the last general meeting of the session by the members. His duties shall not commence until the first of October following.*" And in consequence of this alteration to amend law 4. "That the affairs of the Association shall be conducted by a Council of twelve members, four to form a quorum. *If the President be not a member of Council at the time of his election he shall be an extra member, ex officio, during his term of office only.*" The words in italics are additions to the present laws.

Mr. Davies said that he moved this alteration for the following reasons:—The present method of electing the President by the new Council had the disadvantage that the President had only a few days to prepare his inaugural address; that in all kindred societies with which he was acquainted the members elected their President; that it would be more pleasant for the President to feel that he was the direct choice of the members; and that the members would be led to take more interest in the affairs of the Association. He thought that the choice of the members should be left free and not confined to members of the Council.

Dr. Symes seconded the motion and said that though he did not anticipate great results from the change, he thought it was in the right direction, and would give to the President the support of the members in any movement for the benefit of the Association. He did not believe in the unchangeability of laws, and would alter them at any time when it was for the benefit of the Association to do so.

Messrs. Sumner, Shaw, Hallawell, Armstrong, and other members took part in the discussion, and the motion was passed without opposition.

Mr. Garside, F.C.S., moved—

"That the best thanks of the meeting be given to the donors to the Library Museum and to the authors of papers during the past session."

Mr. Woodcock seconded the motion, which was carried unanimously.

Mr. J. Armstrong, F.C.S., moved—

"That the Council be requested to consider the desirability of altering the time at which the Association holds its General Meeting, from 8·30 to 7·30."

Mr. Abraham seconded the motion.

Considerable discussion followed in which the motion was unanimously approved, although several members urged the importance of consulting the members generally before making such an important change. On being put to the vote the motion was carried.

Mr. T. F. Abraham moved, Mr. Damsell seconded—

"That the best thanks of this meeting be given to the officers and Council for their services during the past session." Carried by acclamation.

The President returned thanks for the Council and himself, and the meeting closed.

NORTHAMPTON PHARMACEUTICAL ASSOCIATION.

The election of officers for the new Council of this Association resulted in the return of Mr. O. Wallis as President, Mr. J. C. Osborne as Vice President, Mr. J. C. Druce as Secretary and Treasurer, and Messrs. Camplin, Townsend, Gudgeon and Mayger as Councillors ; Mr. Atkinson was appointed Librarian. It has also been decided that classes should be conducted in Practical Chemistry, by Mr. W. Hicks ; Botany, by Mr. J. C. Druce ; Materia Medica, by Mr. O. Wallis; Pharmacy by Mr. Lewis ; a Preliminary Class is to be conducted by Mr. Osborne, and a Prescription Class. During the session, also, Mr. Druce will describe volume testing, the use of chemical apparatus, specific gravity, chemical processes, etc.

The opening meeting was held on October 4th, the President, Mr. Wallis, occupying the chair.

The Secretary, Mr. Druce, read a list of donations, also the names of the honorary members who had kindly assisted the Association, and correspondence from old members of the Association, who had sent them good wishes. He then read the following report and balance sheet :—

"The Council have much pleasure in placing before the members the report of their fourth year's progress, during which classes on Botany, Chemistry—practical and theoretical—Materia Medica, Pharmacy, Prescriptions and Latin were conducted; but the attendance during the latter part of the session, from so many members leaving the town, and the temporary reaction caused by the change in conducting the Minor examination, fell below the customary average.

"The Council much regret the loss of their late President, Mr. C. Hester, and their Councillors, Messrs. Kemp and Princep.

"At a meeting held on March 22, 1875, Messrs. Barry, Berry, Bingley, Jeyes, and Mayger were elected from the principals in the town as trustees, to administer the affairs of the Association, should occasion require.

"The botanical ramble was a most pleasant holiday, since the route led through Bedford Purlieus aad Wittering Heath, both rich in floral treasures, visits being also paid to Northamptonshire's most interesting historical memorial — Fotheringay Castle, and one of its stateliest homes—Burghley House. The *soirée* at Christmas was largely attended, and a very enjoyable evening spent.

"Financially the Association is in a very prosperous condition, as will be seen from the annexed balance sheet —a condition in part owing to the kind response made by the principals to the invitation to become honorary members, for which, and the use of the room lent by Mr. Jeyes, the Council take this opportunity of heartily thanking them.

"During the coming session the usual classes will be conducted ; and to encourage attendance the Council have prepared a programme, which it is trusted will meet with the approval of the members.

"In returning thanks for their election, the Council beg to state that while on their part no exertion shall be wanting, they must ask for a hearty co-operation from the members in giving frequent and punctual attendance. There then can be no doubt the session will be made a success, and individually each must be benefited."

RECEIPTS.

	£	s.	d.
Balance from 1874	4	19	9
Twenty-five Members' Subscriptions...	6	5	0
Three Corresponding Members' Subscriptions	0	7	6
Seven Honorary Members' Subscriptions	4	3	6
Prize not competed for...	0	5	0
Interest	0	3	0
	£16	3	9

EXPENDITURE.

Apparatus and Chemicals	1	2	2
Fire, Gas, and Cleaning Room	1	7	0
Books and Stationery	4	9	3
Subscription to Chemistry returned ... ... — ...	0	8	0
Balance	8	17	4
	£16	3	9

Audited and found correct ... { J. Lewis,
A. M. Bate.

Mr. Vickerman moved the adoption of the report, which, having been seconded by Mr. Atkinson, was carried.

Mr. Wallis then delivered the opening address. After thanking the members for the honour done to him by electing him President, he continued :—

"Since the formation of the Association in October, 1871, I find that no fewer than ninety-one members have joined it, many of those passed their examinations whilst connected with us, and those who have passed since leaving the town, can, and I have no doubt do, look back with feelings of pleasure when they think of the evenings spent here and gratitude for the assistance they gained by attending the various classes and making good use of the many opportunities afforded by this Association for gaining knowledge; we know this is so by the fact that many wish to keep up their connection with us by becoming corresponding members, by their occasionally sending us a paper on some pharmaceutical subject, and by the testimony of others who now greatly miss the advantages which we enjoy. What the Association has done in the past it is capable of doing now. I know the Minor examination has been made more difficult, or rather more practical, and I welcome the change ; but this must be counterbalanced by our endeavour to make our knowledge more really practical, and by increased perseverance in study. I would especially ask all to study systematically, to write out a table of the various subjects, with a certain evening for the study of each, and endeavour as far as possible to keep to it. I can state from personal experience that this is an excellent plan and when followed up it is really surprising the amount of work one is capable of performing. The alteration in the conducting of the Minor entails a greater amount of work and increased responsibility upon the class-takers, though I am sure they will perform their part most creditably ; but on their behalf allow me to ask you to encourage them in their efforts by your punctual attendance. Up to the present time success has certainly attended the efforts of this Association. During each session classes have been held in the various subjects embraced in the pharmaceutical curriculum; papers on subjects of pharmaceutical interest have been read, and followed by profitable discussions ; our advantages are also constantly increasing. Our materia medica specimens have been much enriched by several substances rare and interesting; our library is now an extensive one and contains all the text books required by the students, as well as many valuable works of reference; and apparatus for volumetric estimations has also been purchased, so that although we cannot conceal the fact that the attendance during the past session (as stated in the report) has been below the average, still, we have good reason for indulging the hope that by increased individual exertion on the part of the members, the session now commenced will be as successful or even more so than any which have preceded it. I can but regret the loss of our late esteemed president, Mr. C. Hester, whose exertions on behalf of this Association were most untiring, and I take this opportunity of thanking him for his valuable services. I also thank very sincerely those gentlemen who have volunteered to conduct classes. One of our late members, much esteemed by us all, has been, during the last session removed from us by death, and that the melancholy death of drowning, and I have expressed a wish that this Association should send a letter of condolence to his bereaved mother. During the year the Irish Pharmacy Bill has been the subject of much discussion, and the result, as far as English chemists are concerned, is not at all satisfactory. It is, however, to be hoped that the Major examination in Ireland, will be made to resemble as nearly as possible that of the Society for Great Britain. The new Adulteration Act, which came into force on the 1st of the present month, has also a most important bearing upon those connected with our calling; that it is a great improvement upon the late Act is evident; but the clause prohibiting the appointment of a pharmaceutical chemist as public analyst for the town in which he is in business has, I think, taken away one of the principal incentives to pass the Major examination, and cannot but have a prejudicial effect. The substances of comparatively modern introduction to pharmacy such as Jaborandi, Boldo, Carnauba Root, and Arariba or Goa powder, with their origins, properties, and uses, are no doubt known to you all, so that it is not necessary for me to enlarge upon them. The chemical substance which has attracted the greatest amount of attention is salicylic acid, and there is little doubt but that in course of time its applications and uses will, like those of glycerine, be found to be legion. I welcome you all as members of this Association. It rests with you each individually whether it shall be of benefit to you or not. If you take advantage of the many opportunities it affords you for gaining knowledge you will be vastly profited by it; but if, on the contrary, you do not attend the classes—do not work—do not persevere—you must not be surprised if you do not make much progress. I ask each of you then to strive to make this session a most successful one. Self-denial and perseverance are not qualities possessed by us all, but they are undoubtedly the great secret of success."

Mr. Gudgeon moved a vote of thanks to the President, which was seconded by Mr. Osborne and carried with applause. Several new members were then elected, and after the arrangement of other business the meeting terminated.

James Barry, Esq., J.P., has since presented twenty volumes of the *Pharmaceutical Journal* to the Association.

Proceedings of Scientific Societies.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

RELATIONS OF PHYSICS AND CHEMISTRY.*

BY PROFESSOR BALFOUR STEWART, M.A., LL.D., F.R.S.

Since the last meeting of the British Association science has had to mourn the loss of one of its pioneers in the death of the veteran astronomer, Schwabe, of Dessau, at a good old age, not before he had faithfully and honourably finished his work. In truth this work was of such a nature that the worker could not be expected long to survive its completion.

It is now nearly fifty years since he first began to produce daily sketches of the spots that appeared upon the sun's surface. Every day on which the sun was visible (and such days are more frequent in Germany than in this country), with hardly any intermission for forty years, this laborious and venerable observer made his sketch of the solar disc. At length this unexampled perseverance met with its reward in the discovery of the periodicity of sun-spots, a phenomenon which very speedily attracted the attention of the scientific world.

It is not easy to overrate the importance of the step gained when a periodicity was found to rule the solar outbreaks.

A priori, we should not have expected such a phenomenon.

If the old astronomers were perplexed by the discovery of sun-spots, their successors must have been equally perplexed when they ascertained their periodicity.

For while all are ready to acknowledge periodicity as one of the natural conditions of terrestrial phenomena, yet every one is inclined to ask what there can be to cause it in the behaviour of the sun himself.

Manifestly it can only have two possible causes. It must either be the outcome of some strangely hidden periodical cause residing in the sun himself, or must be produced by external bodies, such as planets, acting somehow in their varied positions on the atmosphere of the sun.

But whether the cause be an internal or external one, in either case we are completely ignorant of its nature.

We can easily enough imagine a cause operating from the sun himself and his relations with a surrounding medium to produce great disturbances on his surface, but we cannot easily imagine why disturbances so caused should have a periodicity. On the other hand we can easily enough attach periodicity to any effect caused by the planets, but we cannot well see why bodies comparatively so insignificant should contribute to such very violent outbreaks as we now know sun-spots to be.

If we look within we are at a loss to account for the periodicity of solar disturbances, and if we look without we are equally at a loss to account for their magnitude.

But since that within the sun is hidden from our view, it cannot surely be considered blameworthy if astronomers have directed their attention to that without, and have endeavoured to connect the behaviour of sun-spots with the positions of the various planets.

Stimulated, no doubt, by the success which had attended the labours of Schwabe, an English astronomer was the next to enter the field of solar research.

The aim of Mr. Carrington was, however, rather to obtain very accurate records of the positions, the sizes, and the shapes of the various sun-spots, than to make a very extensive and long-continued series of observations. He was aware that a series at once very accurate and very extended, is beyond the power of a private individual, and can only be undertaken by an established institution. Nevertheless each sun-spot that made its appearance during the seven years extending from the beginning of 1854 to the end of 1860, was sketched by Mr. Carrington with the greatest possible accuracy, and had also its heliographic positions—that is to say, its solar latitude and longitude—accurately determined.

One of the most prominent results of Mr. Carrington's labours was the discovery of the fact that sun spots appear to have a proper motion of their own, those nearer the solar equator moving faster than those more remote. Another was the discovery of changes apparently periodical affecting the disposition of spots in solar latitude. It was already known that sun-spots confined themselves to the sun's equatorial regions, but Mr. Carrington showed that the region affected was liable to periodical elongations and contractions, although his observations were not sufficiently extended to determine the exact length of this period.

Before Mr. Carrington had completed his seven years' labours, celestial photography had been introduced by Mr. Warren De La Rue. Commencing with his private observatory, he next persuaded the Kew Committee of the British Association to allow the systematic photography of the sun to be carried on at their observatory under his superintendence, and in the year 1862 the first of a ten years' series of solar photographs was begun.

Before this date, however, Mr. De La Rue had ascertained, by means of his photoheliograph, on the occasion of the total eclipse of 1860, that the red prominences surrounding the eclipsed sun belong, without doubt, to our luminary himself.

The Kew observations are not yet finally reduced, but already several important conclusions have been obtained from them by Mr. De La Rue and the other Kew observers. In the first place the Kew photographs confirm the theory of Wilson that sun-spots are phenomena the dark portions of which exist at a level considerably beneath the general surface of the sun—in other words, they are hollows or pits, the interior of which is of course filled up with the solar atmosphere. The Kew observers were likewise led to associate the low temperature of the bottom of sun-spots with the downward carriage of colder matter from the atmosphere of the sun, while the upward rush of heated matter was supposed to account for the faculæ or bright patches which almost invariably accompany spots. In the next place, the Kew observers, making use not only of the Kew series but of those of Schwabe and Carrington, which were generously placed at their disposal, have discovered traces of the influence of the nearer planets upon the behaviour of sun-spots. This influence appears to be of such a nature that spots attain their maximum size when carried by rotation into positions as far as possible remote from the influencing planet—that is to say, into positions where the body of the sun is between them and the planet. There is also evidence of an excess of solar action when two influential planets come near together. But although considerable light has thus been thrown on the periodicity of sun-spots, it ought to be borne in mind that the cause of the remarkable period of eleven years and a quarter, originally discovered by Schwabe, has not yet been properly explained. The Kew observers have likewise discovered traces of a peculiar oscillation of spots between the two hemispheres of the sun, and finally their researches will place at the command of the observers the data for ascertaining whether centres of greater and lesser solar activity are connected with certain heliocentric positions.

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* Presidential Address delivered before the Mathematical and Physical Section of the British Association, August 25, 1875.

While the surface was thus being examined both telescopically and photographically, the spectroscope came to be employed as an instrument of research. It had already been surmised by Professor Stokes that the vapour of sodium at a comparatively low temperature forms one of the constituents of the solar atmosphere, inasmuch as the dark line D in the spectrum of the sun coincides in position with the bright line given out by incandescent sodium vapour.

This method of research was greatly extended by Kirchhoff, who soon found that many of the dark lines in the solar spectrum were coincident with the bright lines of sundry incandescent metallic vapours, and a good beginning was thus made towards ascertaining the chemical constitution of the sun.

The new method soon brought forth further fruit when applied in the hands of Huggins, Miller, Secchi, and others, to the more distant heavenly bodies. It was speedily found that the fixed stars had constitutions very similar to that of the sun. But a peculiar and unexpected success was attained when some of the nebulæ were examined spectroscopically. To-day it seems (so rapidly has knowledge progressed) very much like recalling an old superstition to remind you that, until the advent of the spectroscope, the irresolvable nebulæ were considered to be gigantic and remote clusters of stars, the individual members of which were too distant to be separated from each other even with a telescope like that of Lord Rosse.

But Mr. Huggins, by means of the spectroscope, soon found that this was not the case, and that most of the nebulæ which had defied the telescope gave indications of incandescent hydrogen gas.

It was also found by this observer that the proper motions of some of the fixed stars in a direction to or from the earth might be detected by means of the displacement of their spectral lines, a principle of research which was first enunciated by Fizeau.

Hitherto in such applications of the spectroscope, the body to be examined was viewed as a whole.

It had not yet been attempted to localize the use of this instrument so as to examine particular districts of the sun, as for instance a sun-spot, or the red flames already proved by De La Rue to belong to our luminary.

This application was first made by Mr. Lockyer, who, in the year 1865, examined a sun-spot spectroscopically, and remarked the greater thickness of the lines in the spectrum of the darker portion of the spot.

Dr. Frankland had previously found that thick spectral lines correspond to great pressure, and hence the inference from the greater thickness of lines in the umbra of a spot is, that this umbra or dark portion is subject to a greater pressure, that is to say, it exists below a greater depth of the solar atmosphere than the general surface of the sun. Thus the results derived from the Kew photoheliograph and those derived from the spectroscope were found to confirm each other. Mr. Lockyer next caused a powerful instrument to be constructed for the purpose of viewing spectroscopically the red flames round the sun's border, in the hope that if they consisted of ignited gas the spectroscope would disperse, and thus dilute and destroy the glare which prevents them from being seen on ordinary occasions.

Before this instrument was quite ready, these flames had been analysed spectroscopically by Capt. Herschel, M. Janssen, and others on the occasion of a total eclipse occurring in India, and they were found to consist of incandescent gas, most probably hydrogen. But the latter of these observers (M. Janssen) made the important observation that the bright lines in the spectrum of these flames remained visible even after the sun had reappeared, from which he argued that a solar eclipse is not necessary for the examination of this region.

Before information of the discovery made by M. Janssen had reached this country, the instrument of Mr. Lockyer had been completed, and he also found that by its means he was able to analyse at leisure the composition of the red flames without the necessity of a total eclipse. An atmosphere of incandescent hydrogen was found to surround our luminary, into which, during the greater solar storms, sundry metallic vapours were injected, sodium, magnesium, and iron forming the three that most frequently made their appearance.

Here we come to an interesting chemical question.

It had been remarked by Maxwell and by Pierce as the result of the molecular theory of gases that the final distribution of any number of kinds of gas in a vertical direction under gravity is such that the density of each gas at a given height is the same as if all the other gases had been removed, leaving it alone.

In our own atmosphere the continual disturbances prevent this arrangement from taking place; but in the sun's enormously extended atmosphere (if, indeed, our luminary be not nearly all gaseous) it appears to hold, inasmuch as the upper portion of this atmosphere, dealing with known elements, apparently consists entirely of hydrogen.

Various other vapours are, however, as we have seen, injected from below the photosphere into the solar atmosphere on the occasion of great disturbances; and Mr. Lockyer has asked the question, whether we have not here a true indication of the relative densities of these various vapours derived from the relative heights to which they are injected on such occasions.

This question has been asked, but it has not yet received a definite solution; for chemists tell us that the vapour densities of some of the gases injected into the sun's atmosphere on the occasion of disturbances are, as far as they know from terrestrial observations, different from those which would be indicated by taking the relative heights attained in the atmosphere of the sun. Mr. Lockyer has attempted to bring the question a step nearer to its solution by showing that the vapours at the temperature at which their vapour densities have been experimentally determined are not of similar molecular constitution, whereas in the sun we get an indication from the fact that all the elements give us line spectra, that they are in similar molecular states.

Without, however, attempting to settle this question, I may remark that we have here an interesting example of how two branches of science, physics and chemistry, meet together in solar research.

It had already been observed by Kirchhoff that sometimes one or more of the spectral lines of an elementary vapour appeared to be reversed in the solar spectrum, while the other lines did not experience reversal. Mr. Lockyer succeeded in obtaining an explanation of this phenomenon. This explanation was found by means of the method of localization already mentioned.

Hitherto, when taking the spectrum of the electric spark between the two metallic poles of a coil, the arrangements were such as to give an average spectrum of the metal of these poles; but it was found that when the method of localization was employed, different portions of the spark gave a different number of lines, the regions near the terminals being rich in lines, while the midway regions give comparatively few.

If we imagine that in the midway regions the metallic vapour given off by the spark is in a rarer state than that near the poles, we are thus led to regard the short lines which cling to the poles as those which require a greater density or nearness of the vapour particles before they make their appearance; while, on the other hand, those which extend all the way between the two poles come to be regarded as those which will continue to make their appearance in vapour of great tenuity.

Now it was remarked that these long lines were the very lines which were reversed in the atmosphere of the sun. Hence when we observe a single coincidence between a dark solar line and the bright line of any metal, we are further led to inquire whether this bright line is one of the long lines which will continue to exist all the way between two terminals of that metal when the spark passes.

If this be the case, then we may argue with much probability that the metal in question really occurs in the solar atmosphere; but if, on the other hand, the coincidence is merely between a solar dark line and a short bright one, then we are led to imagine that it is not a true coincidence, but something which will probably disappear on further examination. This method has already afforded us a means of determining the relative amount of the various metallic vapours in the sun's atmosphere. Thus, in some instances all lines are reversed, whereas in others the reversal extends only to a few of the longer lines.

Several new metals have thus been added to the list of those previously detected in the solar atmosphere; and it is now certain that the vapours of hydrogen, potassium, sodium, rubidium, barium, strontium, calcium, magnesium, aluminium, iron, manganese, chromium, cobalt, nickel, titanium, lead, copper, cadmium, zinc, uranium, cerium, vanadium and palladium occur in our luminary.

I have spoken hitherto only of telescopic spectroscopy; but photography has been found capable of performing tho same good service towards the compound instrument consisting of the telescope and its attached spectroscope, which it had previously been known to perform towards the telescope alone.

It is of no less importance to secure a permanent record of spectral peculiarities than it is to secure a permanent record of telescopic appearances.

This application of photography to spectrum observations was first commenced on a sufficient scale by Mr. Rutherford, of New York, and already promises to be one of the most valuable aids in solar inquiry.

In connection with the spectroscope I ought here to mention the names ef Respighi and Secchi, who have done much in the examination of the solar surface from day to day. It is of great importance to the advancement of our knowledge that two such competent observers are stationed in a country where the climate is so favourable to continued observation.

The examination of the sun's surface by the spectroscope suggests many interesting questions connected with other branches of science. One of these has already been alluded to.

I may mention two others put by Mr. Lockyer, premising, however, that at present we are hardly in a position to reply to them.

It has been asked whether the very high temperatures of the sun and some of the stars may not be sufficient to produce the disassociation of those molecular structures which cannot be disassociated by any terrestrial means; in other words, the question has been raised, whether our so-called elements are really elementary bodies.

(*To be continued.*)

Parliamentary and Law Proceedings.

The Alleged Poisoning by a Soothing Syrup.

The adjourned inquest upon the body of Harry Burgess, aged eight weeks, alleged to have been poisoned by an overdose of a "Soothing Syrup," was resumed at Barnsley on Tuesday, October 5th, before Mr. Thomas Taylor, coroner.

The coroner proceeded to take the evidence of the chemist who was entrusted with the analysis of the "Soothing Syrup," but the report we have received of what he stated is so defective that it would be useless to publish it.

There being no other witnesses to call the coroner summed up the evidence. He said on Saturday evening, 11th ultimo, Mrs. Burgess went to Eastwood's shop and received a pamphlet, which she read that night, on the following day, and on the Monday. She then got a bottle of Harrop's soothing syrup, and appeared to have taken off the Government stamp and given a teaspoonful to one child. She then shook the bottle, which did not appear to be of much consequence, and gave a second teaspoonful to the other child. In consequence of the state in which the children were found by the father, Dr. Morris was called in and said he found them suffering from some narcotic. It had been clearly shown there was a narcotic in Harrop's soothing syrup, but the witness who analysed it said the quantity was very small. As they were aware, one of the children to whom the syrup was administered died and the other got better. It was for the jury to say if any one was responsible for the death of that child. The pamphlet which was given to the mother said it would not do any harm to a child two days old. The jury would have to consider whether the mother was careless or whether she was deceived by the book. With regard to the mother, she told them she read the pamphlet and gave the children the syrup to do them good. The woman got the book from Mr. Eastwood, but Mr. Eastwood told the jury he never read one. He also told them he did not know what was in the bottle, which could be had not only from a licensed chemist, but at the shop of any patent medicine vendor. The responsible person was the person who issued the pamphlet. No person had a right to mislead or deceive another, but if the doing so caused death, such person would be culpable and guilty of manslaughter. The jury had to say whether the child came to its death by a narcotic, and whether what was administered was used by the mother intending to do good; in other words, they had to determine whether any person was culpable with respect to the death of the child.

The room was then cleared, and after an absence of rather more than two hours, the coroner was called in. In a short time the jury returned the following verdict:—"Died from an overdose of Harrop's soothing syrup, containing morphia, inadvertently administered by his mother, but the jury consider she was misled by statements in the pamphlet, which does not refer to the directions."

Review.

CHEMISTRY: General, Medical, and Pharmaceutical; including the Chemistry of the British Pharmacopœia; a Manual of the General Principles of the Science, and their Applications to Medicine and Pharmacy. By JOHN ATTFIELD, PH.D., F.C.S., Professor of Practical Chemistry to the Pharmaceutical Society of Great Britain, etc., etc. Sixth Edition. London: John Van Voorst, 1, Paternoster Row. 1875.

The appearance of a sixth edition of this manual within ight years sufficiently testifies to its popularity with tudents of chemistry, general, medical, and pharmaceuical. The labour of conducting such a work through the press is no small matter, especially as, in this case, no ingle edition is a mere revised reprint of the former; and he tax upon the author has doubtless been both long and evere, if we may judge from the additions in the present volume. These are numerous and important, although he necessity for many of them would not perhaps be as apparent to a learner as to a teacher. We refer to certain mplifications of the chapters devoted to theoretical coniderations—chapters which, mindful of Dr. Attfield's lear, incisive, illuminating style, we should have thought already sufficiently extended. The zest with which we perused these parts of the book, however, convinced us hat we were mistaken, and that it was possible to say more without obscuring the meaning in a cloud of words. Much more than this negative result has been achieved here. It seems to us that it must be impossible for the dullest student to read the chapters on the general principles of chemical philosophy, without forming a valuable acquaintance with them, to become more intimate n re-perusal. For the subject-matter of the fourth dition, as hinted above, is not simply diluted in this, o as to cover more pages and take longer time in he telling, but is so skilfully prepared and so gradually presented, that assimilation waits on inception, and ducation on both. As an example, take the following:—After explaining in a most graphic manner the ondensation which accompanies combination of hyrogen with oxygen to form water the author states, "a mode of reasoning by which a molecule of oxygen or of many other elements, is shown to be a double structure, hown to contain two atoms. Five equal-sized bottles are before us, two filled with hydrogen, one with oxygen, and wo with steam. The bottles are hot enough to prevent he steam condensing to water, and all five are at the ome temperature. Apply heat so that all shall be equally heated; the three different substances expand equally. Cool equally, the contents contract equally. Apply equal pressure to all five, each is equally affected. Diminish pressure equally, each portion of the three substances equally expands. Gases (practically steam is a gas, it is imply not a permanent gas) gases thus similarly affected must be, physically, similarly constructed or constituted; each bottle must contain the same number of particles or molecules, and at any one temperature and pressure the molecules in each must be equally distant from each other. We do not know the actual number or distance, but whatever be the number and distance, it is the same for each bottle. Say that 1,000,000 is the number. Then we shall have 1,000,000 of molecules in the first hydrogen bottle, 1,000,000 in the second, 1,000,000 in the oxygen bottle, and 1,000,000 in each of the steam bottles. We will cause chemical combination between the 2,000,000 of hydrogen molecules, and 1,000,000 of oxygen molecules, producing as we have seen 2,000,000 of steam molecules having the properties already stated. But a molecule of steam contains an atom of oxygen. Hence 2,000,000 of steam molecules contain 2,000,000 of oxygen atoms, which 2,000,000 of oxygen atoms have been obtained from 1,000,000 of oxygen molecules. Therefore, each molecule of oxygen was a double structure, each molecule of oxygen contained two atoms of oxygen. As Clifford says, 'you cannot put 50 horses into 100 stables, so that there shall be exactly the same amount of horse in each stable; but you can divide 50 pairs of horses among 100 stables.'" This is so put that none can fail to follow it and grasp the conclusion firmly.

Immediately preceding the above is the jolliest bit of illustration in theoretical chemistry it has been our good fortune to meet with. As soon as we saw it the infection of rollicking laughter reached us from the page and our quiet room rang again. If young students are only as eager to ascertain its meaning as we were, Dr. Attfield will be amply repaid by their rapid progress in chemical philosophy. We say no more about it here but direct attention to page 37.

Another feature of the book is a page of advice to students, which will stimulate many young men by its spirited words, "to seek to know, not to pass." In it, the author, speaking of examination, says that it is "especially useful when, following instead of leading education, it is restricted to the subjects of a well-defined, earnestly-followed, compulsory curriculum of study." As is well known, Dr. Attfield is duly consistent in his advocacy of a compulsory curriculum; all students are with him, and though few leading members of the Pharmaceutical Society are of his mind, we believe their number is increasing.

In nomenclature of official substances we notice that the names of the United States' Pharmacopœia are given in addition to those of the British, thus inviting a close comparison of the two. Further, the work is made more complete by the insertion of notices of all the substances mentioned in the Pharmacopœia of India.

It is impossible for us to indicate here with anything like completeness the new matter to be found in the book; suffice it, that the most important of this is just what makes it more than ever the book *par excellence* for students working alone, viz.: the more extended consideration of abstract questions already referred to, fuller details of general processes, such as distillation and of particular operations, and more copious descriptions of apparatus. The latter are rendered more easy to understand by the introduction for the first time of well-executed engravings, which convey at a glance what takes many words to tell. We would suggest that Fig. 38 might be improved by some visible means of support to the apparatus. Lithographs of eight principal varieties of starch, opposite page 452, will assist materially in the identification of these sometimes puzzling bodies. The student is, however, very properly recommended not to rely on these alone, but to obtain specimens for comparison from the respective plant tissues. Brunner's tabular scheme for the separation of poisonous alkaloids by the Stas-Otto method is added to the chapter on chemical toxicology. The table of official tests for impurities in Pharmacopœial preparations is enlarged, and we notice that it includes bodies not mentioned in the Pharmacopœia—lycopodium, for example. In fine, the work is complete up to date; everything we have looked for and expected to find we have found. It is true that such things as jaborandi, boldo, artificial vanillin, salicylic acid, and croton chloral hydrate, are not considered at length; but when the undesirability of unduly augmenting a student's book is remembered, this is the reverse of a fault; sufficient is said to direct inquiry into other channels. Some idea of the extent of the new matter may be formed when we say that five additional pages of index conclude the volume, which has in all 765 pages as against 694 in the last edition.

Notes and Queries.

MAGNESIA IN DRINKING WATER.—Mr. J. A. Wanklyn recommends (*Chemical News*, xxxii., 136), the following method for ascertaining whether drinking water contains more than a minute quantity of magnesia:—700 c.c. of the water are placed in a stoppered litre bottle, and 0·5 gram of finely powdered oxalate of ammonia added. The bottle is then shaken for half a minute, and presently its contents are thrown upon a filter. After rejecting the first portion, 70 c.c. of the filtrate are submitted to the soap test. If the water be sufficiently free from magnesia for general domestic use, the filtrate after the precipitation with oxalate of ammonia should not require more than three soap measures to give a very full and durable lather. Mr. Wanklyn remarks that in dilute solutions whereas one equivalent of lime decomposes one equivalent of soap, one equivalent of magnesia will decompose one and a-half equivalents of soap.

PRESERVATION OF SOLUTION OF HYDROCHLORATE OF MORPHIA. — M. Vidal states (*L'Union Pharmaceutique*, xvi., 228), that a solution of hydrochlorate of morphia may be preserved without alteration during six months, by the addition of hydrate of chloral according to the following formula :—

Distilled Water	10·00 grams.
Hydrochlorate of Morphia. . . .	0·20 „
Chloral	0·40 „

[448]. WALNUT HAIR WASH.—Mr. C. W. LAWTON is in want of a recipe for a Walnut Hair Wash or Dye.

[449]. MIST. COPAIBÆ c. BUCHU et CUBEBA.—Can any reader furnish me with a formula for Mistura Copaibæ c. Buchu et Cubeba ?—A QUERIST.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PHARMACEUTICAL LABORATORY.

Sir,—I have been a constant reader of your Journal for many years, and of the various suggestions made therein from time to time for the advancement of pharmacy I do not recollect one that has so thoroughly impressed me with its value and usefulness as that of Mr. Schacht on the above subject. We are told, however, that the proposition has been considered and found impracticable. The Council are by no means bound to adopt every suggestion that is made to them, but when one of such practical value and real importance is submitted it is surely worth while weighing its merits against any petty obstacles that might appear to stand in the way of its adoption. It has been said that "those who excuse, accuse themselves," and the replies to Mr. Schacht's query at the last meeting partook very much of this character. Either the Chemical Laboratory has recently undergone some very important changes in the subjects brought before the students, or the assertion that they learn galencial manipulation there is incorrect.

But it is not merely on behalf of students that I would support this proposition: enough has been said, written, and done on that score of late without a supplement from me, and there has never been any difficulty in finding space or means when the special interests of students have been concerned—may the results justify one half of it; but here is a question which affects the whole body, from the junior apprentice to the gravest proprietor of the oldest pharmacy, and why should it not be carried out? If a pharmaceutical laboratory in full operation is not at first practicable, at least commence with a museum of pharmaceutical apparatus; not models under glass shades, but of sufficient size for fitting an ordinary laboratory, and let the curator be able to give practical information as to their working capabilities, etc. The Americans have some four or five forms of small drug mills; if there is such a thing made in this country (and there certainly should be) I should like to see one, either English or American, at Bloomsbury Square, with a sample of the powder it is capable of producing, particulars as to facilities for cleaning, etc., etc. Space devoted to such purposes would become the most attractive part of the Society's premises to pharmaceutical chemists, and would be by no means the least fruitful in its results.

Let the Council make money grants to provincial associations, endow the London School, and provide a large room for seven or eight students to meet occasionally for conversational purposes, if it so pleases them and they think it worth the doing; but why will they neglect this far weightier matter?

CHARLES SYMES.

Liverpool, October 11, 1875.

Sir,—The last issue of the *Pharmaceutical Journal* brings to light the very melancholy fact that the Committee has again shelved the very valuable proposal of Mr. Schacht—viz., the establishment of a Pharmaceutical Laboratory which would enable members to inspect and examine the various forms of apparatus required in pharmacy.

I, for one, sincerely deplore this step, and feel rather surprised that in so strenuously advocating practical work, they should deprive members of one of the most valuable auxiliaries to such an end as this proposal of Mr. Schacht's undoubtedly would be. The objections raised to it were certainly of the feeblest kind. The members feared the Society would have to become manufacturers and vendors of preparations—certainly a very undesirable position for a Society like ours to occupy; but fortunately this difficulty is easily to be overcome. Then it was thought it would be very difficult to decide what particular form of apparatus would be best for the different purposes to which it might be applied; with this I perfectly and entirely agree, and it is precisely for the solution of this difficulty that Mr. Schacht's valuable suggestion was made.

A pharmacist contemplating the construction of a small laboratory does not want to be pulling all to pieces two or three times before he gets his requirements efficiently met; but this is a fate I can assure him, from personal experience, will inevitably overtake him if he attempts such a thing unaided from without. This was very forcibly alluded to by Mr. Groves in his talented address to the members of the British Pharmaceutical Conference at Bristol.

This is a question in which, I am sure, a large number of our members are interested, and I trust the matter will not be allowed to rest in the condition in which the Committee have left it.

ALFRED E. TANNER.

Fairfield, Liverpool, October 11, 1875.

W. Aston.—We are unable to comply with your request, as the information asked for could only be supplied by the Board of Examiners.

H. Hardwick.—Dr. Tilden's 'Chemical Notes on the Pharmacopœia' have not yet been published in a separate form.

J. F. Edisbury.—We are obliged for the cutting enclosed in your note. We agree with you that the conduct described was very disgraceful, but do not think it is of sufficient pharmaceutical interest for publication in our columns.

A. B.—If your experiment was conducted in the manner you describe we are unable to explain the result you obtained.

C. A.—(1) The so-called violet powder consists of finely powdered starch, scented with orris or some other substance. (2) The answer to this question may be found in any work on chemistry.

J. Woodland.—The statement first referred to in your letter is rendered as it was reported, though it is obviously incorrect, as would be evident to any one conversant with the subject. Whether the inaccuracy is the result of defective reporting or incorrect opinion of the witness seems to be of little importance in this case. The statement you refer to in the other case was not given in evidence, but is reported only as an incidental remark.

G. Eades.—We know of no reason why ordinary paste would not answer the purpose.

F. Francis.—It is simply impossible to prepare a satisfactory mixture with the prescribed ingredients.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Palmer, Mr. Bostock, Mr. Tichborne, F.W.

EAST INDIA CINCHONA BARK.

BY B. H. PAUL.

The increasing importation of Cinchona bark from India, as a result of the efforts that have been made by the Government to establish its production in that country, promises to furnish an abundant supply of material, not only for the manufacturer of alkaloids, but also for pharmaceutical use in other ways.

As it is proposed to abandon the manufacture of bark alkaloids in India, there will probably be a larger quantity of bark imported from that country very shortly, and it may be of interest to some of the readers of this Journal to know what is the character of this bark, as obtained from different localities. The following analyses refer to some parcels of bark that have recently been imported from Ceylon. Mr. Holmes, the Curator of the Society's Museum, has been so kind as to examine some of the samples and define their botanical character so far as this was possible:—

19.	Crystallized Quinine Sulphate	1·42
	Crystallized Cinchonidine Sulphate . .	3·46
	Cinchonine	1·90
20.	Crystallized Quinine Sulphate	1·69
	Crystallized Cinchonidine Sulphate . .	3·46
	Cinchonine	1·43

21. *C. succirubra.*—Quills from $\frac{1}{6}$th to $\frac{1}{2}$ inch in diameter, with a small proportion—say one sixth—of renewed bark.

Crystallized Quinine Sulphate	1·59
Crystallized Cinchonidine Sulphate . .	2·70
Cinchonine	0·95

22. *C. succirubra.*—Quills $\frac{1}{4}$ to $\frac{1}{2}$ inch, much broken up, of a rather deeper red tint internally, and a rougher inner surface than No. 21, containing about one-tenth renewed bark.

Crystallized Quinine Sulphate	1·85
Crystallized Cinchonidine Sulphate . .	4·10
Cinchonine	1·63

23. *C. succirubra.*—Quills $\frac{1}{4}$ to $\frac{3}{4}$ inch, much broken up; with about three-fourths of renewed bark.

Crystallized Quinine Sulphate	1·62
Crystallized Cinchonidine Sulphate . .	4·97
Cinchonine	2·05

24. *C. succirubra.*—Quills $\frac{1}{4}$ to nearly an inch in diameter, with no renewed bark.

Crystallized Quinine Sulphate	2·31
Crystallized Cinchonidine Sulphate . .	·63
Cinchonine	·16

25. *C. succirubra.*—Quills chiefly $\frac{1}{4}$ inch in diameter, but with more numerous and larger warts than is usual in such small quills; none of the bark renewed bark.

Crystallized Quinine Sulphate	2·37
Crystallized Cinchonidine Sulphate. . .	·38
Cinchonine	·12

26. *C. officinalis*, var. "Amarilla del Rey."—Quills mostly $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter, with about one-sixth of renewed bark.

Crystallized Quinine Sulphate	6·08
Crystallized Cinchonidine Sulphate. . .	·98
Cinchonine	trace.

27. *C. officinalis*, var. "Amarilla del Rey."—Quills mostly $\frac{1}{2}$ inch in diameter, with about one-sixth of renewed bark and one-tenth of var. *crispa*.

Crystallized Quinine Sulphate	5·03
Crystallized Cinchonidine Sulphate. . .	trace.
Cinchonine	·13

All the above samples were in a somewhat moister condition than is usually the case with Cinchona bark, and it was found very difficult to grind them until they had been dried at a temperature of 100° C. The average loss of weight amounted to about 10 per cent. The results given above apply to the bark in this dried condition.

The results stated in the following table also refer to Indian barks of recent importation, but I am unable to ascertain whether they are from the plantations of the mainland or from Ceylon.

Kind of Bark.	Sulphates.		Cinchonine
	Quinine.	Cinchonidine.	
1. East India Crown Renewed . . .	3·85	1·50	2·70
2. East India Crown .	5·20	·82	—
3. East India Crown .	4·3	1·5	·23
4. East India Crown .	4·5	1·6	·18
5. East Indian Crown, Renewed ? . .	3·8	1·2	·22
6. Red Bark, Mossed .	1·72	—	1·70

I hope, shortly, to be able to give some further results obtained from other localities.

AMMONIACUM AND DOREMA ROOT.

BY W. DYMOCK,

Professor of Materia Medica, Bombay.

Bombay appears to be the chief mart for ammoniacum, and it is here that the original packages which come from the Persian Gulf ports are opened and sorted for the various markets.

The bales, generally of matting or coarse canvas, contain all parts of the plant broken up and encrusted with the adherent exudation. In those which I have examined the portions of plants answer to the description of the *Dorema Ammoniacum*, Don. Seed in the mature state is separated in large quantities, and I have seen heaps which must have contained a hundredweight or more in the sorting rooms; the seed is given to cattle.

It would appear then that the collection takes place after the plant has matured its fruit, and that hardly any attempt is made by the collectors to separate the plant from the gum resin; the latter would appear to exude from every part, even the fruit is coated with it, and perforated by insects in the same manner as the stem.

Ammoniacum is usually sorted into three qualities: large tears, middle-sized tears, and small; the last kind is often carelessly picked, and contains dirt and other refuse. If the drug is kept in Bombay during the monsoon the tears get soft and unite into a lump. It does not appear to be generally known that the root of the *Dorema* is an article of commerce in Bombay; it is imported in large quantities from Persia, under the name of Boi, and is used in the Parsee fire temples as an incense. The roots vary in size, the largest being three inches in diameter at the crown; they are generally more or less forked; the root-bark is thin and papery like that of the Sumbul, but the root itself is compact and has a resinous section. A small specimen, powdered and exhausted with boiling water, yielded about 1oz. of dark coloured ammoniacum.

It is this root which was some years ago exported to Europe as Bombay sumbul, after having been cut up and impregnated with musk. When old and worm eaten it becomes of a loose and spongy texture, and might be mistaken for sumbul by a superficial observer.

INCOMPATIBLES.*

A Chapter for Students.

BY B. F. JAMES.

Medicinal substances, which, when brought together, cannot be made to accord, but give rise to changes by which compounds are formed that are inert or unsuitable for administration, are called *incompatible.*

Incompatibility may be of three kinds :—Chemical, Pharmaceutical, Therapeutical.

By chemical incompatibility is meant the condition assumed by substances when brought into contact, by which insoluble substances are produced, or other chemical changes take place, which have not been foreseen or intended by the prescriber.

It was formerly supposed, if two or more substances were ordered in a mixture, where under the existing conditions they would form an insoluble compound, that such substances were incompatible. If, for example, some preparation of opium was ordered with a vegetable infusion containing tannic acid, it was considered to be improper, as tannate of morphia is insoluble ; but that this is an error will be at once obvious if it be remembered that many substances insoluble in water may be readily dissolved by the fluids of the stomach and the intestines, and readily absorbed into the circulation. Tannate of morphia and tannates of the other alkaloids are doubtless less readily absorbed than their more soluble salts, but such substances are far from inert, and under certain circumstances may be very effectual as therapeutic agents. Tannate of morphia will cause sleep, tannate of emetia will cause vomiting, and tannate of strychnia will cause all the medicinal and poisonous effects of that alkaloid,—except that they act less rapidly. Very many insoluble substances are used in medicine, as calomel, sub-nitrate of bismuth, reduced iron, etc.

The formation of an insoluble substance, therefore, as the result of a mixture of chemical bodies, while it shows *chemical* incompatibility, does not necessarily render the mixture improper for administration ; on the contrary, it may be a condition which especially adapts it for the purposes for which it was prescribed, but in all such cases the effect of the insoluble substance must be understood by the physician beforehand, otherwise very different results may be produced from those which he intends; or, as in most cases, the medicine may become practically useless.

For example, if compound infusion of roses be prescribed for its refrigerative effect as a draught, and a pill of acetate of lead be given at the same time for its astringent action, the effects of one or the other substance would be very much reduced, or perhaps, both be completely neutralized, for the sulphuric acid of the infusion would form an insoluble substance with the lead of the pill—sulphate of lead—which is not capable of being absorbed in appreciable quantities.

Insolubility is not always the result of the mixture of substances which are chemically incompatible. For example, solutions of the alkalies, even if very dilute, have the effect of so acting upon the active principles of stramonium, henbane and belladonna, that after a few hours' contact, the activity of the latter substances is totally destroyed.

Again, ammonia and acetic acid, used separately for external application, act as rubefacients, but when mixed form acetate of ammonium, a neutral salt, having no such action.

Permanganate of potassium, chromic acid and nitrate of silver all act as caustics, but when mixed with organic substances, oils, glycerine, etc., they are decomposed, and their escharotic effects prevented.

The mixture of substances which are chemically incompatible may give rise to explosion or combustion, and thus cause serious accidents ; the cases where such changes occur are, however, not common.

Mixtures of creasote or other organic substances with oxide of silver are of this description ; spontaneous combustion in such mixtures is not unfrequently the result.

Pharmaceutical incompatibility is applied to substances which are physically incapable of being mixed or where unsightly or inelegant preparations are the result. Thus, if nitrous ether be added to tincture of guaiacum a gelatinous mass will be produced.

The same takes place where mucilage of acacia is added to solutions containing alcohol, or if resinous tinctures be added to aqueous solutions the resins will separate.

Infusions or other preparations containing tannin form, inky solutions with iron preparations. Fatty oils are pharmaceutically incompatible with aqueous solutions, but become compatible by the aid of certain substances, as mucilage of acacia, albumen, etc., forming what is called an emulsion.

By therapeutic incompatibility is meant the combination of such substances as possess opposite physiological properties—as the calabar bean and belladonna ; cantharides and bromide of potassium; camphor and aconite.

No arbitrary rules are of much service in regard to incompatibles—a practical acquaintance with the properties and combinations of substances being the only sure guide against error in this direction.

The following may, however, be of some assistance :

1. Alkalies precipitate the metallic oxides from salts of the heavy metals ; also the alkaloids, in some cases dissolving them if added in excess, but most frequently leaving them in an insoluble condition.
2. Salts containing volatile acids, as carbonates, acetates, cyanides, etc., are decomposed by strong acids, a salt of the stronger acid being produced.
3. Metallic oxides in contact with acids combine to form salts which may be soluble or insoluble according to the acid employed.
4. Vegetable astringents precipitate gelatine, albumen, the alkaloids and many metallic salts.
5. Alcoholic solutions precipitate solutions containing gums, and metallic salts insoluble in alcohol.
6. Aqueous solutions precipitate tinctures containing substances insoluble in water. Many special cases of incompatibility might be given, but these are best learned by practical experience.

SALICYLIC ACID.*

BY HERMANN ENDEMANN, PH.D.

The close relation which salicylic acid bears to two substances of great practical value, carbolic acid on the one hand, and indigo on the other, have made its study an interesting one for many chemists. That salicylic acid may be obtained from phenol was demonstrated by Kolbe and Lautemann in 1860, who prepared it by the action of dry carbonic acid gas on heated phenol, while pieces of sodium were dissolving in it. Its disinfecting properties, however, were shown only by experiments made during the last year.

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* From the Boston *Laboratory,* for August.

* From the *American Chemist,* for August.

Its relation to indigo is longer known (1852), but no method is in existence yet which allows the regeneration of this valuable dyeing material from its product of decomposition. Salicylic acid was discovered by Piria in 1838, who prepared it by oxidizing salicylol, the oil of *Spiræa ulmaria,* with an aqueous solution of chromic acid.

Cahours obtained the same in 1844 from the methylsalicylate or oil of wintergreen (*Gaultheria procumbens*).

Gerland, in 1852, prepared salicylic acid from anthranilic acid with the aid of nitrous acid:—

$$\begin{matrix} C_7H_7NO_2 \\ C_7H_7NO_2 \end{matrix} + N_2O_3 = \begin{matrix} C_7H_6O_3 \\ C_7H_6O_3 \end{matrix} + N_4 + H_2O.$$

This reaction gives the connecting link for salicylic acid and indigo, anthranilic acid being a product of oxidation of indigo:—

$$\underbrace{C_8H_5NO}_{\text{Indigo.}} + 2\,O + H_2O = \underbrace{C_7H_7NO_2}_{\text{Anthranilic acid.}} + CO_2.$$

In 1853 Kolbe foresaw the connection of salicylic acid and phenol, and defined the first as standing to phenol in the same relation as the acid ethyl carbonate to ethyl alcohol.

The year 1860 brought Kolbe and Lautemann's discovery mentioned above.

In 1874 Kolbe modified and simplified his original process considerably by dividing it into—1st, the preparation of dry sodic carbolate with the aid of phenol and caustic soda; and 2nd, treating the sodic carbolate at high temperature with carbonic acid gas.

The cheapness of soda as compared with sodium brought at once salicylic acid into a position that it could be made a useful commercial article, provided its properties favoured its use, and the latter problem was soon solved by the discovery of its disinfecting properties.

The manner in which Professor Kolbe carries out his new process is described as follows:—

The saturating capacity of a phenol, and also that of a soda lye is determined, and both are then mixed according to equivalents, so as to form sodic carbolate. The solution thus obtained is carefully evaporated to dryness in an iron vessel, taking care that the dry mass sticking to the bottom of the vessel is constantly removed by scrapers, and that the mass itself is also constantly crushed with pestles or other arrangements to facilitate its drying out, until at length the carbolate remains as a perfectly dusty dry powder of a rose-red tint.

Excess of carbolic acid or soda gives always an inferior dark-looking residue, which when it undergoes the final process of treating with carbonic acid gas, gives always far less salicylic acid than is in accordance with the amount of calculated carbolate present in this mass.

The dry carbolate is then either filled into the retorts at once, or it may be kept for further treatment by filling it, when hot, into vessels, which may be hermetically sealed. The fact that sodic carbolate is very hygroscopic explains the necessity of this manœuvre.

After filling the carbolate into the retorts, the contents are slowly heated to 100° C., and when this temperature is reached a slow current of perfectly dry carbonic acid gas is allowed to enter the retort. The temperature is then slowly increased to 180° C., and may, towards the end of the operation, reach from 220° C. to 250° C.

About an hour after beginning the operation, carbolic acid will commence to distil, and the process may be considered finished if, at the latter-mentioned temperature, 220° C. to 250° C., no more carbolic acid distils. It will then be found that the distilled carbolic acid amounts to just half of the original quantity employed.

The residue in the retort is basic salicylate of soda, which is dissolved, and which, on acidifying with an acid, yields a brownish-coloured crystalline precipitate of salicylic acid.

The further process of decolorizing the salicylic acid was not described by Kolbe. In Dingler's *Polytechnic Journal,* April 1875, Rautert states, that this acid may be easily decolorized by heating salicylic acid in a retort to 170° C., and then injecting into the retort a current of superheated steam (temperature 170° C.). Salicylic acid distils at once colourless, and after a short time nothing but a trace of a black resinous mass remains in the retort. The apparatus must be arranged in such a manner that the neck of the retort can by mechanical means, as for instance an inserted movable wire, be kept free from crystals.

A far lighter-coloured product can also be obtained, according to my own experiments, by precipitating at first only about one-twentieth of the salicylic acid, which precipitate, being almost black, will remove considerable of the colouring matter of the solution. After filtering this precipitate off, the solution yields on being acidified a considerably lighter coloured acid. The unavoidable loss of some of the acid does not favour the use of this method.

Professor Kolbe's patent for the United States claims the manufacture of salicylic acid and homologous compounds by the treatment of phenol, cresol, or homologous compounds with carbonic acid in the presence of an alkali, an alkaline earth, or mixtures of them.

An exceedingly interesting reaction takes place if we substitute potash in the above process; the resulting acid is under these circumstances not salicylic, but paraoxybenzoic acid, a substance which is isomeric with salicylic acid, and according to Professor Kolbe's experiments, without any disinfecting properties whatever. If the process, however, is carried out with potash, but at a temperature not exceeding 145° C., the resulting acid is, according to Hartmann, also in this case salicylic acid.

Ost makes the following statement, which shows that under the influence of potash even already formed salicylic acid may be converted into paraoxybenzoic acid.

Dry neutral sodic salicylate is decomposed when heated to 220° C., disodic salicylate remaining in the retort, while 1 mol. carbonic acid and 1 mol. of phenol pass off.

Dry neutral potassic salicylate yielded under the same circumstances dipotassic paraoxybenzoate.

Baryta, strontia, lime, and magnesia furnish at 220° C. salicylic acid, and act therefore like soda. (Ost.)

If in Kolbe's process for the manufacture of salicylic acid, cresol be substituted for phenol, cresotic acid is formed, which shares with salicylic acid the disinfecting properties. We may, therefore, use for the manufacture of salicylic acid a noncrystalline carbolic acid containing cresol, as the disinfecting properties of the product are not diminished by its containing some cresotic acid.

For medical internal use, however, the two products ought to be held strictly apart until such time as the medical properties of both substances have been well defined, and an admixture of one with the other has been proved harmless even for such purposes.

Cresotic acid was some years since described by Drechsel, who obtained it by heating cresol and bicarbonate of soda in a sealed tube.

I come now to speak of the experiments which have been made by Professor H. Kolbe and others, and which go to prove the disinfecting and preserving properties of salicylic acid, and the practical application of this substance for industrial and medical purposes.

Professor Kolbe's original experiments were made to study the influence of salicylic acid on non-organized ferments, like emulsin or synaptase as contained in bitter almonds, or myrosin as contained in black mustard. The results were quite striking, as small quantities of salicylic acid sufficed to prevent the action of these ferments on amygdalin or myronic acid respectively.

Only if the quantity of salicylic acid used for these experiments was very small a slight odour of either oil of bitter almonds or mustard oil could be detected after several hours' standing.

His experiments made on organized ferments were the following :—

A grape sugar solution containing 1 gr. of salicylic acid to 1 litre of fluid, did not ferment.

0·18 gr. salicylic acid to 1 litre of grape sugar solution will retard, but not prevent, fermentation ; an addition of salicylic acid (0·20 gr.) to this fermenting liquor prevented further fermentation.

The growth of fungi on beer could be prevented by the addition of 1·2 gr. salicylic acid to 1 litre of beer for 12 days ; the beer, however, had soured during this time, it having been kept in a loosely covered beaker for all that time. Milk containing 0·04 per cent. of salicylic acid will sour 36 hours later than pure milk.

Urine with some salicylic acid added was found after three days clear and free from ammonia. Eggs were laid in water which contained suspended salicylic acid, then dried on stands. The result has been that they remained fresh even for months if kept at the common temperature. An experiment made with meat, which was covered with salicylic powder and then closely packed in a jar, appears also, according to private information, which I received lately, to have given satisfactory results. Since, however, temperature and other atmospheric influences may modify the results considerably, Professor Kolbe has so far at least refrained from publishing results until similar experiments can be repeated in warmer climates.

I must now present some abstracts of papers giving the results of experiments made by other authors regarding the preserving influence of salicylic acid.

Professor C. Neubauer, of Wiesbaden, has studied the influence of salicylic acid on yeast, or the fermentation of must.

1. Fresh and filtered grape juice, in which all spores had been destroyed by heating it to 65° C., received a trace of yeast and additions of salicylic acid in the following proportions :—

Quantity of salicylic acid calculated for 1000 litres of must.	Results.
5·5 grammes	The surface became turbid in from 8 to 10 days, and was covered with fungi in 15 days. No fermentation.
11· ,,	
22· ,,	,, ,,
44· ,,	,, ,,
66· ,,	,, ,,
88· ,,	,, ,,
110· ,,	,, ,,

Must containing no salicylic acid fermented in the regular manner, active fermentatien becoming visible in the course of a few days.

2. 50 c. c. samples of grape-juice free from ferments received additions of 1 c. c. fluid wine yeast, containing 0·0049 gr. yeast cells each, and varying quantities of salicylic acid.

	Calculated for 1000 litres must.	Weight of dry yeast grown within 9 days.
No salicylic acid.	No salicylic acid.	0·2452 gr.
0·0006 gr. ,,	12 grs. ,,	·1975 ,,
0·0012 ,, ,,	24 ,, ,,	·1654 ,,
0·0018 ,, ,,	36 ,, ,,	·1465 ,,
0·0024 ,, ,,	48 ,, ,,	·0926 ,,

Samples containing more salicylic acid than 48 grs. per 1000 litres must show during the duration of this experiment (9 days) no visible signs of fermentation.

3. A third series of experiments shows, that, if we take only one-tenth of the quantity of yeast taken in 2 to start fermentation, 28 grs. of salicylic per 1000 litres must are sufficient to entirely prevent fermentation even for 20 days.

4. 50 c. c. grape-juice sown with spores of *Penicillium glaucum* allowed the rapid development of the fungus, which came to fructification in the short time of four days.

50 c. c. of grape-juice containing 0·0028 gr. salicylic acid and sown with the spores of *Penicillium glaucum* remained perfectly unaltered for twenty days.

The author states as his conviction, obtained from his results, that salicylic acid will become of invaluable importance to manufacturers of wine, because it is tasteless and powerful in its action on the enemies of wine, even if applied in very small quantities, and therefore will enable wine merchants to entirely do away with the old methods of curing and preserving it.

Professor Kolbe adds to the foregoing article some further experiments made by him which especially go to show the uselessness of paraoxybenzoic acid, and the isomeric oxybenzoic acid as disinfectants or preservatives, at the same time he makes the remarkable statement, that the salts of salicylic acid are not disinfectants, and that oil of wintergreen, salicin, and salicylol are likewise without disinfecting properties.

(*To be continued.*)

IMPROVEMENTS IN THE MANUFACTURE OF SULPHURIC ACID.

The following description of an improvement in the manufacture of sulphuric acid, which is the invention of Dr. Sprengel, and is stated to have worked for some time past successfully at Lawes' Chemical Manure Company's Works, Barking, is quoted from the *Journal of the Society of Arts* :—

"The process as usually carried out is as follows :—A sulphur mineral is burnt upon the hearth of a furnace in the presence of a sufficient supply of air ; the sulphurous acid so formed is sent forward into a large leaden chamber, being caused to carry with it in its passage a quantity of nitrous fumes, which fumes, in the chamber, act as the vehicle or carrier for the transference of the oxygen from the air to the sulphurous acid, the latter, consequently, becoming oxidized to form sulphuric acid. At different points of the chamber jets of steam are introduced for two purposes—first, to supply the proper amount of water for the hydration of the sulphuric acid compound ; and second, to cause the precipitation of the so-formed acid on to the floor of the chamber, from whence it may be run off. For a long time it was considered that a certain heat in the chamber should be maintained, and that the steam thus introduced also effected this result ; this has since, however, been proved to be erroneous. In every 2000 tons of acid formed in the chamber there are contained about 1000 of water, which water, seeing that none is introduced in any other form, must have been obtained by the condensation of steam. The improvements referred to consist in the use in the place of this steam of what has been called 'pulverized' or 'atomized' water or spray, this spray being injected into the chambers in the place of the steam jets.

"It would seem that, beyond the chief advantage, that of the saving of fuel, there are other advantages to be obtained by this method of working ; for instance, the chamber is much cooler without the use of the steam, and it is found that the yield of acid is better under such circumstances, while at the same time the chambers can be caused to do more work, as a greater quantity of the gases will be contained in them at a given time, owing to such gases occupying a less volume at the reduced temperature. The water spray is produced by the use of a small quantity of steam, which is made to escape from a platinum jet, under a pressure of about two atmospheres, into the centre of a flow of water. Twenty pounds of steam used in this way will convert 80 lbs. of water into a fine mist, the actual weight of which issuing from a jet of the above size amounts to about one-third of a ton in twenty-four hours. These jets are placed in the sides of the chambers about 40 feet apart, being supplied with water from a tank above. The saving of coal by this arrangement amounts to about two-thirds of that formerly burnt, and from statements made by Messrs. Lawes, it would appear that they have already saved by this means during the past year upwards of 1000 tons of coal. The amount of pyrites, and also of nitre used, is also reduced for the production of the same amount of acid.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 23, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

STRYCHNIA PICK-ME-UPS.

THE House of Commons, the Nasmyth hammer, and the trunk of an elephant, alike enjoy a reputation similar in this, that they are all credited with the ability to deal in their respective spheres with the most diverse objects. At least one of our medical contemporaries appears to be ambitious of converting this trio into a quartette, by affecting to display almost omniscient sagacity in the editorial chair. Whether in performing its more immediate function of keeping its clients abreast of the progress in medical science or in advising a junior contemporary, in settling the disputes of irate practitioners or in dictating their duties to pharmacists, in denouncing a Government that will not follow its advice or in frightening the public by Commissioners' reports, the *Lancet* displays an energy and breadth of action that is simply marvellous even in these days. That it sometimes makes a false move, and receives a smart rap upon the knuckles in consequence, as in the case of its recent crusade against street ices, does not appear to affect its activity, and its paternal supervision of all classes of the community knows no diminution. Only last week it was felt to be " desirable to point the moral of the dismal tragedy" at Norwood, and in doing so the *Lancet* stumbled across some information that appears to have been considered so novel and urgent that it was necessary it should be conveyed to the general public as it would seem by early slips communicated to the daily newspapers.

"Pick-me-ups" have already elicited considerable professional acumen as to their composition; but it may be new to some of our readers to learn that strychnia "probably forms an ingredient in many of the mischievous compounds known as pick-me-ups," and that it " is taken and administered by unprofessional persons with a recklessness perfectly astonishing when it is remembered that the drug is one of the most potent and dangerous poisons." They may also be unacquainted with the fact—and this ignorance may extend to Messrs. LONGMANS, the publishers, also—that PEREIRA'S 'Materia Medica' is consulted by weak-minded lay readers "much as they repair to a cookery book," and that they thus become acquainted with the "infinitely harmful and perilous" knowledge that nux vomica is very serviceable in shaking or tremor of the muscles, produced by habitual intoxication. They may also be surprised to learn that, as the *Lancet* asserts, "acting upon a statement of this kind, chemists and laymen have dared to play with the drug, and the consequence has been a perpetual risk of misadventure, like that which has occurred at Norwood."

Our contemporary is pleased to conclude its lucubration by intimating that the Norwood episode may be of service if this pointing of the moral be understood and appreciated. We must confess that so far as we can understand it we have appreciated it as something very closely allied to clap-trap. That abuses of the kind indicated do occur occasionally, we are not disposed to deny; but we do dispute the justice of founding thereon a sweeping charge against chemists and druggists, who, with the exception of the medical profession, are the only persons who can legally deal with strychnia in the manner specified. At present, so far as we are informed, the presence of strychnia in "pick-me-ups," even if those articles constituted the staple commodity of the pharmacist's wares, is as little vouched for by experiment as that of the "dirt and indigestibility" of which street ices were recently asserted to be "concocted." Nor do we believe that respectable pharmacists are in the habit of indiscriminately recommending strychnia tonics, as insinuated, or of offering facilities for the dispensing of old prescriptions containing powerful poisons, as asserted. We prefer to believe that the following sentence, in a communication received from a pharmaceutical chemist upon the subject is fairly representative. He says, " If patients ask for copies of prescriptions for friends, I invariably refuse them when strychnia, arsenic, nux vomica, aconite, etc., are ordered for internal use." A witty American contemporary, *à propos* of the recent meeting at Boston, has affected to find a *raison d'être* for pharmaceutical conferences in a necessity for periodically testing drugs upon victims provided for the purpose; but it had the grace to picture the druggist as a mild and melancholy man, depressed by the terrible possibilities of his calling. However, if one tithe of what is suggested by the *Lancet* on this subject were true, he might rather be drawn as pining for opportunities to scatter poison broadcast through the world.

In conclusion, we would presume to remind our contemporary that it requires caution in assuming general rules from isolated cases. *Ex uno specta omnes* may be a true saying sometimes, but it requires careful application; else the confusion between the berries of *Atropa Belladonna* and those of *Solanum Dulcamara,* exhibited at a recent inquest, and commented upon by the *British Medical Journal* last week, might be argued to indicate a sad unacquaintance with English plants in the medical profession generally.

THE CITRATE OF MAGNESIA PROSECUTION.

The prosecution of Mr. James Kerr, of Greenock (see before, p. 27), for the sale of "citrate of magnesia" that was adulterated with carbonate of soda, tartaric acid, sugar, and sulphate of soda, has resulted in the dismissal of the case, on the ground that the substance sold was the article of commerce known by that name, and so recognized by the medical faculty. Costs however were refused, the Magistrate saying that the Fiscal was warranted in investigating the case. We hope to furnish a fuller report of the case next week.

MEDICINAL PROPERTIES OF THE LABURNUM.

It will be remembered that a short time since (before, p. 275) in reporting a case where several boys had been poisoned through eating some laburnum root, Dr. Vallance said the symptoms were such as to indicate great therapeutical value in that substance. A letter to the *Medical Times and Gazette*, from Dr. H. J. Hardwicke, of Sheffield, confirms this conjecture. Dr. Hardwicke states that he has already used laburnum root "in several painful affections in the form of a decoction of the strength of a handful of the roots to a quart of boiling water," an ounce of the decoction being given for a dose to an adult. The therapeutic effects are said to be a feeling of drowsiness followed by deep sleep and profuse perspiration, succeeded on waking by thirst and loss of appetite. There is no nausea or vomiting and the bowels seem to be unaffected by it; but pain is quickly relieved on its administration. Should there appear to be any general disposition on the part of the medical faculty to repeat Dr. Hardwicke's experiments, it is evident that there is considerable room for improvement in them from a pharmaceutical point of view, especially since it is known that too large a dose may produce coma or even death.

ACCIDENT IN THE PREPARATION OF PHOSPHORIC ACID.

We regret to learn that whilst engaged in the preparation of phosphoric acid by the process recommended at the recent meeting of the American Pharmaceutical Association (see before, p. 273), Dr. W. H. Pile, of Philadelphia has been severely, though not dangerously, injured, through the sudden explosion of a retort containing phosphorus, nitric acid, and bromine. It is evident therefore that the utmost caution should be exercised by any of our readers who may be tempted to try the process.

ARSENIC EATERS.

During a lecture delivered by Dr. Knapp in connection with a recent meeting of German natural philosophers at Gratz in Styria, he is reported by the Vienna correspondent of the *Standard*, to have introduced to the audience two arsenic-eaters, one of whom ate 0·30 grams of yellow sulphuret of arsenic, the other 0·40 grams of arsenic acid, in sight of the assembly. Amongst other things Dr. Knapp said—

"It is difficult to give any certain particulars as to the increase in number of arsenic-eaters. I have convinced myself that there exist many of them in Upper Styria, and also in Middle Styria; very many stable boys, ostlers, wood-cutters, and foresters are known to me as arsenic-eaters; even the female sex is addicted to the practice. Many began already at seventeen or eighteen years of age to take arsenic, and continued it to a great age. Most arsenic-eaters keep the matter secret, so that it is impossible to give accurate statistics. They all assign as their motives for indulging in the habit that it prevents illness; furthers their wish to look rosy and healthy; that it is a remedy against difficulty of breathing, and assists the digestion of indigestible food. A poacher in Upper Styria, who made experiments in my presence of eating arsenic, told me he had acquired courage by the habit. The appearance of the arsenic-eaters in all cases known to me is healthy and robust. I think only robust persons can become accustomed to the practice. Some of them attain a great age. Thus in Zeiring I saw a charcoal burner, upwards of seventy, still strong and hearty, who, I was told, had taken arsenic for more than forty years. I heard, too, of a chamois hunter of eighty-one, who had long been used to eat arsenic. I never observed an arsenic cachezy in those addicted to the habit. It certainly happened once that such an arsenic-eater (a leather dresser's apprentice in Ligist, 1865), while intoxicated took too much, thereby poisoning bimself severely. According to his own account he had taken a piece as large as a bean. He entirely recovered, however, and ate arsenic afterwards, but more carefully. As far as my observations extend, white arsenic, namely arsenious acid, As_2O_3, (also called flowers of arsenic), and the yellow arsenic, As_2S_3 (orpiment), are taken, and that in a dry state, alone or on bread. The dose is, of course, very small at first, and is gradually increased, the largest quantity eaten in my presence by the poacher in Zeiring being 14 grammes. A certain Matthew Schober, in Ligist, ate 7½ grammes before me on the 17th April, 1865. The intervals, too, at which arsenic is taken vary—every fortnight, every week, twice or three times a week. But all doubt as to the existence of arsenic-eaters is now removed by the present experiments."

THE BENEVOLENT FUND ELECTION.

It may be useful to remind our readers that the voting papers for the Election of Benevolent Fund Annuitants, which takes place next Wednesday, the 27th inst., may be delivered personally by the voter on the day of election; but if forwarded to the Secretary, they must be sent *on or before Tuesday*, October 26th. Subscriptions or donations paid on or before the day of election will entitle the givers to vote thereat.

THE CHEMISTS' BALL.

We are requested to state that a preliminary meeting of the Ball Committee will be held at 17, Bloomsbury Square on Monday, November 1.

THE EXAMINERS OF THE IRISH PHARMACEUTICAL SOCIETY.

In publishing the names of these gentleman, as given in our last impression, the *Lancet* adds, "Two of the Examiners, Drs. Smith and Collins, are, we understand, sons of members of the Council, the former being the son of the Vice-President of the Council, Dr. Aquila Smith."

DEATH OF PROFESSOR WHEATSTONE.

Just at the time of going to press we learn of the death, in Paris, on the 19th inst., of Sir Charles Wheatstone, whose name is inseparably connected with one of the most wonderful inventions of modern times, the practical application of electricity—in the form of the electric telegraph.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN EDINBURGH.

October 14th, 1875.

Present: Messrs. Ainslie, Buchanan, Gilmour, Kemp, Kinninmont, Tait, and Young.

Professor Maclagan was also present, on behalf of the Privy Council.

MINOR EXAMINATION.

Twelve candidates were examined. *Six* failed. The following *six* passed and were declared qualified to be registered as Chemists and Druggists :—

Foulsham, Harry Botwright	Ipswich.
Lund, William	Heywood.
Macintosh, John	Elgin.
Perry, Horatio Nelson	Gravesend.
Rosson, John Henry	Manchester.
Thomas, John	Aberystwith.

The above names are arranged in order of merit.

MODIFIED EXAMINATION.

Two candidates were examined, but failed to pass.

EXAMINATIONS IN LONDON.

October 20th and 21st, 1875.

Present (20th)—Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Hills, Linford, Martindale, Moss, Schweitzer, Southall, Taylor, and Umney.

(21st), Messrs. Allchin, Barnes, Benger, Bottle, Carteighe, Corder, Gale, Linford, Martindale, Moss, Schweitzer, Taylor and Umney.

Dr. Greenhow was present on the 20th, on behalf of the Privy Council.

MAJOR EXAMINATION.

Three Candidates were examined. *One* failed. The following *two* passed and were declared qualified to be registered as Pharmaceutical Chemists :—

Thompson, George Alfred	Tonbridge.
Coles, William	Great Missenden.

MINOR EXAMINATION.

Twenty-three Candidates were examined. *Eleven* failed. The following *twelve* passed, and were declared qualified to be registered as Chemists and Druggists :—

Equal.	Harriman, Edwin	Liverpool.
	Pashler, William Ingram	Cambridge.
	Wright, Bentley Warren	Grantham.
	Smith, George	Sunderland.
	Parrott, William Searle	Falmouth.
	Randall, Frederick Joseph	Colchester.
Equal.	Baker, William Horsman	Liverpool.
	Smith, Joseph	Manchester.
	Fowler, Edwin	London.
Equal.	Kidd, William Champley	Malton.
	Rheeder, Thomas	Knaresborough.
	Raynes, Sidney Herbert	London.

The above names are arranged in order of merit.

MODIFIED EXAMINATION.

Nine Candidates were examined. *Four* failed. The following *five* passed, and were declared qualified to be registered as Chemists and Druggists :—

Abbott, Joseph	Liverpool.
Llewelyn, Ynyr	Stourbridge.
Lucas, Robert	Lichfield.
Rogers, Henry	Maidstone.
Stanton, Henry Samuel	Rock Ferry.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination :—

Certificate of the College of Preceptors.

Parker, William Henry	Hitchin.

Certificates of the University of Cambridge.

Bickle, Leonard Watkins	Birmingham.
Brown, John	Pontefract.
Camm, Alfred	Kidderminster.
Collitt, William	Gainsborough.
Slater, William M.	Ipswich.

PRELIMINARY EXAMINATION.

The following is the result of the Preliminary Examination held on the 4th inst. :—

ENGLAND AND WALES.

One hundred and seventy-seven candidates presented themselves for examination, of whom *ninety-seven* failed. The following *eighty* passed, and have been duly registered as Apprentices or Students :—

	*Willis, Joseph George	Bristol.
	*Rainey, Archibald Edward	Spilsby.
	*Smith, William	Louth.
Equal. Equal.	*Herbert, George	Greenholme.
	*Hogg, James Edmund	Worcester.
	*Smith, Frederick George	Coventry.
	*Smith, Sidney	Birmingham.
	*Burton, Walter	Mansfield.
Equal.	*Beck, Percy Charles	Norwich.
	*Thornton, Charles Henry	King's Lynn.
	*Heighington, Thomas	Woburn.
	*Driffield, Robert	Spilsby.
Equal Equal.	*Chapman, George William	Leicester.
	*Hemstead, Alfred Joseph	Canterbury.
	*Mactaggart, Catherine	Welwyn.
Equal.	*Peck, Frederick William	Cambridge.
	*Rees, Samuel	Llandyssul.
Equal.	Austen, Charles Wilson	Surbition.
	Brown, Hedley Oliver	Barrow-on-Humber.
	Maudson, Beresford F. H.	Brighton.
	Wells, Arthur John	Leamington.
	Lewis, David Morgan	Neath.
	Cooper, Thomas Edward	Wellington, Salop.
Equal.	Bakewell, William Whitehorn	Uttoxeter.
	Chesterfield, Thomas Mann	Wisbech.
	Dickinson, David	Boston.
	Dillon, Charles Linder	Hereford.
	Gibson, Frederic Evens	London.
	Paine, William Henry	Weston-super-Mare.
	Forster, Arthur William	Norwich.
Equal.	Aston, William	Bilston.
	Christie, Douglas	Wallingford.
	Evans, John	London.
	Ferriday, Edwin Joseph	Oakengates.
	Langbeck, Hugo Waldemar	London.
	Miller, Henry	Sutton-in-Ashfield.
	Pegg, James Alfred	Mansfield.
	Saunders, James Warnes	Hackney.
Equal.	Hugill, Arthur Major	Leeds.
	Jones, Edward	Newcastle Emlyn.
	Walker, Charles J.	London.
Equal.	Davison, Samuel Rutherford	Shrewsbury.
	Holmes, William Albert	Kendal.
	Humphreys, Griffith	Corwen.
	Lockwood, James Savory	Sheffield.
	Phillips, Thomas	Newcastle Emlyn.
	Rice, John William	Winchester.
Equal.	Barrow, Frank Arthur	Newmarket.
	Beales, Samuel	Wisbech.
	Betts, George	Norwich.
	Carveth, William Uglow	Plymouth.
	Dearnley, William Robert	Halifax.
	Tookey, Edwin James	Birmingham.

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* Passed in the First Division.

Equal.	Allen Frederic Charles	Birmingham.
	Harrison, Stephen Wright	North Shields.
	Needham, Thomas	Manchester.
	Verdon, Levinous Henry	Knighton.
	Williams, Evan Wynne	Dolgelly.
	Wright, George Cornelius W.	Leeds.
	Evans, Evan	Dolenchaf.
Equal.	Dutton, Thomas Pryce	Bristol.
	Fargher, Charles	Douglas.
	Jenkins, Daniel Evan	Lampeter.
	Lloyd, George Lewis	Cardigan.
	Roberts, Griffith	Braich Talog.
Equal.	Bairstow, Tom	Manchester.
	Count, Sydney	Colchester.
	Duckett, Frederick Wm.	Clifton.
	Gibson, Atkin Brewster	Grantham.
	Gibson, Frederick John	Cambridge.
	Harris, Walter Scott	Canterbury.
	Jones, Hugh Robert	Bangor.
	Lane, James	Nottingham.
	Leech, John Henry	Cambridge.
	Locking, Henry	Hull.
	Plattin, Henry Ramm	Fakenham.
	Walker, William Grayston	York.
	Wardell, Frederick Wm.	Huddersfield.
	Whineray, Edward	Ulverston.
	Willis, Henry James	New Brompton.

SCOTLAND.

Twenty-five candidates presented themselves for examination. Of these *five* failed. The following *twenty* passed and have been duly registered :—

Equal.	*Hardie, James Millar	Dundee.
	*Semple, William	Dumfries.
	*Kerr, James	St. Boswells.
	*Johnston, William	Montrose.
	*Watson, James Crowe	Montrose.
Equal.	*Cormack, George	Fochabers.
	*Illingworth, George S.	Aberdeen.
	*Lawson, William Stewart	Glasgow.
	*Murchie, William Gardiner	Lockerbie.
Equal.	*Duncan, James	Aberdeen.
	*Pirie, William Rettie	Aberdeen.
	*Hislop, Robert	East Linton.
	*Mauchlen, Robert	Glasgow.
Equal	Christie, William	Banff.
	Marshall, John	Coatbridge.
	Blyth, William B. A.	St. Andrews.
	Leggat John	Aberdeen.
	Young, James Robertson	Edinburgh.
	Cowan, Andrew	Ayr.
	Chapman, George	Macduff.

The questions for examination were as follows :—

Time allowed. Three hours.

LATIN.

Cæsar—De Bello Gallico, Lib. I.

1. Translate into English :—Divico respondit ; ita Helvetios a majoribus suis institutos esse, uti obsides accipere, non dare, consueverint: ejus rei populum Romanum esse testem. Hoc responso dato, discessit. Postero die castra ex eo loco movent. Idem facit Cæsar; equitatumque omnem, ad numerum quatuor millium, quem ex omni provinciâ et Aeduis atque eorum sociis coactum habebat, praemittit, qui videant, quas in partes hostes iter faciant. Qui, cupidius novissimum agmen insecuti, alieno loco cum equitatu Helvetiorum proelium committunt ; et pauci de nostris cadunt.

Grammatical Questions on the preceding passage.

2. Compare *postero, cupidius, novissimum.*

3. Give the present, perfect, supine, and infinitive, of *respondit, consueverint, coactum, videant, insecuti, cadunt.*

4. Account for the cases of *Helvetios, testem, millium, loco.*

ARITHMETIC.

5. Convert one million and thirty thousand grains into *grammes.*

6. Reduce £4 17*s:* 6*d.* to the fraction of £5 : and 16*s.* to the fraction of £200.

7. Multiply $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ together, and divide $4\frac{1}{3}$ by $2\frac{3}{4}$.

8. Multiply 5·34 by ·0021, and divide ·011214 by 53·4.

9. Find the value of 60 cwt., 3 qrs., 12 lbs., at £7 13*s.* 6*d.* per cwt.

ENGLISH.

10. Name the number, gender, person, and case, of the following words :—*he, her, its, us, yours, ye, thee, them, my.*

11. Write down the present and the past indefinite tenses of the following perfect participles :—*bereft, borne, brought, caught, shorn, shrunk, sodden, swung, swollen.*

12. Write a short account of Columbus, Oliver Cromwell, or Lord Nelson.

The following is a list of the Centres at which the examination was held, showing the number of Candidates examined at each Centre, and the result :—

ENGLAND AND WALES.

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberystwith	3	2	1	London	22	10	12
Berwick	1	0	1	Manchester	9	2	7
Birmingham	8	4	4	Newcastle-on-Tyne	3	1	2
Boston	4	4	0	Northampton	1	0	1
Brighton	1	1	0	Norwich	6	3	3
Bristol	6	4	2	Nottingham	6	4	2
Cambridge	6	4	2	Oxford	2	0	2
Canterbury	4	2	2	Peterborough	2	2	0
Cardigan	3	3	0	Plymouth	4	1	3
Carlisle	3	2	1	Portsmouth	1	0	1
Carmarthen	4	3	1	Preston	4	0	4
Carnarvon	3	2	1	Reading	2	1	1
Cheltenham	1	0	1	Salisbury	2	0	2
Chester	3	1	2	Scarborough	2	1	1
Colchester	1	1	0	Sheffield	3	1	2
Darlington	2	0	2	Shrewsbury	3	3	0
Exeter	1	0	1	Southampton	4	1	3
Hereford	1	1	0	Stafford	3	1	2
Hull	4	2	2	Swansea	2	0	2
King's Lynn	3	2	1	Taunton	1	0	1
Leamington	4	2	2	Truro	3	0	3
Leeds	11	3	8	Worcester	2	1	1
Leicester	4	1	3	York	1	1	0
Lincoln	1	1	0				
Liverpool	7	2	5				

SCOTLAND.

Aberdeen	10	9	1	Edinburgh	9	5	4
Dumfries	2	2	0	Glasgow	3	3	0
Dundee	1	1	0				

BENEVOLENT FUND.

SUBSCRIPTIONS RECEIVED DURING JUNE, JULY, AUGUST AND SEPTEMBER, 1875.

	£	*s.*	*d*
Abernethy, John, Corn Market, Belfast	0	2	6
A Friend, Wigan	0	5	0
A Friend, Wigan	0	2	6
Airey, George, 24, Wallgate, Wigan	0	5	0
Allan, William, Dumfries	0	10	6
Allen, Thompson, Bridge Street, Boston	0	5	0
Ashley, William, Derby	0	10	6
Austin, H. F., 125, Bermondsey Street, S.E.	1	1	0
Bailey, G. W., North Walsham, Norfolk	0	5	0
Bamford, J. W., 37, Cronkeyshaw Road, Oldham	0	5	0
Barton, H. E., High Street, Kenilworth	0	5	0
Bates, Henry, 38, George Street, Oldham	0	10	6
Bayley, William, Earle Street, Crewe	0	10	0
Beardsley, J., 20, Sneinton Street, Nottingham	0	5	0

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* Passed in the First Division

Bell, Thomas, Ambleside	0	10	6
Bemrose, J., Long Bennington, near Grantham	0	10	6
Berry, Thomas, 189, Henshaw Street, Oldham	0	5	0
Biddle, James William, 54, Dale End, Birmingham	1	1	0
Bigg, Thomas, Great Dover Street, Borough	1	1	0
Bindloss, George Frederick, 97, Leighton Road, Kentish Town, N.W.	0	10	6
Birch, H. C., 7, Church Road, Upper Norwood	1	1	0
Blade, E., 18, Lee Bridge, Halifax	0	5	0
Blain, William, Bolton	0	10	0
Bowden, E. and A., 13, Charles Street, St. James's, S.W.	1	1	0
Boyd, Thomas, Old Grapes Lane, Carlisle	0	5	0
Braddock, James, 97, Yorkshire Street, Oldham	0	5	0
Bradley, T. D., 33, Bond Street, Brighton	0	5	0
Brelsford, James, Chat Moss, Oldham	0	10	6
Briggs, George, Oldbury	0	10	6
Brown, J. F., 4, Market Square, Dover	1	1	0
Burn, D H., Arbroath	0	5	0
Butcher, Thomas, Cheltenham	2	2	0
Butler, Samuel, 18, Ashgrove Road, Redland, Bristol	1	1	0
Callaway, Lemuel, 21, Tavern Street, Ipswich	1	1	0
Capper, Edmund, Gay Street, Bath	0	5	0
Casey, E., 10, Canal Street, Ancoats, Manchester	0	2	6
Chadwick, George William, Sherrard Street, Melton Mowbray	0	5	0
Churchill, J. and A., 11, New Burlington Street, W.	1	1	0
Clarke, C. J., Old Buttermarket, Ipswich	0	5	0
Clifton, Frederick, 34, Corn Market, Derby	0	10	6
Coleman, E. J., High Street, Cardiff	0	10	6
Cook, Robert, Great Grimsby	0	10	6
Cooke, John, 126, Hoxton Street, N.	0	10	6
Cooper, Mark, Church	0	5	0
Corbyn and Co., 300, Holborn, W.C.	1	1	0
Cornell, William, Ipswich	1	1	0
Cosway, E. C., 19, Notting Hill Terrace, W.	0	5	0
Coulson and Jacombs, 52, Ludgate Hill, Birmingham	0	10	6
Cox, Mrs, Stony Stratford	0	10	6
Crook, Charles, Mirfield	0	5	0
Cutcliffe, George J., 7, Strand, Dawlish	0	4	6
Darby and Gosden, 140, Leadenhall Street, E.C.	2	2	0
Davies, D. J., Aberystwith	0	5	0
Davy, Yates and Routledge, 64, Park Street, Southwark	2	2	0
Dickins, Rowland, Aylesbury	0	5	0
Dixon, James, North Kelsey	0	3	0
Dobell, Dr. Horace, 86, Harley Street, W.	1	1	0
Dunn, Richard, Brock Street, Bath	0	5	0
Dunsford, S., Market Place, Wigan	0	5	0
Elliot, E., Guide Post, Morpeth	1	1	0
Ellis, T. W., Loddon	0	10	6
Eminson, J. M. O. 79, Abbey Road, St. John's Wood, N.W.	0	5	0
Epps, James, 48, Threadneedle Street, E.C.	1	1	0
Falkner, Richard, 12, Market Place, Banbury	1	1	0
Fallowfield, J,, 36, Lower Marsh, Lambeth	1	1	0
Field, J. J., 22, Upper Gifford Street, N.	1	1	0
Field, Sam, 71, Scholes, Wigan	0	5	0
Finnis, Steriker (Esq., J. P.), Dover	1	1	0
Flint, C. B., 12, Bridge Street Row, Chester	0	10	6
Foottit, C. M., Great Marlow	0	10	0
Fowler, Stanley, 36, Elgin Crescent, Notting Hill, W.	1	1	0
Fowler, W. R., Market Place, Boston	0	10	6
Fox, C. J., Witney, Oxon	0	5	0
Fox, George, Dawgreen, Dewsbury	0	10	6
Fryer, John, Batley Carr, Yorks.	0	10	6
Gaitskill, J., Gosforth, via Carnforth	0	5	0
Gardner, J., Swaffham	1	1	0
Gardner, T., Morecambe	0	10	6
Gerard, G. R., Great Bedwin, Wiltshire	0	10	6
Gill, W. H., 19, George Street, Croydon	0	10	6
Gillespie, James, High Street, Irvine, N.B.	0	5	0
Glover, John S., 244, Manchester Street, Wernath, Oldham	0	5	0
Goodall, F., 46, Manchester Street, Oldham	0	10	6
Goodenough, J., Somersham	1	1	0
Gorton and Sons, 144, High Street, Whitechapel	1	1	0
Greaves, E., Mexborough	0	10	6
Greenwell, R. H., Chester-le-Street	0	10	6
Groves, H. F., 7, Mount Pleasant Place, Lewisham	2	2	0
Hackforth, F., Leyland, Lancashire	0	10	6
Hackforth, M., Leyland, Lancashire	0	5	0
Hall, Samuel, 3, Alma Place, Eastbourne	1	1	0
Hanbury, Cornelius, Plough Court, Lombard Street, E.C.	1	1	0
Harrop, W. H., Hagley Street, Halesowen	0	5	0
Harvey, Edward, Giltspur Street, E.C.	1	1	0
Haslop, William, 43, George Street, Oldham	0	5	0
Hebden, W. C., 64, Northgate, Halifax	0	10	6
Herrings and Company, 40, Aldersgate Street, E.C.	2	2	0
Hickley, G., 101, Church Street, Brighton	0	10	6
Hickman, William, Archer Street, Notting Hill, W.	0	10	6
Hooper, William, 7, Pall Mall East, S.W.	2	2	0
Hothersall, John, 25, Standishgate, Wigan	0	5	0
How, W., Dorchester	0	10	6
Howorth, George B., Egremont, Cheshire	0	5	0
Hudson, John, Esq., Hull	2	2	0
Hughes, Edward, 7, Bridge Street, Llanelly	0	10	6
Hughes, Robert, Rhydlydam, Denbighshire	0	5	0
Hulley, John, 97, Manchester Road, Heaton Norris, Stockport	0	10	0
Hulme, Thomas, 132, Huddersfield Road, Oldham	0	10	6
Hurst, James, 27, Bottom Ash Moor, Oldham	0	5	0
Ingoldby, William, Barton-on Humber	0	2	6
Jackson, J. T., Westwood, Oldham	0	5	0
Johnson, Thomas, 80, Wallgate, Wigan	0	5	0
Jones, Charles, Bromyard	0	5	0
Kear, Henry, 11, Lawrence Hill, Bristol	6	10	6
Kellett, R. E., Market Place, Wigan	0	5	0
King, Thomas S., 1, Montague Villas, New Brompton, Kent	0	10	6
King, W. S., 1, Montague Villas, New Brompton, Kent	0	10	6
Lacy, B. W., 4, The Terrace, Stamford Hill, N.	1	1	0
Lawrance, E., Welwyn	0	11	0
Laws, John, 111, Church Street, N.W.	1	1	0
Lee, W., Castle Northwich	0	5	0
Levick, George, Caistor	0	4	0
Lewin, Edward, C., Market Place, Boston	0	5	0
Lister, George, Cottingham	0	10	6
Litherland, Henry, 134, Wallgate, Wigan	0	5	0
Lloyd, William, Carnarvon	0	10	6
Longbotham, J., Chester-le-Street	0	5	0
Lord, R. B., Market Place, Oldham	0	5	0
Lumley, W. T., and Sons, Kirbymoorside	0	5	0
McIntyre, P. S., Bridge End, Tweedmouth	0	5	0
Macdonald, H. S., 51, London Street, Glasgow	0	5	0
Machon, Henry, Saffron Walden	0	10	6
Mackintosh, William, 92, Union Street, Aberdeen	0	5	0
Maggs, S. B., St. Leonard's-on Sea	0	10	6
Mann, R., Newcastle-on-Tyne	0	10	6
Mantell, Charles, 20, Cregoe Street, Birmingham	0	10	6
Marks, Henry and Sons, 61, Houndsditch, E.C.	0	10	6
Mason, W. W. Shortwood, Nailsworth	0	2	6
Mather, Mrs. Ellen, Haddington	0	5	0
Mather, John, 108, Scholes Street, Wigan	0	5	0
Maw, C., 11, Aldersgate Street, E.C.	1	1	0
Maw, Son, and Thompson, 11, Aldersgate Street, E.C.	2	2	0
Millington, Edward, 98, Queen's Road, Dalston, E.	0	10	6
Mills, Robert M., Market Place, Bourne	0	5	0
Moore, Thomas, Sheepshed	0	5	0
Morson, Thomas, 124, Southampton Row, W.C.	1	1	0
Myott, William, 4, Greenacres Old Road, Oldham	0	5	0
Newzam, H. S., 40, Theberton Street, Islington	0	10	6
Oldham, J., Market Street, Mansfield	0	10	6
Olive, W. T., Burry Port	0	10	6
Parker, William, Darlaston	0	10	6
Parkinson and Son, Southampton Row, W.C.	1	1	0
Parkin, William, Gomersal, near Leeds	0	2	6
Parkinson, William, Lees Road, Oldham	0	10	6
Parrington, W., Batley, Yorks.	0	5	0
Pars, Robert C., Thrapston	0	10	
Pearson, C. J., 4, Russell Street, Swansea	1	1	0
Peatson, H. R., 102, Broughton Road, Salford	0	10	9
Penrose, Arthur Petch, 5, Amwell Street, E.C.	0	10	6
Pepper, John, 237, Tottenham Court Road, W.	0	10	6
Phillips, Jonathan, Clarence Chambers, Wallgate, Wigan	0	10	
Picnot, C., 24, High Street, Strood	1	1	0
Pidduck, John William, 11, Bridge Terrace, Harrow Road, W.	0	10	6
Pinkerton, John S., 248, London Road, Glasgow	0	10	6
Piquet, J., 12, York Street, Jersey	0	5	0
Polding, Peter, Market Place, Wigan	0	10	6
Potts, R. S., Ilkeston, Derbyshire	0	10	6
Powell, D., St. Thomas, Swansea	0	5	0
Powell, E. F., 95, High Street, Winchester	0	10	6
Prichard, E., 10, Vigo Street, W.	1	1	0
Rees, W. H, and Company, Dartmouth	0	10	6
Rice, R. S., 33, Wharf Street, Leicester	0	5	0
Rix, William, Eltham, Kent	0	10	6
Roberts, W. C., Post Office, Llansilin	0	2	6
Robinson, Eardley, 166, High Street, Deritend, Birmingham	0	10	6
Romans, Thomas W., Wrotham	0	10	6
Rouse, F. J., 114, High Street, Clapham, S.W.	0	10	6
Royse, Robert, Stockport	0	10	6
Schweitzer, Julius, 79, Pavilion Road, Sloane Street, S.W.	2	2	0
Shaw, John, 24, Great George Place, Liverpool	0	10	6
Sheldrake, G., 21, North Street, Keighley	0	5	0
Simpkins, J., Minchinhampton	0	10	6
Simpson, T. and Son, Stowmarket	0	5	0
Skirrow, W. E., Bingley	0	10	0
Slater, John, 9, Castle Street, Beaumaris	0	10	6
Slater, T., Stone	0	10	6
Smeeton, William, Leeds	0	10	6
Smith, J. G., Esq., J.P., Dover	2	2	0
Smith, R. F., 35, High Street, Barton-on-Humber	0	5	0
Smith, S. A., 3, Lower Parade, Leamington	1	1	0
Soole, J. H., High Street, Grays, Essex	0	10	6
Spencer, Thomas, Addingham, via Leeds	0	2	6
Spencer, W. H., Burnham Market	0	5	0
Starkie, Richard Stringer, 441, Strand, W.C.	1	1	0
Steadman, William. Ashford	0	10	6
Stephen, J., Protstonhill, Gamrie, N.B.	0	2	6
Stephenson, J. N., Heckmondwike	0	5	0
Strachan, Alexander, 111, George Street, Aberdeen	0	5	0
Strickett, J., 161, Saint George's Road, Peckham	0	10	6
Tate, E. P., 30, Terminus Road, Eastbourne	1	1	0
Taylor, H., 39, Ledbury Road, Notting Hill, W.	0	5	0
Taylor, Samuel, 70, Great George Street, Leeds	1	1	0
Thomas, H., 7, Upper St. Martin's Lane, W.C.	1	1	0
Thomas, R., Merthyr	0	5	0
Thomas, Samuel C., Yaxley, Hunts.	1	1	0

Thompson and Capper, Bold Street, Liverpool	1	1	0
Thompson, J., 11, Aldersgate Street, E.C.	1	1	0
Thursby Pelham	0	5	0
Tottenham, Mrs. M. A., Brill, Bucks.	0	5	0
Trim, Edmund, 9, Wellington Terrace, Bournemouth	1	1	0
Troake, R. J., 126, White Ladies Road, Clifton, Bristol	0	10	6
Turner, James, Stacksteads	0	5	0
Turner, John, Aylesbury	0	5	0
Twiss, W., Hunstanton	0	10	6
Wakeham, C., Helston	0	5	0
Wall, Harriet, Shaw, near Oldham	0	5	0
Walpole, William, Great Yarmouth	0	10	6
Wand, Stephen, 18, Haymarket, Leicester	0	5	0
Ward, D., Chipping Ongar	0	10	6
Watson, James, Mauritius	0	3	5
Watson, T. E, 75, Clayton Street, Newcastle-on-Tyne	0	10	6
Wealthall, Alfred, 156, Great Jackson Street, Hulme	0	10	6
Wellington, H. A., Freshwater, Isle of Wight	0	5	0
Wells, Thomas, 91, Charlwood Street, Pimlico, S.W.	1	1	0
Weston, Charles, Ventnor, Isle of Wight	1	1	0
Wharton, F., 110, Lees Road, Oldham	0	10	6
Whitaker, Mrs. E. H., Shaw, near Oldham	0	5	0
Wilcox, G., 11, Prospect Row, Birmingham	0	5	0
Wilkinson, B. J., 1, Myddleton Road, Kingsland, E.	0	12	6
Wilks, Maurice, 31, Rochdale Road, Manchester	0	5	0
Williams, Evan, St. Clears	0	10	6
Williams, Mrs., 23, Pulteney Street, Bath	0	5	0
Wilson, A. G., 272, Manchester Street, Oldham	0	5	0
Wilson, J. S., South Street, Crook, Darlington	0	10	6
Wilson, Thomas, Walsham-le-Willows	0	5	0
Woolley, Sons, and Company, 69, Market Street, Manchester	2	2	0
Wrighton, Henry, Market Place, Cannock	1	1	0
Wrigley, William, 182, Manchester Street, Oldham	0	10	6
Wyatt, F. J., 43, Norland Road, W.	0	5	0
Wyke, Jacob, Abergavenny	0	5	0
Wyleys and Co., Coventry	1	1	0
Younger, Thos., Market Place, Brampton	0	5	0

Donation.

Faulconer, Robert S., 270, Walworth Road	10	10	0

Provincial Transactions.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION AND SCHOOL OF PHARMACY.

The seventh annual meeting was held in the rooms of the Association, Blackfriars Street, on Tuesday evening, October 12, Mr. W. Scott Brown, President, in the chair. The minutes of the last annual meeting were read and confirmed.

Messrs. Rashworth, N. M. Barnes, F. Bradbury, S. M. Carter, Lund, W. Mason, G. H. Mason, J. L. Osmond, W. Porter, F. Robinson, J. J. F. Riley, Richardson, R. Skinner, J. B. Williams, and Wolstenholme, were elected associates.

The Honorary Secretary, Mr. F. Baden Benger, then read the—

Annual Report of the Council.

"The Council of the Manchester Chemists and Druggists' Association are happy to be able to report satisfactorily of its progress during the past year. When, immediately after the passing of the Pharmacy Act in 1868, this Association was formed, a ready acceptance was given to the invitation issued by the Executive Committee to the chemists of the district, and the first annual report showed that 142 members and 138 associates had paid their subscriptions. It was scarcely to be expected that in the absence of any powerfully exciting events, such as that referred to, the long-cherished feelings of mutual distrust, and the desire for isolation rather than friendly intercourse, which prevailed, could be easily removed, and there was perhaps not much cause for surprise when it was found that some members every year fell back into the old habits, and broke their connection with the Association. In spite of this discouragement your Council have year after year done all that the means placed at their disposal allowed to promote the higher scientific education of assistants and apprentices, in fact, to found a School of Pharmacy in Manchester, and to carry out other secondary though highly important aims likely to benefit the whole trade, and this year they have to report a turn in the tide. The list of paid-up members has suddenly risen from 80 to 121; the number of associates is 65, being rather fewer than last year. The Treasurer's statement will show a very considerable increase in the annual income, though some exceptional expenses incurred during the year maintain the small balance due to the Treasurer shown in the last balance sheet.

"This very marked improvement is perhaps largely due to the liberal response made by the Pharmaceutical Council to the application conveyed through your President for a grant to supplement the students' fees. Encouraged by this ready sympathy and assistance, many members of the trade have willingly enrolled themselves when called on, and your Council trust others will follow their example, for it is difficult now to understand the position of those who still decline to bear their trifling share in the maintenance of an Association to which they freely admit they are greatly indebted.

"The monthly evening meetings of last session were devoted to a series of gratuitous lectures on the detection of adulteration of food, by Mr. Louis Siebold, F.C.S. These lectures, it is scarcely necessary to add, were peculiarly interesting and instructive to members of this Association, and were well attended.

"Courses of lectures on Chemistry, Materia Medica and Pharmacy, and Botany, were given during the winter months in the classroom of the Association, by Mr. Siebold and Mr. Leo Grindon, and these gentlemen's reports will be presented to you.

"The reading-room has been kept open five evenings a week during the whole of the year, but the attendance during the summer months was so small as scarcely to justify a continuance of this course. It is proposed, however, to light and heat the rooms during the winter, from seven till ten every evening, except Saturdays and Sundays.

"Lectures by members and other friends are already promised for the monthly meetings, and it is proposed to hold during the winter one meeting at the Memorial Hall, of a more social character. Members and associates will be advised of each of these.

"The following courses of lectures to associates have been commenced by Mr. Siebold:—

"*Chemistry.*—Thirty lectures on Friday evenings. Fee 30*s*.

"*Materia Medica and Pharmacy.*—Twenty-five lectures on Tuesday evenings. Fee 25*s*.

"For students attending both courses, fee 50*s*. The Botany class has been postponed till after Christmas.

"Your Council have much pleasure in referring to the fact that Mr. Naylor, a former associate and prizeman in our classes, has distinguished himself and reflected credit on the character of his early teaching by carrying off the silver medal in the Chemistry class, and the bronze medal in that of Practical Chemistry, at the School of Pharmacy of the Pharmaceutical Society.

"Your Association is again indebted to the Pharmaceutical Society for weekly copies of the *Pharmaceutical Journal*, and to the Pharmaceutical Conference for the 'Year-Book of Pharmacy.'

"In conclusion, your Council most earnestly invite the co-operation of members in carrying on the work of the Association. In so large a body there must be many able to make valuable communications to the meetings, or whose opinions would be useful in the discussions which follow the reading of papers. It is within the power of all to assist by inducing their friends or acquaintances to join the Association, by making an effort to support by their presence those who contribute lectures, and by offering suggestions for increasing the usefulness of the Association."

The Treasurer, Mr. Geo. S. Woolley, read his statemen of accounts:

Dr.

October, 1874.	£	*s.*	*d.*
To Cash, 121 Members	60	10	0
,, ,, 1 ,, 1873	0	10	0
,, ,, Donation	0	10	0
,, ,, 66 Associates	8	5	0
,, ,, Pharmaceutical Society	50	0	0
,, ,, Lecture Fees	49	17	0
,, ,, 7 Lists	0	7	0
,, Balance due Bank	2	2	5
,, ,, ,, Treasurer	10	12	0
	£182	13	5
,, Cash in hand	£0	10	11

Cr.

1874-5.	£	*s.*	*d.*
By Balance due Treasurer	14	0	2
,, Cash to Mr. Siebold in aid of Lecture Fees	50	0	0
,, ,, Messrs. Siebold and Grindon, amount of Lecture Fees	49	17	0
,, Rent	32	0	0
,, Cash paid Attendant	13	5	0
,, ,, Advertising, Stationery, Postage, etc.	9	7	11
,, ,, Printing Lists	9	2	0
,, ,, Furniture, Repairs, and Alterations	2	0	0
,, ,, Sundries, Coals, Gas, Petty Cash, etc.	2	10	5
,, ,, in hand	0	10	11
	£182	13	5
By Balance due Bank	£2	2	5
,, ,, ,, Treasurer	10	12	0

LIBRARY FUND.

Dr.

1874.	£	*s.*	*d.*
To Balance	7	11	5
	£7	11	5
To Balance in Bank	6	4	8

Cr.

1874-5.	£	*s.*	*d.*
By Expenditure	1	6	9
,, Balance in Bank	6	4	8
	£7	11	5

October 12, 1875.—Audited and found correct.

C. A. JOHNSTONE.

The President in moving the adoption of the report said that its full and complete character rendered any extended observations on his part unnecessary, and he would simply state that after seven years' work it was satisfactory to find the Association was continuing to perform efficiently the duties which at the outset they had proposed, namely, providing for the education of assistants and apprentices. They had not accomplished all that was hoped for, but the work done was eminently practical, and perhaps at some future time they might still obtain a college of pharmacy for Manchester. The co-operation of the body of chemists and druggists was essential, and it was to be regretted that a larger proportion did not unite in the efforts made by this Association. This year, however, gave promise of increased numbers, and he felt that the liberality of the London Society would stimulate the efforts of the local body. The work of the Pharmaceutical Society and of this branch of its members had been eminently serviceable to the public, who were now, to a large extent, protected from the risk of ignorant or incompetent dispensers. The duty devolved on all in the business to aid in carrying out the educational part of the arrangements, and thus enable themselves to say with a clear conscience that the assistants and apprentices of Manchester and district had the means placed at their disposal to prepare for the examinations now enforced by law. The character of the teaching in the School was of the highest, and the result as shewn by the examinations was gratifying. Again the statement of accounts shewed balance due to the treasurer, but he hoped a further increase in the list of members would by the end of the session wipe off this debt. Arrangements had been made for interesting monthly meetings, and a successful session might fairly be counted on.

Mr. J. J. Slugg, F.R.A.S., seconded the adoption of the report and treasurer's statement, which was carried unanimously.

Mr. Louis Siebold, F.C.S., then read his—

REPORT ON THE CLASSES OF THE MANCHESTER SCHOOL OF PHARMACY FOR THE SESSION 1874–5.

Mr. Siebold said that eighty lectures had been delivered to the students of this school during the past session, namely, thirty-six lectures on Pharmaceutical Chemistry, by himself, twenty-nine on Materia Medica and Pharmacy, also by himself, and fifteen lectures on Botany, by Mr. L. H. Grindon, whose valuable services he had been in a position to secure, owing to the liberal support he had received through the Council of the Manchester Association from the Council of the Pharmaceutical Society. Nineteen students had attended the chemistry course, thirteen the course on materia medica and pharmacy, and eleven the botany course, making a total of forty-three entries. The attendance throughout the session had been good, and a satisfactory progress had been made by the students, most of whom had never attended any previous courses. The number of students was nothing to boast of, but considering that the fees were now as high as, with a due regard to the position of the students, they could reasonably be made, he thought the result was quite satisfactory. Previous experience had convinced him that by charging very low fees a much larger attendance of students could be secured; but he was nevertheless of opinion that the Council had acted wisely in fixing the charges as they had done, for the students were beginning to see that they ought to pay a fair price for the instructions they received, and he had no doubt that with the fees as they now stood, the attendance in the course of a few years would be such as to make the school self-supporting, an end greatly to be desired. As in previous years examinations were held at the end of the session, and prizes awarded to the successful competitors. The chemistry prize is due to Mr. C. Challinor, the materia medica prize to Mr. R. T. Slinger, and the botany prize to Mr. W. C. Crowther.

The questions were as follows:—

Chemistry.

Time allowed: Two Hours.

1. State the result of the action of HCl upon aqueous solutions of the following chemicals:—Lead acetate, ammonium benzoate, chlorinated lime, ammonium sulphide, potassium cyanide, and neutral potassium chromate.
2. Calculate how much crystallized sodium carbonate will be required for neutralizing 100 grains of potassium bitartrate.
3. Explain the action of MnO_2 on HCl.
4. How would you detect iron and copper in a sample of zinc sulphate?
5. How is tartar emetic prepared?
6. How much nitric acid B.P. by weight would measure one pint?
7. If 20 grains of mercuric chloride were strongly heated in a crucible for some time, what would be the nature and quantity of the residue?
8. How would you ascertain the strength of liquor potassæ?

Materia Medica and Pharmacy.

Time allowed: Two Hours.

1. Recognize the ten specimens of drugs placed before you, and mention the botanical source, natural order, and habitat of each.
2. Give a description of the principle kinds of opium.
3. Name the constituents of bitter almonds.
4. How would you ascertain the purity of saffron?
5. Give a good process for making clarified honey.
6. How are the following extracts prepared?—

Extractum Belladonnæ.
,, Stramonii.
,, Jalapæ.

Botany.

(By Mr. L. H. Grindon.)

Time allowed: Two Hours.

1. Give the essential characters of the *Ranunculaceæ* and the *Rosaceæ*, and state how the two orders differ.
2. Give the essential characters of the *Umbelliferæ*, and name as many as you can of its important species.
3. Enumerate all the parts and organs of a flower, and say what are their purposes.
4. What is the meaning of the terms legume and silique? To what orders could you apply these terms?
5. Give a short description of *Papaver somniferum*, referring to all its principal organs.
6. Briefly describe the leading modes of the germination of the seed.
7. What is an involucrum? and in what orders is it very remarkable?
8. What orders are remarkable for their bitterness? and which for the number of their poisonous species?
9. What plants are comprised under the general term, *Cryptogamia*?

Mr. Siebold also stated that twenty-two entries had been made in the chemistry class, and sixteen in that on materia medica and pharmacy; he thought the prospects of the new session very encouraging.

The prizes, consisting of books, were then distributed to the successful candidates by the chairman, after which the following gentlemen were elected office-bearers for the year:—

President, Mr. W. Scott Brown; Vice-Presidents, Mr. J. T. Slugg, F.R.A.S., Mr. W. Wilkinson; Treasurer, Mr. Geo. S. Woolley; Hon. Secretary, F. Baden Benger, F.C.S. Other members of Council: Messrs. Barnaby, Blain, Bostock, Botham, Hargraves, Hughes, Kay, Mumbray, Payne, Robinson, Hermann Woolley, and J. Waterhouse.

The meeting concluded with a vote of thanks to the retiring officers.

After the meeting the Annual Dinner was held at the Blackfriars Hotel. About fifty of the leading members of the trade in Manchester and district were present, and several guests.

The President, Mr. W. Scott Brown, occupied the chair, and the vice-chairs were filled by Mr. J. T. Slugg, F.R.A.S., and Mr. W. Wilkinson—the Vice-Presidents.

After the chairman had proposed the customary loyal toasts, Mr. Blyton, of Liverpool, proposed "The Pharmaceutical Society of Great Britain," which was responded to by the President. The following other toasts given:—"The Pharmaceutical Conference," by Mr. Woolley, acknowledged by Mr. Benger; "The Manchester Chemists' Association," by Mr. Gibson, responded to by Mr. Wilkinson; "Kindred Local Associations," proposed by Mr. Siebold, and acknowledged by Mr. Scott (Rochdale) and Mr. Blain (Bolton); "The Medical Profession," by Mr. J. T. Slugg; and "Our Guests," by Mr. Hughes, replied to by Mr. J. Plant, F.G.S., Curator of the Peel Park Museum, Mr. O'Neil, F.C.S., and Mr. Watson, D.Sc.

A very agreeable evening was spent, and these annual celebrations bid fair to become increasingly popular and appreciated.

NORWICH CHEMISTS' ASSOCIATION.

At a meeting of the students of the Norwich Chemists' Association, on Tuesday, 12th October, Mr. F. Sutton, F.C.S., delivered the following address:—

"It is customary at the commencement of a new session of an Association like this to start off with a few words of encouragement or warning to young students who are about to begin another six or nine months' search after knowledge. Having been asked to say these few words to you, I have consented willingly—not because I think myself superior in knowledge to many of yourselves, or that I have profited much by the principles I am about to advocate; but this I can say, that my experience has shown me many of the shoals and quicksands which lie in the passage towards learning, and it is the benefit of that experience I desire to convey to you in what I have to say. I shall endeavour to preach you a little homily, and for this purpose I must have a text and that text or motto is the word "Thorough." Those of you who may remember anything of the history of England before the Restoration, will perhaps remember the adoption of this one word by the powerful but unprincipled and cruel minister of the Crown, Earl Strafford, when he designed to make Charles a monarch as absolute as any on the continent, to put the estates and the personal liberty of the whole people at the disposal of the Crown, and, in short, to reverse the whole of the privileges and rights which our forefathers had fought and died for, and the acquisition of which had mainly helped to make England the great nation shew as and is. That man had a single eye to this point, and, like all men of ability with one idea, he was a dangerous man. My desire, however, is not that you should adopt this word in the same way as he did, but that you should use it as your motto for study. In the present day greater demands are made upon students than formerly, and what with examinations and competitions on every side there is quite enough to do; but this very set of circumstances and the increasing activity of life tend greatly to make students superficial, and to render them satisfied if they can merely squeeze through the required standards and then quickly forget the little they once did know. In these eastern counties we are somewhat unfortunate in having no local centres for the prosecution of scientific knowledge such as occur in the Northern, Midland, and Western counties, and this arises mainly from the fact that the district is agricultural rather than manufacturing. This deficiency makes it all the more necessary for us to help ourselves; we must be self-reliant and do what we can to keep pace with our neighbours. When I compare the present state of things with the time at which I was of your age, I see a manifest improvement in the means of acquiring knowledge, but I cannot say as much for the disposition to make use of those means. This Association is an evidence of the growth of means; it rests with you to show us the evidence of its usefulness, and this can only be done by your determination to buckle down to "thorough" hard work. The one thing I would impress upon you is the prosecution of steady, systematic study. You may not be able to learn much, but whatever you do learn let it be done well. An amusing story is told of Cuvier, the celebrated French naturalist. The compilers of a scientific dictionary once applied to him for his opinion on their definition of a crab; they had described it as 'a fish of a red colour that walked backwards.' After reading the description, Cuvier quietly said 'Yes, that's all very well as far as it goes, but a crab is not a fish, it hasn't a red colour, and doesn't walk backwards.' This is an instance of the want of exactness, and you may depend upon my word that any kind of knowledge which is acquired without exactness or, in other words, thoroughly, is worse than useless. It is often said that there is no royal road to knowledge, and it is true; there are here and there brilliant intellects which acquire knowledge rapidly and exactly, but the rule is like that of Artemus Ward's show, 'You may pay and come in, or you may pay and not come in, but you can't come in without paying;' in other words you must work if you would obtain the reward. Now I fancy I can hear some of you say, 'But how can you expect me to study hard at night after a hard day's drudgery at business?' My answer to this would be that in this respect you are much better off than your predecessors were when there was no early closing movement, when we had to open shop at seven and keep at work till half-past nine or ten at night, when if we had any desire to study it must be either early in the morning or by the help of a stolen piece of candle in the bedroom at night; these were times when it required strong efforts and great self-denial to prosecute knowledge, and the efforts had to be made alone; there was none of the emulation which naturally comes from meeting with each other, affording mutual help and possessing a good library, diagrams, and apparatus such as are connected with this room. It may be hard and self-denying for you even with these advantages to stick to study, but I want to impress upon you this one fact that if you do not while you are young acquire the habit of systematic study, you will have enormous difficulty in acquiring it afterwards. Don't think because I say this that I was a model of propriety when I was your age. Unfortunately it was the contrary, and though it is true I had few advantages yet I have bitterly regretted not taking the benefit of those advantages ever since. In this very room where I am now speaking I spent the last three years of my school life, and I can now remember with shame the wasted opportunities which occurred there. One thing especially reproaches me. We had a Latin master exceedingly clever as a classical scholar, but, like many clever men, very absent and self-absorbed. I took advantage of this on many occasions by taking up to him three or four days in succession the same written exercise, and he never found it out. I congratulated myself on getting off so easily, but I totally forgot that it was not my master I was cheating so much as myself. Any young student who is content to scamp his labour in this way, and in after life desires to acquire knowledge will have to work very much harder to get it. One of the chief things a youth should obtain while he is a youth is to know *how to study*; and the classes carried on here, together with the admirable text-books of the present day, will materially help you in this matter, if you get into the way of taking systematic notes and, above all, of *thinking* over the subject of your studies during the day; this can be done at odd times very well without at all interfering with your usual occupation or incurring your master's censure that you are neglecting his affairs in the prosecution of your own. There is no doubt that in the future there will be a much larger demand for scientific knowledge, and those of you who desire to make a position in the world will do well to cultivate it. Chemistry and physics are especially serviceable, since they can be turned to account in almost any occupation that you may be called upon to follow. As a nation we begin to feel the want of scientific knowledge among the lower and middle classes, and foreigners are outstripping us in this respect very distinctly. The other day Dr. Lyon Playfair, formerly Professor of Chemistry in Edinburgh University, delivered an address at the opening of the New Yorkshire College of Science."

[Here followed some extracts from Dr. Playfair's speech, relative to the energy displayed by foreigners in the scientific training of their workmen, etc.]

Mr. Sutton then continued:—"Most of the foregoing remarks apply to study in general, but they apply also with equal force to our own special department—Pharmacy. Depend on it that any young man who determines to know his business thoroughly is sure to succeed, and will stand out head and shoulders above those who are merely content to get a smattering of things in general—just sufficient to enable them to squeeze through their examinations, 'saved as if by fire.' The day is fast coming when we shall see pharmacy standing in a higher position than it has done. There are fewer coming into the occupation, and the numbers of competitors for a living on a given space of ground are lessening. I hope the day may speedily come when we may find fewer establishments, but such as there are *really good*; when each place has a working laboratory with efficient apparatus, and where real practical work can be done, rather than, as is often the case now, all the important preparations purchased of a wholesale manufacturer, so that the occupation of a pharmaceutical chemist is more that of a huckster than of a scientific man. I cannot help contrasting our own condition in this respect with that of pharmacists on the continent; the state of efficiency common to their largest and best establishments is carried out equally well on a smaller scale even in villages. Last year in travelling through Sweden, I met accidentally in the train a village apothecary (*apotheker* as they are there called, and their position corresponding to our pharmaceutical chemist). We got into conversation together as well as we could and I found him a man of considerable intelligence; he did not know English but he could speak fairly well French and German, and was evidently well up in Latin. He told me that though living in an out of the way country place he had a complete set of working apparatus and manufactured all his important galenical preparations, distilled all the waters required, and that to add to his income he collected or grew aniseed and carraway, and distilled the oils largely for the wholesale market. I have witnessed the same completeness in pharmacies in Germany, Austria, Switzerland, Russia, Finland, and Denmark; each establishment, whether small or large, has its proper set of steam apparatus, stills, retorts, evaporating pans, and so on, so that real practical work is carried on, much to the advantage and progress of true pharmaceutical science. Although we have in England none of the same protection from Government such as is common on the continent in the case of pharmaceutical business, I see no reason why we should not imitate the establishments themselves in carrying on efficient work. It may happen sometimes that young men make mistakes in choosing their path in business life, or their friends make a mistake for them. There is perhaps no occupation which more needs a thorough love for it than chemistry, whether pure or pharmaceutical, and a young man who has no heart in it cannot expect to make it the source of a happy and profitable livelihood. If such an one finds this to be the case early in his life, he had better give it up and take to something more congenial to his taste. I remember hearing of an amusing instance of this kind which occurred in the very building which I now occupy as a place of business in this city. Many years ago the premises were occupied by a man well-known in his time, Mr. Paul Squires, and he had for his apprentice a young man named Henry Bright, from Saxmundham in Suffolk; the young fellow found out after a little time that he did not like the life of a chemist and druggist, but at every spare moment, and when he was out of the range of his master's eye, he fell to sketching, leaving the marks of his genius upon any available piece of paper or blank wall he could find. His old master told me himself that he noticed the boy had no interest in the occupations of the place, and one day, as he (the master) was standing at a high back window, he looked down and saw young Bright very busy with his pencil at the laboratory window; slipping downstairs quietly he came behind the young fellow and looked over his shoulder, and there he saw a caricature portrait of himself, and being a hasty-tempered old gentleman he gave him a cuff of the head for wasting his time, and packed him off there and then to follow his genius. It was a good thing for the boy he did, for he afterwards became the celebrated painter of mountain scenery—Henry Bright—whose pictures are admirable productions and will now fetch large sums of money. I have no doubt some of you will think that my advocacy of hard study would leave you little time for recreation or enjoyment, but I assure you that is not my intention; I would have you be equally thorough in play as you are in work, for then you can enjoy both in their proper turn; amuse yourselves by all means at proper times, and in a legitimate way, and in my experience I know of no set of men who enjoy a laugh or a bit of fun more than some of our most prominent scientific men. Many a time, I have no doubt, you have pored over the dry stuff in Bentley or Attfield, or have groaned over the thought of meeting those horrid examiners at Bloomsbury Square; but if you could peep in upon them of an evening when a few of them may meet in a social way and have a chat you would think them more like a lot of noisy children than sedate and proper men of science. This is as it should be, and I hope in the spirit of my motto you will, all through your lives, continue both to work and to laugh thoroughly."

Mr. Corder, in proposing the thanks of the meeting to Mr. Sutton for his kindness in giving the opening address, and for the excellent advice it contained, remarked that whilst travelling abroad with a friend who was also a pharmacist, during the past summer, in Switzerland, he had noticed with pleasure the state of pharmacy there; they were especially attracted by a pharmacist's establishment at Montreux, a small town of about 2000 inhabitants on the Lake of Geneva. The establishment was fitted with every convenience, and the assistant—who, by the way, was an apothecary as well as pharmacist—took great pleasure in showing them the laboratory, fitted up with excellent apparatus by Wolfe and Son, of Vienna. He had just been distilling a quantity of aqua lauro-cerasi, and what was much to the purpose (although he had passed higher examinations than the English Major) was not afraid of work, as the turned-up shirt sleeves and general appearance proved.

Twenty-three students were present, and paid marked attention to the address, according Mr. Sutton a hearty vote of thanks at its conclusion.

THE LEEDS CHEMISTS' ASSOCIATION.

The thirteenth annual meeting of the Leeds Chemists' Association was held in the library, on the evening of Wednesday, October 13th; the President, Mr. F. Reynolds in the chair. The minutes of the last meeting of the present session having been read; Mr. Maude was elected a member, and Mr. S. N. Tredwell and Mr. George Owen, associates.

The Secretary then read the annual report. It stated that the feeling existing amongst the members during the year had been decidedly cordial and fraternal; the attendance at the evening meetings somewhat better than of late years; the library had been freely used for reference; and the number of students attending the classes on Chemistry and Botany moderately good. Still, it was much to be regretted that in a town like Leeds, where the chemists numbered nearly one hundred and fifty, the Association did not receive a much larger amount of support, and that its numbers were not very much greater. Its present numbers were forty members, and forty-six associates, showing an increase of one member, and a decrease of ten associates as compared with the previous year. During the year the Committee had expended upon new books and periodicals for the library, the sum of £5 10s. 4d., a large portion of which had been taken up in replacing missing volumes and periodicals. Notwithstanding this extra drain upon their resources, and the falling off in subscriptions, the expenditure of the Association during the year had been kept within its income, leaving a few shillings in the hands of the secretary in its favour. During the previous session there had been held eleven general meetings; the first of which was occupied by the annual business of the Association; the second by a tea and social gathering of the whole trade; and the remaining nine by papers on scientific subjects connected with the art of the chemist, several of which were read by men ranking high in the walks of science, and were of a very superior character. Classes in Chemistry and Botany had been provided for the associates under teachers connected with the Science and Art Department, South Kensington. Twelve attended the one on chemistry, eleven of whom succeeded in obtaining first or second-class certificates, and one a Queen's bronze medal; and eighteen attended the one on botany, five of whom obtained second-class certificates. On taking a general view of the position of the Association, the Committee were satisfied with the soundness of its condition and sanguine of its ultimately occupying a much higher position in its own town and amongst its kindred societies throughout the country.

The report having been adopted, the election of officers and committee for the ensuing year took place, the voting being as usual by ballot, Messrs. Abbott and Elison acting as scrutineers. The result showed that the following gentlemen had been elected:—President, Mr. Edwin Yewdall; Vice-President, Mr. Peter Jefferson: Treasurer, Mr. John Land; Secretary, Mr. Samuel Taylor; Librarian, Mr. E. O. Brown; Curator, Mr. E. S. Payne; Committee, Messrs. Edward Brown, Freshfield, Reynolds, J. W. Longley, Joseph Budle, John Hellowell, and Whitwell Manfield.

The new President having taken the vacated chair, expressed his gratification at the honour conferred upon him, and proposed a vote of thanks to the retiring officers.

Mr. Iredale seconded the proposition, which was carried by acclamation and responded to by the late President, on behalf of himself and brother officers.

On the motion of Mr. Abbott, seconded by Mr. Longley, the best thanks of the Association were then presented to the Council of the Pharmaceutical Society for the grant of £25 for general educational purposes, just received, and for the unanimity with which it had been voted.

On the motion of Mr. F. Reynolds, seconded by Mr. Ellison, the thanks of the Association were also given to the Pharmaceutical Society for the gift of the Journal during the past year, and to the Pharmaceutical Conference, for the 'Year-Book of Pharmacy.'

Mr. Yewdall then in a short paper introduced for discussion the new "Sale of Food and Drugs Act." A short discussion ensued, but the hour being somewhat late, it was adjourned to a future meeting; after which a report of both meetings will be given.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual meeting of this Association was held on Friday, the 17th ult., the President, Mr. Fitzhugh, F.C.S., in the chair. After a few introductory remarks by the President, the Hon. Secretary, Mr. Williams, read the annual Report of the Council. The Treasurer's Report was presented and showed a balance in hand of £13 8s. 9d. Both reports were agreed to and passed.

A long discussion then took place as to the best means to be adopted for increasing the number of associates, and various suggestions were made, but it was ultimately decided to leave the matter in the hands of the incoming Council. A hearty vote of thanks was given to Mr. Fitzhugh for his services as President, and that gentleman suitably responded. Similar votes were also passed to the other officers of the Association.

The following gentlemen were elected officers for the ensuing year:—President, Mr. J. H. Atherton, F.C.S.; Vice-President, Mr. R. Fitzhugh; Treasurer, Mr. Rayner (re-elected); Hon. Secretary, Mr. Roberts Jackson; Council, Messrs. Bolton, T. B. Fletcher, Lewis, Lomas, W. Smith, White, Williams and Wilford.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS' ASSOCIATION.

An Association, called by the above name, has been formed at Newcastle-on-Tyne. The following were elected as officers:—President, Mr. A. Brady; Vice-President, Mr. G. E. Boulton; Secretary, Mr. Hugh Williams; Treasurer, Mr. A. M. Hughes; Committee, Messrs. Fox, R. M. Hay, H. G. Hay, Davies, Parkin, and Welch. The business was formally opened on Monday October 18, when the President read his address. He began by exposing the system of cram, and adduced as a proof of the fallacy of that system the many failures in the Minor examination. He was glad for the honour of pharmacy that the idea entertained by many young men that a month or two of study would suffice to pass the examinations was negatived, the said failures being plain evidence that any such supposition was entirely groundless. He therefore enforced upon the students the necessity of study, and to go through a regular and legitimate course of study, which alone could insure success, not only in passing the examinations, but also in making good pharmacists, and enabling them to show a good face in whatever sphere they might be placed. Mr. Brady then gave a very interesting account of the development of chemistry from its infancy upwards, commencing with that particular phase of human error which, beginning in the search for the philosopher's stone, formed the foundation of so important a division of science as that we now call chemistry, he dilated largely upon the devoted pursuit of the alchemist, the patient struggle with constant disappointments, etc. Contrasting chemistry with alchemy, he said that it was a problem still amongst chemists, the transmutation of metals, but one which is no longer pursued with a view to the mere production of gold from dross, but in that larger, wider, grander spirit, in which the addition to the knowledge of facts, and the pursuit of truth becomes a sufficient end for long and arduous labour. Mr. A. Brady concluded his address by mentioning the researches of the late Master of the Mint, as a fine example of the alchemy of modern times, viz., the demonstration of the distinctly metallic properties of hydrogen, as having nothing to recommend it save its bearing on scientific truth, yet nothing that was done by the alchemist or astrologer could vie in glory with this discovery.

Mr. Boulton moved a vote of thanks for the interesting address, which was seconded by Mr. Ferrard. Mr. Brady briefly acknowledged the same, when the meeting terminated.

Classes will be held on the several subjects required by the Pharmaceutical Society :—Botany and Materia Medica, Mr. A. Brady ; Chemistry and Pharmacy, Mr. Mayfield ; Latin, Mr. Waterhouse.

Proceedings of Scientific Societies.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Relations of Physics and Chemistry.

BY PROFESSOR BALFOUR STEWART, M.A., LL.D., F.R.S.*

(*Concluded from page* 318.)

A third question is of geological interest. It has been asked whether a study of the solar atmosphere may not throw some light upon the peculiar constitution of the upper strata of the earth's surface, which are known to be of less density than the average interior of our planet.

If we have learned to be independent of total eclipses as far as the lower portions of the solar atmosphere are concerned, it must be confessed that as yet the upper portions—the outworks of the sun—can only be successfully approached on these rare and precious occasions. Thanks to the various government expeditions despatched by Great Britain, by the United States, and by several Continental nations—thanks, also, to the exertions of Lord Lindsay and other astronomers—we are in the possession of definite information regarding the solar corona.

In the first place, we are now absolutely certain that a large part of this appendage unmistakeably belongs to our luminary, and in the next place, we know that it consists, in part at least, of an ignited gas giving a peculiar spectrum, which we have not yet been able to identify with that of any known element.

The temptation is great to associate this spectrum with the presence of something lighter than hydrogen, of the nature of which we are yet totally ignorant.

A peculiar physical structure of the corona has likewise been suspected. On the whole, we may say that this is the least known, while it is perhaps the most interesting, region of solar research; most assuredly it is well worthy of further investigation.

If we now turn our attention to matters nearer home, we find that there is a difficulty in grasping the facts of terrestrial meteorology no less formidable than that which assails us when we investigate solar outbreaks. The latter perplex us because the sun is so far away, and because also his conditions are so diffierent from those with which we are familiar ; while on the other hand, the former perplex us because we are so intimately mixed up with them in our daily lives and actions ; because, in fact, the scale is so large and we are so near. The result has been that until quite recently our meteorological operations have been conducted by a band of isolated volunteers, individually capable and skilful, but from their very isolation incapable of combining together with advantage to prosecute a scientific campaign. Of late, however, we have begun to perceive that if we are to make any advance in this very interesting and practical subject, a different method must be pursued, and we have already reaped the first fruits of a more enlightened policy; already we have gained some knowledge of the constitution and habits of our atmosphere.

The researches of Wells and Tyndall have thrown much light on the cause of dew. Humboldt, Dove, Buys Ballot, Jelinek, Quetelet, Hansteen, Kupffer, Forbes, Welsh, Glaisher, and others have done much to give us an accurate knowledge of the distribution of terrestrial temperature.

Great attention has likewise been given to the rainfall of Great Britain and Ireland, chiefly through the exertions of one individual, Mr. G. J. Symons.

To Dove we are indebted for the law of rotation of the wind, to Redfield for the spiral theory of cyclones, to Francis Galton for the theory of anti-cyclones, to Buchan for an investigation into the disposition of atmospheric pressure which precedes peculiar types of weather, to Stephenson for the conception of barometric gradients, to Scott and Meldrum for an acquaintance with the disposition of winds which frequently precedes violent outbreaks ; and to come to the practical application of laws, we are much indebted to the late Admiral Fitzroy and the system which he greatly helped to establish for our telegraphic warnings of coming storms.

Again, the meteorology of the ocean has not been forgotten. The well-known name of Maury will occur to every one as that of a pioneer in this branch of inquiry. Fitzroy, Leverrier, Meldrum, Toynbee, and others have likewise done much ; and it is understood that the meteorological offices of this and other maritime countries are now busily engaged upon this important and practical subject. Finally, the movements of the ocean and the temperatures of the oceanic depths have recently been examined with very great success in vessels despatched by Her Majesty's Government ; and Dr. Carpenter has by this means been able to throw great light upon the convection-currents exhibited by that vast body of water which girdles our globe.

It would be out of place to enter here more minutely into this large subject, and already it may be asked what connection has all this with that part of the address that went before it.

There are, however, strong grounds for supposing that the meteorology of the sun and that of the earth are intimately connected together. Mr. Broun has shown the existence of a meteorological period connected apparently with the sun's rotation, five successive years' observations of the barometer at Singapore all giving the period 25·74 days. Mr. Baxendall, of Manchester, was, I believe, the first to show that the convection-currents of the earth appear to be connected somehow with the state of the sun's surface as regards spots; and still more recently Mr. Meldrum of the Mauritius observatory, has shown, by a laborious compilation of ship's logs and by utilizing the meteorological records of the island, that the cyclones in the Indian Ocean are most frequent in years when there are most sun-spots. He likewise affords us grounds for supposing that the rainfall, at least in the tropics, is greatest in years of maximum solar disturbance.

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* Presidential Address delivered before the Mathematical and Physical Section of the British Association, August 25, 1875.

M. Poey has found a similar connection in the case of the West Indian hurricanes; and finally, Piazzi Smyth, Stone, Köppen, and, still more recently, Blanford, have been able to bring to light a cycle of terrestrial temperature having apparent reference to the condition of the sun.

Thus we have strong matter-of-fact grounds for presuming a connection between the meteorology of our luminary and that of our planet, even although we are in complete ignorance as to the exact nature of this bond.

If we now turn to terrestrial magnetism the same connection becomes apparent.

Sir Edward Sabine was the first to show that the disturbances of the magnetism of the earth are most violent during years of maximum sun-spots. Mr. Broun has shown that there is likewise a reference in magnetic phenomena to the period of the sun's rotation about his axis, an observation recently confirmed by Hornstein; and still more recently Mr. Broun has shown that the moon has an action upon the earth's magnetism, which is not altogether of a tidal nature, but depends, in part at least, upon the relative position of the sun and moon.

I must trust to your forbearance if I now venture to bring forward considerations of a somewhat speculative nature.

We are all familiar with the generalization of Hadley; that is to say, we know there are under currents sweeping along the surface of the earth from the poles to the equator, and upper currents sweeping back from the equator to the poles. We are likewise aware that these currents are caused by the unequal temperature of the earth; they are in truth convection-currents, and their course is determined by the positions of the hottest and coldest parts of the earth's surface. We may expect them, therefore, to have a reference not so much to the geographical equator and poles as to the hottest and coldest regions. In fact we know that the equatorial regions into which the trade-winds rush and from which the anti-trades take their origin, have a certain annual oscillation depending upon the position of the sun, or, in other words, upon the season of the year. We may likewise imagine that the region into which the upper currents pour themselves is not the geographical pole, but the pole of greatest cold.

In the next place we may imagine that these currents, as far as regards a particular place, have a daily oscillation. This has, I believe, been proved as regards the lower currents or trade-winds, which are more powerful during the day than during the night, and we may therefore expect it to hold good with regard to the upper currents or anti-trades; in fact, we cannot go wrong in supposing that they also, as regards any particular place, exhibit a daily variation in the intensity with which they blow.

Again, we are aware that the earth is a magnet. Let us not now concern ourselves about the origin of its magnetism, but rather let us take it as it is. We must next bear in mind that rarefied air is a good conductor of electricity; indeed, according to recent experiments, an extremely good conductor. The return trades that pass above from the hotter equatorial regions to the poles of cold, consisting of moist rarefied air, are therefore to be regarded in the light of good conductors crossing lines of magnetic force; we may therefore expect them to be the vehicle of electric currents. Such electric currents will of course react on the magnetism of the earth. Now, since the velocity of these upper currents has a daily variation, their influence as exhibited at any place upon the magnetism of the earth may be expected to have a daily variation also.

The question thus arises, Have we possibly here a cause which may account for the well-known daily magnetic variation? Are the peculiarities of this variation such as to correspond to those which might be expected to belong to such electric currents? I think it may be said that, as far as we can judge, there is a likeness of this kind between the peculiarities of these two things; but a more prolonged scrutiny will of course be essential before we can be absolutely certain that such currents are fitted to produce the daily variation of the earth's magnetism.

Besides the daily and yearly periodic changes in these upper convection-currents, we should also expect occasional and abrupt changes forming the counterparts of those disturbances in the lower strata with which we are familiar. And these may be expected in like manner to produce non-periodic occasional disturbances of the magnetism of the earth. Now it is well known that such disturbances do occur, and further that they are most frequent in those years when cyclones are most frequent, that is to say, in years of maximum sun-spots. In one word, it appears to be a tenable hypothesis to attribute at least the most prominent magnetic changes to atmospheric motions taking place in the upper regions of the atmosphere where each moving stratum of air becomes a conductor moving across lines of magnetic force; and it was Sir William Thomson, I believe, who first suggested that the motion of conductors across the lines of the earth's magnetic force must be taken into account in any attempted explanation of terrestrial magnetism.

It thus seems possible that the excessive magnetic disturbances which take place in years of maximum sun-spots may not be directly caused by any solar action, but may rather be due to the excessive meteorological disturbances which are likewise characteristic of such years; on the other hand, that magnetic and meteorological influence which Mr. Broun has found to be connected with the sun's rotation points to some unknown direct effect produced by our luminary, even if we imagine that the magnetic part of it is caused by the meteorological. Mr. Broun is of opinion that this effect of the sun does not depend upon the amount of spots on his surface.

In the next place, that influence of the sun in virtue of which we have most cyclones and greater meteorological disturbance in the years of maximum spots, cannot, I think (as far as we know at present), be attributed to a change in the heating power of the sun. We have no doubt traces of a temperature effect which appears to depend upon the sun-period; but its amount is very small, whereas the variation in cyclonic disturbance is very great. We are thus tempted to associate this cyclone-producing influence of the sun with something different from his light and heat. As far, therefore, as we can judge, our luminary would appear to produce three distinct effects upon our globe. In the first place, a magnetic and meteorological effect, depending somehow upon his rotation; secondly, a cyclonic effect, depending somehow upon the disturbed state of his surface; and lastly, the well-known light-and-heat effect with which we all are familiar.

If we now turn to the sun, we find that there are three distinct forms of motion which animate his surface-particles. In the first place, each particle is carried round by the rotation of our luminary; secondly, each particle is influenced by the gigantic meteorological disturbances of the surface, in virtue of which it may acquire a velocity ranging as high as 130 or 140 miles a second; and lastly, each particle, on account of its high temperature, is vibrating with extreme rapidity, and the energy of these vibrations communicated to us by means of the ethereal medium produces the well-known light-and-heat effect of the sun.

Now, is it philosophical to suppose that it is only the last of these three motions that influences our earth, while the other two produce absolutely no effect? On the contrary, we are, I think, compelled by considerations connected with the theory of energy, to attribute an influence, whether great or small, to the first two as well as to the last.

We are thus led to suppose that the sun must influence the earth in three ways, one depending on his rotation, another on his meteorological disturbance, and a third by means of the vibrations of his surface-particles.

But we have already seen that, as a matter of fact, the sun does appear to influence the earth in three distinct ways—one magnetically and meteorologically, depending apparently on his period of rotation; a second cyclonically, depending apparently on the meteorological conditions of his surface; and a third by means of his light and heat.

Is this merely a coincidence, or has it a meaning of its own? We cannot tell; but I may venture to think that in the pursuit of this problem we ought to be prepared at least to admit the possibility of a threefold influence of the sun.

Even from this very meagre sketch of one of the most interesting and important of physical problems, it cannot fail to appear that while a good deal has already been done, its progress in the future will very greatly depend on the completeness of the method and continuity of the observations by which it is pursued. We have here a field which is of importance not merely to one, or even to two, but almost to every conceivable branch of research.

Why should we not erect in it a sort of science-exchange into which the physicist, the chemist, and the geologist may each carry the fruits of his research, receiving back in return some suggestion, some principle, or some other scientific commodity that will aid him in his own field?

But to establish such a mart must be a national undertaking, and already several nations have acknowledged their obligations in this respect.

Already the German Government have established a Sonnenwarte, the mere building and equipment of which is to cost a large sum. With an appreciation of what the spectroscope has done for this inquiry, the first directorship was offered to Kirchoff, and on his declining it, Herr Vogel has been placed in charge. In France also a physical observatory is to be erected at Fontenay, on an equal, if not greater scale, of which Janssen has already accepted the directorship; while in Italy there are at least three observatories exclusively devoted to this branch of research.

Nor must we forget that in this country the new observatory at Oxford has been so arranged that it can be employed in such inquiries. But what has England as a nation done?

Some years since, at the Norwich meeting of this Association, a movement was set on foot by Colonel Strange which resulted in the appointment of a Royal Commission on the advancement of science, with the Duke of Devonshire as chairman. This commission have quite recently reported on the steps that ought in their opinion to be taken for the advancement of scientific research.

One of their recommendations is expressed in the following words:—

"Important classes of phenomena relating to physical meteorology and to terrestrial and astronomical physics require observations of such a character that they cannot be advantageously carried on otherwise than under the direction of Government. Institutions for the study of such phenomena should be maintained by the Government; and in particular an observatory should be founded specially devoted to astronomical physics."

If the men of science of this country who procured the appointment of this commission, and who subsequently gave evidence before it will now come forward to support its recommendations, it can hardly be doubted that these will be speedily carried into effect.

But other things besides observations are necessary if we are to pursue with advantage this great physical problem.

One of these is the removal of the intolerable burden that has hitherto been laid upon private meteorologists and magneticians. Expected to furnish their tale of bricks, they have been left to find their own straw. Nothing more wretched can be imagined than the position of an amateur (that is to say, a man who pursues science for the love of it and is unconnected with any establishment) who has set himself to promote observational inquiries, whether in meteorology or magnetism.

He has first to obtain with great expenditure of time or money, or both, copies of the individual observations taken at some recognized institution. He has next to reduce these in the way that suits his inquiry, an operation again consuming time and demanding means. Let us suppose all this to be successfully accomplished, and a valuable result obtained. It is doubtless embodied in the Transactions of some Society, but it excites little enthusiasm; for it consists of something which cannot be repeated by every one for himself like a new and interesting experiment. Yet the position of such men has recently been improved. Several observatories and other institutions now publish their individual observations; this is done by our Meteorological Office, while Dr. Bergsma, Dr. Neumayer, and Mr. Broun are recent examples of magneticians who have adopted this plan. The publication of the work of the latter is due to the enlightened patronage of the Rajah of Travancore, who has thus placed himself in front of the princes of India and given them an example which it is to be hoped they will follow. But this is only one step in the right direction; another must consist in subsidizing private meteorologists and magneticians in order to enable them to obtain the aid of computers in reducing the observations with which they have been furnished. The man of science would thus be able to devote his knowledge, derived from long study, to the methods by which results, and the laws regulating them, are to be obtained; he could be the architect and builder of a scientific structure without being forced to waste his energies on the work of a hodman.

Another hindrance consists in our deficient knowledge as to what observations of value in magnetism and meteorology have already been made. We ought to have an exhaustive catalogue of all that has been done in this respect in our globe, and of the conditions under which the various observations will be accessible to outside inquirers. A catalogue of this kind has been framed by a committee of this Association, but it is confined to the dominions of England, and requires to be supplemented by a list of that which has been done abroad.

A third drawback is the insufficient nature of the present facilities for the invention and improvement of instruments, and for their verification.

We have no doubt advanced greatly in the construction of instruments, especially in those which are self-recording. The names of Brooke, Robinson, Welsh, Osler, and Beckley will occur to us all as improvers of our instruments of observation. Sir W. Thomson has likewise adapted his electrometer to the wants of meteorology. Dr. Roscoe has given us a self-recording actinometer; but a good instrument for observing the sun's heat is still a desideratum. It ought likewise to be borne in mind that the standard mercurial thermometer is by no means a perfect instrument.

In conclusion, it cannot be doubted that a great generalization is looming in the distance—a mighty law, we cannot tell what, that will reach us, we cannot yet say when. It will involve facts hitherto inexplicable, facts that are scarcely received as such because they appear opposed to our present knowledge of their causes. It is not possible, perhaps, to hasten the arrival of this generalization beyond a certain point; but we ought not to forget that we *can* hasten it, and that it is our duty to do so. It depends much on ourselves, our resolution, our earnestness, on the scientific policy we adopt, as well as on the power we may have to devote ourselves to special investigations, whether such an advent shall be realized in our day and generation, or whether it shall be indefinitely postponed. If Governments would understand the ultimate *material* advantages of every step forward in science, however inapplicable each may appear for the moment to the wants or pleasures of ordinary life, they would find reasons, patent to the meanest capacities, for bringing the wealth of mind, now lost on the drudgery of common labours, to bear on the search for those wondrous laws which govern every movement, not only of the mighty masses of our system, but of every atom distributed throughout space.

SOCIAL SCIENCE CONGRESS.

Address on Health.

BY BENJAMIN W. RICHARDSON, M.D., F.R.S.

We meet in this assembly, a voluntary parliament of men and women, to study together and to exchange knowledge and thought on works of every-day life and usefulness. Our object, to make the present existence better and happier; to inquire, in this particular section of our Congress—What are the conditions which lead to the pain and penalty of disease; what the means for the removal of those conditions when they are discovered? What are the most ready and convincing methods of making known to the uninformed the facts: that many of the conditions are under our control; that neither mental serenity nor mental development can exist with an unhealthy animal organization; that poverty is the shadow of disease, and wealth the shadow of health?

These objects relate to ourselves, to our own reliefs from suffering, to our own happiness, to our own riches. We have, I trust and believe, yet another object, one that relates not to ourselves, but to those who have yet to be; those to whom we may become known, but whom we can never know, who are ourselves, unseen to ourselves, continuing our mission.

We are privileged more than any who have as yet lived on this planet, in being able to foresee, and in some measure estimate, the results of our wealth of labour as it may be possibly extended over and through the unborn. A few scholars of the past, like him who, writing to the close of his mortal day, sang himself to his immortal rest with the "*Gloria in excelsis*;" a few scholars might foresee, even as that Bæda did, that their living actual work was but the beginning of their triumphant course through the ages—the momentum. But the masses of the nations, crude and selfish, have had no such prescience, no such intent. "Let us eat and drink, for to-morrow we die." That has been the pass, if not the password, with them and theirs.

We, scholars of modern thought, have the broader, and therefore more solemn and obligatory knowledge, that however many to-morrows may come, and whatever fate they may bring, we never die; that, strictly speaking, no one yet who has lived has ever died; that for good or for evil our every change from potentiality into motion is carried on beyond our own apparent transitoriness; that we are the waves of the ocean of life, communicating motion to the expanse before us, and leaving the history we have made on the shore behind.

Thus we are led to feel this greater object—that to whatever extent we, by our exertions, confer benefits on those who live, we extend the advantage to those who have to live; that one good thought leading to practical useful action from one man or woman, may go to the virtue of thousands of generations; that one breath of health wafted by our breath may, in the aggregate of life saved by it, represent in its ultimate effect all the life that now is or has been.

At the close of a parliamentary session, an uneventful leader of a section of Parliament banters his more eventful rival, and enlivening his criticism by a sneer at our Congress, challenges the contempt of his rival, as if to draw it forth in the same critical direction. Alas! it is too true that great congresses, like great men, and even like parliaments, do live sometimes for many years and talk much, and seem to miss much and advance little; so that in what relates to the mere present, it were wrong, possibly, to challenge the sally of the statesman, who, from his helpless height, looked down on our weakness. But inasmuch as no man knoweth the end of the spoken word, as that which is spoken to-day, earnestly and simply, may not reappear for years, and may then appear with force and quality of hidden virtue, there is reason for our uniting together beyond the proof of necessity which is given in the fact of our existence. Perchance some day our natural learning, gathered in our varied walks of life, and submitted in open council, may survive even parliamentary strife; perchance our resolutions, though no sign-manual immediately grace them, are the informal Bills which Ministers and Oppositions shall one day discuss, Parliaments pass, royal hands sign, and the fixed administrators of the will of the nation duly administer.

These thoughts on the future, rather than on the passing influence of our congressional work, have led me to the simple design of the address which, as President of this Section, I venture to submit to you to-day. It is my object to put forward a theoretical outline of a community so circumstanced and so maintained by the exercise of its own freewill, guided by scientific knowledge, that in it the perfection of sanitary results will be approached, if not actually realized, in the co-existence of the lowest possible general mortality with the highest possible individual longevity. I shall try to show a working community in which death—if I may apply so common and expressive a phrase on so solemn a subject—in which death is kept as nearly as possible in its proper or natural place in the scheme of life.

Health and Civilization.—Before I proceed to this task, it is right I should ask of the past what hope there is of any such advancement of human progress. For as my Lord of Verulam quaintly teaches, "the past ever deserves that men should stand upon it for awhile to see which way they should go, but when they have made up their minds they should hesitate no longer, but proceed with cheerfulness." For a moment, then, we will stand on the past.

From this vantage-ground we gather the fact, that onward with the simple progress of true civilization the value of life has increased. Ere yet the words "sanitary science" had been written: ere yet the heralds of that science, some of whom, in the persons of our illustrious colleagues Edwin Chadwick and William Farr, are with us in this place at this moment; ere yet these heralds had summoned the world to answer for its profligacy of life, the health and strength of mankind were undergoing improvement. One or two striking facts must be sufficient in the brief space at my disposal to demonstrate this truth. In England, from 1790 to 1810, Heberden calculated that the general mortality diminished one-fourth. In France, during the same period, the same favourable returns were made. The deaths in France, Berard calculated, were 1 in 30 in the year 1780, and during the eight years, from 1817 to 1828, 1 in 40, or a fourth less. In 1780, out of 100 new-born infants, in France, 50 died in the two first years; in the later period, extending from the time of the census that was taken in 1817 to 1827, only 38 of the same age died—an augmentation of infant life equal to 25 per cent. In 1780 as many as 55 per cent. died before reaching the age of ten years; in the later period 43, or about a fifth less. In 1780 only 21 persons per cent. attained the age of fifty years; in the later period 32, or eleven more, reached that term. In 1780 but 15 persons per cent. arrived at sixty years; in the later period 24 arrived at that age.

Side by side with these facts of the statist we detect other facts which show that in the progress of civilization the actual organic strength and build of the man and woman increases. Just as in the highest developments of the fine arts the sculptor and painter place before us the finest imaginative types of strength, grace, and beauty; so the silent artist, civilization, approaches nearer and nearer to perfection, and by evolution of form and mind develops what is practically a new order of physical and mental build. Peron—who first used, if he did not invent, the little instrument, the dynamometer, or muscular strength measurer—subjected specimens of different stages of civilization to the test of his gauge, and discovered that the strength of the limbs of the natives of Van Diemen's Land and New Holland was as 50° of power, while that of the Frenchmen was 69°, and of the Englishmen 71°. The same order of facts is maintained in respect to the size of body. The stalwart Englishman of to-day can neither get into the armour nor be placed in the sarcophagus of those sons of men who were accounted the heroes of the infantile life of the human world.

We discover, moreover, from our view of the past, that the developments of tenacity of life and of vital power have been comparatively rapid in their course when they have once commenced. There is nothing discoverable to us that would lead to the conception of a human civilization extending back over two hundred generations; and when in these generations we survey the actual effect of civilization—so fragmentary, and overshadowed by persistent barbarism—in influencing disease and mortality, we are induced to the observation of at most twelve generations, including our own, engaged, indirectly or directly, in the work of sanitary progress. During this comparatively brief period, the labour of which until within a century, has had no systematic direction, the changes for good that have been effected are amongst the most startling of historical facts. Pestilences which decimated populations, and which, like the Great Plague of London, destroyed 7165 people in a single week, have lost their virulency; gaol fever has disappeared, and our gaols, once each a plague-spot, have become, by a strange perversion of civilization, the health-spots of, at least, one kingdom. The term "black death" is heard no more; and ague, from which the London physician once made a fortune, is now a rare tax even on the skill of the hard-worked union medical officer.

(*To be continued.*)

Review.

ON NOXIOUS AND OFFENSIVE TRADES AND MANUFACTURES, with especial reference to the best practicable means of abating the several Nuisances therefrom. By H. LETHEBY, M.B., M.A., &c. London: Statham and Co., Palsgrave Place, Strand, W.C. 1875.

Dr. Letheby read a paper before the Society of Medical Officers of Health, last January. This paper, which appeared at the time in *Public Health*, is now reprinted with additional matter in the form of a pamphlet. Dr. Letheby finds it convenient to classify the nuisances occasioned by the numerous noxious and offensive trades and manufactures, under three heads according to their individual peculiarities, thus:—

1st. Those which are caused by the escape of noxious or offensive effluvia, as gases and vapours.

2nd. Those which are produced by smoke, dust, or other mechanical impurities.

3rd. Those which are occasioned by the discharge of noxious or offensive matters into gutters, ditches, or water courses.

In this paper he confines his attention to the first of these, and trusts by and bye to be able to find time to deal with the nuisances which arise from the second and third causes.

The nuisances here enumerated are occasioned by sulphuretted hydrogen generated in the manufacture of sulphate of ammonia from gas liquor, etc.; by the products of the distillation of coal tar; by the melting of pitch and asphalte, for the production of materials suited for the making of asphalte pavements; by the clarification of oil for burning and other purposes; by the distillation of oils and fats for the production of stearic, margaric, palmitic, oleic, and other fatty acids; by oil boiling for making linoleum, printers' ink, etc.; by varnish making and resin distilling; by fat melting, bone boiling, tripe dressing, and the cooking of sheeps' heads, bullocks' cheeks, livers and feet; by manure making; by the roasting of coffee, chicory, and cocoa; and by a certain class of manufacturing operations, during which muriatic, sulphurous, and nitrous acid fumes are disengaged.

Dr. Letheby recommends the following measures for abating these nuisances:—

1st. That all noxious and offensive operations should be carried on, as far as possible, in air-tight chambers, which can be ventilated by means of flues, or by the chimney draft.

2nd. That all condensible and absorbable gases and vapours should be passed through condensers and absorbents best suited for their absorption, as water in spray, and scrubbers charged with water, oil of vitriol, or alkaline solutions.

3rd. That when necessary, these scrubbers should be supplemented with special purifiers, as hydrated oxide of iron, hydrate of lime, etc.

4th. That organic vapours and sulphuretted hydrogen and empyreumatic matters should be conveyed to the furnace fire and destroyed.

5th. That all offensive materials should be conveyed in properly constructed carts or tanks which can be closely covered.

Lastly. That the whole of the operations should always be managed with care and attention to details, there being no neglect of the sound condition of every part of the plant or working apparatus.

There is nothing very novel or ingenious in these suggestions, but that they are practical and common sense cannot be denied.

The young and inexperienced health officer would find much useful information in the pages of this little pamphlet

Obituary.

Notice has been received of the death of the following:—

On the 27th of September, 1875, Mr. Morris Banks, jun., Chemist and Druggist, of Birmingham, aged 39 years. Mr. Morris had been a Member of the Pharmaceutical Society since 1869.

On the 29th of September, 1875, Mr. Charles Anderson, Pharmaceutical Chemist, of Lower Belgrave Street, S.W. aged 61 years. Mr. Anderson had been a Member of the Pharmaceutical Society since 1842.

On the 1st of October, 1875, Mr. Thomas Vose, Pharmaceutical Chemist, of Liverpool, aged 57 years. Mr. Vose had been a Member of the Pharmaceutical Society since 1853.

On the 2nd of October, 1875, Mr. William Henry Middleton, Chemist and Druggist, of Bradford, Yorkshire, aged 41 years.

On the 4th of October, Mr. William Whirledge Cooper, Chemist and Druggist, of Stoke Newington, aged 35 years. Mr. Cooper had been an Associate of the Pharmaceutical Society since 1869.

On the 6th of October, 1875, Mr. James Knight, Pharmaceutical Chemist, of New Park Road, Brixton Hill, aged 71 years. Mr. Knight had been a Member of the Pharmaceutical Society since 1853.

On the 16th of October, 1875, Mr. Thomas Foster, Chemist and Druggist, of Evesham, Worcestershire, aged 69 years.

On the 17th of October, 1875, Mr. John Kellett, Chemist and Druggist, of Hulme, Manchester, aged 43 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PHARMACEUTICAL LABORATORY.

Sir,—I have often wished that access could be had to a collection of pharmaceutical apparatus and appliances, such as it appears to me Mr. Schacht has very judiciously advocated as an addition to the establishment at Bloomsbury Square.

I admit that we could not teach practical pharmacy to the visitors to the establishment without practical operations were conducted; but that is not a sufficient reason why the establishment of a laboratory should not be undertaken—a dummy laboratory if you like, having furnaces without fire and stills without steam.

The Society would not teach its members much by such a possession, but its members might learn a great deal from it.

At sundry times when I have visited our materia medica museum I have been struck with the smallness of the knowledge I had gained by the visit. I do not think that would have been the case had I walked through a collection of apparatus requisite for the performance of the pharmacopœial processes.

The pharmacist who struggles through official processes with crude or antiquated appliances is in a condition in which he very readily gives vitality to the spores of information which would fill the atmosphere of a technical museum of pharmacy—the empty furnaces would be fired by his enthusiasm, and the stills would be supplied with "the vapour of his wild imaginings."

Mr. Williams thinks that pupils learn practical pharmacy behind the counter, the natural reply to which observation is that they don't; and, besides that, it is not the pupils but the members who might be expected to benefit by the proposed collection—men like Mr. Schacht, in their desire for a knowledge of the manufacturer's tools, but unlike him in not having access to any laboratory where they may present their cards.

The proposed collection of apparatus in working order might easily and advantageously be put to occasional use by senior students operating on such a scale as the practical pharmacist of the provinces might probably require, and thus establish the data regarding cost of fuel and amount of production which the visitors to the laboratory would be glad to get from the curator.

The want of space seems to me the one reasonable objection to the experiment, for though it costs less to build two furnaces than to keep one in fuel, the cost of accommodating a satisfactory collection might amount to a considerable item for rent.

I think Mr. Schacht will do a good turn to the Society's country cousins by keeping the matter in view and promoting its development whenever opportunity offers.

BARNARD PROCTOR.

Grey Street, Newcastle,
October 14, 1875.

Sir,—The suggestion made by Mr. Schacht to establish a Pharmaceutical Laboratory Museum at Bloomsbury Square, has, I believe, been wisely set aside by the Council. However desirable such a proposal may appear in theory, I feel convinced that practically it would prove useless and cumbersome.

Not unnecessarily to occupy your valuable space, I would ask you to consider two points in respect thereto, namely, Is it desirable? and Is it practicable?

To be desirable, there must of necessity be a demand for such a museum. Does this demand exist? I trow not. In the first place, in how many retail establishments do we find laboratories, worthy of the name, existing? I think I might safely say not one per cent., for the simple reason that pharmacists as a rule, have neither time nor do they find it profitable to engage in the preparation of chemicals, etc., requiring elaborate apparatus and constant attendance, while there exist so many manufacturers whose preparations can be thoroughly depended on, and supplied at prices far below those at which any private maker could hope to produce them. In the second place, where such laboratories do exist or are desired, Mr. Schacht himself gives us the real source of the needed information, namely, "privately by the kindness of individuals." I apprehend that any gentleman, wishing to erect a fully equipped laboratory, would find but little difficulty, through the courtesy of some friend, in obtaining access to establishments where he could see every needed appliance of the most modern construction in actual working order, and obtain all the information he might require from those directly engaged in their use, as to the mode of working, the cost, the amount of produce, and so forth, infinitely more accurate and satisfactory than any he could hope to obtain from the most obliging curator, whose information would of necessity to a great extent emanate from the manufacturer rather than the user of the apparatus.

Is it practicable? To answer this query I would simply ask those who consider it to be so to take a tour over the premises of our Society, and to show where space would be found for the exhibition of anything like a representative collection of such appliances, the name of which is legion. Or allowing, for argument sake, an impossibility, that such a collection could be housed to-day, what would be its character five, ten, or twenty years hence, but a museum of pharmaceutical antiquities obsolete and worthless?

Entertaining as I do the highest personal regard for Mr. Schacht, I cannot but think that in the present instance in his genuine desire to promote the interests of pharmacy, he has been led to propound a scheme impracticable and uncalled for.

EDWIN B. VIZER.

Belgrave House, Cliftonville,
Brighton, October, 19, 1875.

AN OBSCURE PRESCRIPTION.

Sir,—Perhaps some of your numerous readers who are adepts in deciphering medical hieroglyphics will kindly inform me of the name and composition of the ingredient in the prescription, a fac-simile copy of which I subjoin:—

"℞ Acqua Capodieci . . . . ℥viij.

"A dessert-spoonful three times a day between meals.

"J. YOUNG."

By so doing they will oblige

"A PUZZLED PHARMACIST."

October 13, 1875.

James May.—You will find forms for making Coloured Fires which contain shellac in the present series of the *Pharmaceutical Journal*, vol. ii., p. 430.

Inquirer (Newcastle).—An Act dealing with the registration of trade-marks was passed last session, which provided for the establishment of a registry and the issue of general rules as to fees, etc., before the 1st of January, 1876. These general rules have not yet been issued, but as soon as they are full information on the subject will be given in this Journal.

"*Inquirer*" (Dorking).—Numerous papers have appeared in the *Pharmaceutical Journal* upon the subject of this preparation since its introduction into the Pharmacopœia. In the 'Additions to the Pharmacopœia' it is recommended that curd soap should be used.

W. R.—The distinction of Senior and Junior Bell Scholarships is now abolished. The examination in French is not confined to any particular book. For other details apply to the Secretary, who will supply you with a copy of the regulations.

J. Austen.—(1) This question is one that we cannot undertake to answer. (2) The proportions are such as to ensure the formation of a neutral carbonate of ammonia. (3) Filices.

G. P.—We feel compelled to refer you to a Latin grammar for an answer to your question.

E. Nuthall.—(1) Perhaps an application to Professor Abel at the Royal Arsenal Laboratory, Woolwich, would obtain for you what you want. (2) See an Article on Some Recent Proposals relating to Heating and Lighting, vol. iii., p. 969; also Professor Barff's lectures on the Carbon Compounds, printed in vol. v., pp. 354, 394, 412, 496 and 512.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Hesse, Mr. Pritchard, Mr. G. Brown, Mr. Cleaver, Lux, Mr. F. J. Barrett, M. Planchon, Mr. Fairlie, Mr. Butt.

ANOTHER NOTE ON LINIMENTUM TEREBINTHINÆ ACETICUM AND THE SOLUBILITY OF GLACIAL ACETIC ACID.

BY W. SYMONS, F.C.S.

As probably the recent notices of Glacial Acetic Acid have been suggested by the short paper contributed by me to the Pharmaceutical Conference, perhaps you will allow me to occupy a little of your space on the matter.

Mr. Barnes judiciously lost no time in correcting his assertion that "Glacial Acetic Acid mixes with fixed and essential oils in all proportions." It would have been more judicious to have tested the fact before publishing the assertion, and it would have been better also as suggested by my son, if in his second communication he had stated the strength of the acid used.

From a scientific point of view the subject is far from exhausted yet, and from casual experiments which I cannot now follow up with sufficient exactness, I venture to think it may lead to more important practical applications. However, from a business stand-point, I must for one decidedly object to the suggestion which my son, writing from Norwich, has made, that a stronger acid should be introduced into the Pharmacopœia.

I have not now an opportunity of testing the strength of the acid with which I experimented. It was supplied by a well-known London house, but had been some months exposed in a stoppered bottle, occasionally used. With this acid it was impossible to make a clear solution when olive oil or camphor liniment alone was mixed with turpentine, but the addition of castor oil *before* the acid was added made a perfectly clear and stable solution.

If I had anticipated that, through the kindness and courtesy of Professor Attfield and Professor Redwood, my short contribution to the Pharmaceutical Conference would have received so much attention, I might have more carefully repeated the experiments with acid of ascertained strength, but I was justified in saying that with an acid of the strength used "some oil soluble in spirit seems essential as a blending medium."

If the addition of a portion of castor oil makes a perfectly clear liniment with the ordinary acid, it appears unnecessary and from a working pharmaceutist's stand-point very injudicious and inconvenient to suggest to the compilers of the Pharmacopœia the introduction of an acid of a higher strength.

Barnstaple, October 18, 1875.

ON SOME RECENT RESEARCHES IN VEGETABLE CHROMATOLOGY.

BY HENRY POCKLINGTON, F.R.M.S.

The *Journal of Botany* for April,[*] translates from the 'Monatsbericht' of the Berlin Academy, a paper by N. Pringsheim, which will be read with interest by all who are interested in vegetable chromatology whether they agree with the author's conclusions or no, and a short notice of it here will probably not be uninteresting in connection with our previous notice of the researches of M. Chautard[†] and Mr. Sorby.[‡] Pringsheim discusses the different chlorophylloids generally found in plant leaves, with especial reference to those having a near alliance with chlorophyll or found with it, under the following heads:—

1. The yellow chromule of etiolated plants. Pringsheim proposes for this the name of Etiolin, and says that it gives a spectrum "nearly identical with that of ordinary chlorophyll only differing as to the amount of absorption in the places corresponding to the chlorophyll bands." Following the nomenclature adopted by Kraus and other continental chromatologists, the author gives the following description of etiolin spectrum.[*] "Even with moderately thick layers, generally before the three bands in the blue have united into a continuous absorption band, the chlorophyll band I. is seen in its right place very distinctly defined. Further, when the illuminated layers increase in thickness, bands II. and IV. gradually show themselves, and when sufficiently concentrated band III. also appears." He says also that the whole seven bands of the chlorophyll spectrum are present, I., II., III., and IV. being exactly in their right place, but V., VI., VII. displaced towards the red, and that in thick solutions band II. is split. He also remarks that etiolin manifests the same red fluorescence as chlorophyll, and concludes that "etiolin is an unmixed substance, being a yellow modification of chlorophyll," a "yellow form of chlorophyll being produced in the dark, but a green modification in the light."

It is hardly necessary to say that these are not the conclusions arrived at by Mr. Sorby, nor do they appear to be the views held by Fremy or Kraus, and on this ground, as well as on account of their intrinsic importance if true, they require examination and discussion, and I will venture later to indicate what appear to me to be their points of divergence from other theories and the more or less serious objections that may be urged against them. In the first place, however, it may be useful to explain that according to the nomenclature employed, the band No. I. is situate in the red between Frauenhofer's lines B and C, and is the "specific line" of M. Chautard.[†] In Sorby's nomenclature it is described as between 1 and 2 of his interference spectrum scale.[‡] No. 2 band is in the orange between C and D: No. III. lies to the violet of D (3½ Sorby), and No. IV. to the red of E (between 5 and 6 Sorby). In Kraus' scale[§] they lie between 3° and 9°; 10·5° and 14°; 31° and 33°. The bands in the blue are broad faint absorption bands which coalesce into a general absorption when all but extremely dilute solutions are examined. They lie between F (53° Kraus) to mid-distance between it and G (or 73° K.), and between near the last (74° K.) to beyond G (93° K.). General absorption to the end of the spectrum exists immediately beyond the last named band, or from 94° Kraus to 100° K. These bands are quite indistinguishable (on account of their coalescence with the final general absorption) in all except very dilute solutions, and under these circumstances Nos. II. and III. are very obscure or quite invisible, and No. I. is reduced to little more than a line. These points require to be borne in mind in examining charts of absorption spectra, or in working over the ground covered by continental chromatologists.[*]

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[*] *Journal of Botany*, [N.S.] vol. iv., p. 114.

[†] *Pharm. Journ.* [N.S.] vol. iii., p. 1014, and vol. iv., p. 61.

[‡] *Pharm. Journ.*, [N.S.] vol. iv., p. 489.

[*] Quoted from the translation in *Journal of Botany*.

[†] Mr. Sorby has recently adopted the far preferable "wave length" method of indicating the position of his bands.

[‡] *Pharm. Journ.*, [N.S.] vol. iii., p. 1014.

[§] A scale of 100 equal parts.

2. Under the second head our author discusses the chromule of yellow blossoms. This, he says, differs in its optical properties from that last named (etiolin) "only in having weaker absorptions in the first part of the spectrum. Kraus seems to have been the only one who has subjected the chromules of yellow blossoms to spectrum analysis." (In this he certainly is in error.) "From not using layers sufficiently rich in chromule he failed to detect the chlorophyll bands of the first half of the spectrum just as he had done with etiolin." He says further, and this is noteworthy, that "this weakening of the chlorophyll characteristics varies in different flowers. The strength of the bands, however, seems to remain constant in plants of the same natural order. In some of the examples which showed the weakest absorptive power, such as a kind of yellow rose, *Carthamnus tinctorius*, and various yellow dahlias, even with concentrated layers 370mm. in thickness, *there was scarcely a trace of band I.* to be seen. (The italics are mine.) The yellow chromules of blossoms accordingly form a continuous series of gradations of chlorophyll. Even those which differ most betray their genetic connection by presenting similar absorption bands in the blue." He notes also that the chromule (anthoxanthine) becomes more soluble in water in proportion as the essential characteristics of chlorophyll vanish.

3. The yellow ingredient in the green leaf (*Chlorophyll*) is discussed under the third and last head, and the author takes exception to the conclusions of Kraus respecting it, ascribing certain errors which he believes himself to have found therein to want of due care in using a sufficiently thick layer of the dilute solutions. The usual method of separating the yellow from the blue component is that of using two non-miscible solvents, one generally being alcohol, the other benzol (Kraus), carbon disulphide, or some fatty oil. The liquids are mixed by shaking, and allowed to separate, when the alcohol will no longer appear green, but more or less yellow, whilst the other solvent will show a grass green or glaucous colour. Kraus appears to regard these as the two components of chlorophyll, and believes that the first four bands of the chlorophyll spectrum are entirely due to the glaucous element, whilst the general absorption of the violet end is due to the coalescence of the higher bands of the two components. To this statement Pringsheim takes exception, and states, what is undoubtedly true, that there are certain conditions of experiment which are necessary for the proper observation of these phenomena, and since he ascribes the errors of other chromatologists to disregard of them, it is well to give these at some length. The first condition is that the added solvent must not be perfectly miscible with the alcohol of the chlorophyll solution, which depends on the dilution of the alcohol, and "a certain dilution is an advantage by keeping the alcohol and benzol portions as separate as possible, too much water on the other hand is apt to produce turbidity on the addition of the benzol." It is important also to remember that benzol, carbon disulphide, various fatty and ethereal oils, etc., are able to absorb many times more chlorophyll than even high percentaged alcohol, and are accordingly tinged much more deeply." He also states that the upper spectrum always reveals the "specific" band in the red, but does not accept Kraus's explanation that in these cases complete elimination of the glaucous element has not taken place, on the ground that he has never succeeded in preparing a yellow alcoholic portion which had no chlorophyll bands in the first half of the spectrum With this I agree so far as regards Kraus's method but by decantation of the upper solvent and repeated agitation with fresh disulphide and redecantation (a species of fractional "decantation"), a solution can be obtained that shows no band in the red, even when very considerable thicknesses are employed and this solution agrees with solution of xanthophylloids prepared by the methods previously described,[*] from sources less open to error than the petals of flowers experimented upon by our author.

The author then describes the "band-raising" power of the solvents, which he says Hundt has shown to depend upon their dispersive power. Sorby, if I mistake not, has diligently sought for such connection, but has failed to discern either it or any other physical alliance, though such may possibly exist and ultimately be found in the region of thermics. He does not, however, appear to give any new observation on these points, and I think he would not ascribe so much importance to them had he known that Sorby gave (in the 'Proceedings of the Royal Society' for 1873), charts of his xanthophylloids[†] (including Kraus's compound *Kyanophyll*) in which the step by step bands which Pringsheim ascribes to band displacement are shown in carbon disulphide solutions of the substance. The processes pursued by Sorby and other experiments quite preclude any application of our author's intimation that "by judiciously regulating the relative proportions of the solvents we may sometimes succeed in producing the observed medium" (position of bands). He concludes by saying that "it is certain that many of (Sorby's) chromules must have been deprived of their original spectrum characteristics by the treatment to which they were subjected." (He overlooks, or does not know, that most of these chromules can be obtained in an approximately pure state under conditions not exposed to this source of error). "In the determination of the spectra moreover the influence of the solvent, of amount, time of concentration, and of thickness of layers, seem to have been equally disregarded. It is clear that a single spectrum can give us no adequate information as to the absorption phenomena of any chromule unless we are acquainted beforehand with its phases of absorption and know to which phase of bands it corresponds." (This is true). "Sorby has nowhere stated with reference to his yellow chromules to which he ascribes two separate bands in the blue to what extent the various positions of the bands are influenced by the solvent, nor how they depend on the thickness of the layers, nor does he state that with an increase of the chromule the additional bands do not appear. I doubt not that the whole perhaps of his yellow chromules—one only excepted—would suddenly reveal also the chlorophyll bands of the first half, if my method (of thick layers) were applied. If in future more accurate distinctions are attempted to be drawn, it will be necessary in every case to demonstrate carefully to what extent the observed difference in the spectra might or might not be explained by the solvent employed, or whether they do not depend on some cellular contents of the plants examined, and finally it would have to be shown that they are more than particular phases of the same absorption bands."

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[*] In my charts on page 950 of vol. iii., and page 61 of vol. iv., the higher bands are not shown for this reason.

[*] *Pharm. Jour.* [N.S.], vol. iv. page 489.

[†] See *Phar. Jour.*, loc. cit.

It is hardly necessary to point out to those who have read my notice of Mr. Sorby's Royal Society paper that Pringsheim has, to say the least of it, scarcely given a fair representation of his work. We take for instance Mr. Sorby's yellow chlorophyll[*] and we find that he prepares it in a manner described in my previous paper, and evaporates it from the carbon disulphide solution at a gentle heat and redissolves it in benzole for examination. When he wishes to compare it with blue chlorophyll he takes a *benzol solution* of blue chlorophyll and makes the comparison and points out also that "when dissolved in alcohol the principal band in the red is made about twice as broad and half as dark as when in benzol or carbon disulphide, and can no longer be seen quite detached and separate from that due to blue chlorophyll especially if the relative amount of the latter be considerable." Our author, also it appears to me, overlooks the important use Mr. Sorby has made of photo-chemical analysis in his researches and the enormous variety of plants of various degrees of development, and very different position in the scale of vegetation he has examined. I think he has also quite misapprehended what Mr. Sorby claims for his chromules. Mr. Sorby does not, I think, claim more than this, that these chromules exist in the plant in a separate or separable state and he does not investigate their genesis or their genetic relations. These are quite distinct subjects for inquiry, and I do not think that Pringsheim has brought any cogent arguments against Mr. Sorby's classification or opposed any obstacle to our acceptance of his results. The real value of Pringsheim's paper, and that it is a valuable paper I have no hesitation in admitting, lies in its indication of sources of error, and its prominent indication of phenomena likely to be overlooked, and for this thanks are due.

SALICYLIC ACID.[†]

BY HERMANN ENDEMANN, PH.D.

(*Concluded from page* 324.)

The importance of preserving the wholesomeness of water kept on ships, especially on long voyages, has led Professor Kolbe to make a series of experiments by filling good water into new barrels and adding to some of them small quantities of salicylic acid, 1 gramme to 20 litres of water being the maximum. The experiments were made during the winter, and the barrels were therefore kept in a heated room. According to a letter received from Professor Kolbe the experiments have so far been satisfactory, but for the purpose of giving the experiment a more practical shape a number of barrels were filled in a similar manner, and sent out to sea in the early part of June, on board of a ship, which has started from Hamburg on a one year's cruise. At the expiration of this time the water is to be examined and the final results will then be published.

Julius Mueller, of Breslau, after corroborating some of Professor Kolbe's statements, made experiments with the view of comparing the disinfecting properties of carbolic acid and salicylic acid.

On trying the disinfecting influence of 0·1 and 0·2 per cent. carbolic acid solutions and salicylic acid solutions respectively, on cut liver, the experiment was in favour of carbolic acid, and, as the author thinks, because the volatile carbolic acid acted on the germs, coming into the loosely covered vessel from the outside, before they reached the liquid. Should this result be not rather due to the alkaline reaction of the bile, which will partly neutralize the salicylic acid, and thus make it inactive?

The author succeeded in preventing the action of emulsin by the addition of 0·2 per cent. of salicylic acid, while of carbolic acid as much as 10 per cent. was required. 0·2 per cent. of salicylic acid will retard the action of ptyalin, contained in saliva, on starch; 1 per cent. will make it perfectly inactive; of carbolic acid 10 per cent. are required to reach the same result.

Similar results were obtained by studying the action of these disinfectants on glycogen and pepsin.

I have taken some pains to get possession of Professor C. Thiersch's treatise on the use of salicylic acid in the place of carbolic acid for the treatment of wounds by Lister's method, but on examining it I find, that, interesting as its contents may be to medical men, I should, for a chemist's journal, confine myself only to a summary of the results obtained, without going into details.

Professor Thiersch considers salicylic acid fully equal to carbolic acid as a preventive of putrefaction in surgical treatment; it surpasses the latter on account of its being odourless and less irritating.

Salicylic wadding for dressing of wounds is prepared in two grades, one containing 3 per cent., the other 10 per cent. of salicylic acid.

The respective solutions used are—

For 3 per cent.—

750 grams salicylic acid, dissolved in
7500 „ alcohol, and diluted with
150 litres water of 70° C. to 80° C.

Saturate with this solution 25 kilograms wadding from which the fat has been previously extracted.

For 10 per cent.—

1 kilogr. salicylic acid dissolved in
10,000 grs. alcohol and diluted with
60 litres water of 70° C. to 80° C.

Saturate with this solution 10 kilograms wadding treated as before.

The respective mixtures are allowed to cool to await the crystallization of salicylic acid, and then dried.

In the same manner a dry salicylic jute dressing may be prepared.

For particulars I must refer to the original article.

Salicylic acid solution 1 : 300 may be used in every operation of surgical practice with the exception of cleansing of metallic instruments, which are easily corroded by salicylic acid, and for which operation, therefore, a carbolic solution is preferable. For external use, in the shape of a powder, a mixture with starch, 1 to 5, has been in use.

To ascertain whether salicylic acid may be taken internally Professor Kolbe tried the experiment upon himself, commencing with ·5 gram and gradually going as high as 1·5 gram per day. His health remained normal. It was taken by him in the shape of a cordial prepared according to the following receipt:—

Salicylic Acid	5·0 grams.
Spiritus Vini	95·0 „
Water	140·0 „
Syr. Cort. Aurant.	60·0 „

The health of others who partook of this mixture in like quantities, was likewise not in the least affected.

Professor Wunderlich used a mixture of—

Salicylic Acid	1 grams.
Oleum Amygdal. Dulc.	20 „
Gum Arabic	10 „
Syr. Amygdal.	25 „
Aqua Florum Aurant.	45 „

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[*] Proceedings Royal Society, xxi., 453.

[†] From the *American Chemist*, for August.

Salicylic acid is not absorbed through the skin. Professor Kolbe took a bath of 27° R., containing in 250 kilogrammes of water 250 grams. of salicylic acid, and remained in it for ten minutes. The urine, though carefully examined for the rest of the day, was free from salicylic acid. No bad effects of this substance on the skin were perceptible.

Since it now may be conceded that the general health is not affected by the internal use of salicylic acid, it would be of interest to ascertain whether ferments, such as cause disease, can by its use be made inactive.

Dr. Benecke, of Marburg, has for this purpose proposed the following plan, viz.: to use salicylic acid before and after vaccination, and ascertain whether the effects of the lymph can be allayed by the use of this medicine.

Of the results of these experiments nothing has been published yet. Dr. K. Fontheim, states that until October of last year he treated 107 cases of diphtheria, using Letzerich's method of merely removing mechanically the diphtheritic excrescences of the throat, and lost of these cases only five by death. In this manner he generally succeeded in bad cases to effect a cure in from twelve to fifteen days, in light cases in from five to seven days.

Since he commenced to use salicylic acid he lost from thirty-two cases none, and claims to have shortened the duration of the disease in bad cases to eight days, in light cases to from two to four days.

Using, besides that, salicylic acid as a prophylactic, he was able to save other inmates of infected places from taking this disease, while formerly, as a rule, the sickness would attack nearly all the members of a family.

Diphtheritic after-effects were observed only in one case, which had been treated with salicylic acid.

The amount of salicylic acid given per day internally was about 0·20 gram.

Contagious diseases of animals were successfully treated with salicylic acid by Professor Friedberger and Professor Dr. Zürn, of Leipzig.

Professor Friedberger proved also the disinfecting properties of salicylic acid on sheep by subcutaneous injection of putrid fluids before and after treatment with this substance.

Professor Zürn made experiments with some disinfectants in order to compare their relative value. The disinfectants examined were acetate of alumina, phenol, and salicylic acid, and the substance to be disinfected was a putrid fluid full of bacteria, micrococci, spirilla, etc. The results of the disinfectants are to be found in the following tabulated statement. The experiments were made in such a manner that one drop of the liquid to be disinfected was, under the microscope, mixed with one drop of the disinfectant mixed with water in such proportion as given in the tabulated statement:—

Solutions of	Acetate of alumina.	Phenol.	Salicylic acid.
1·50	Infusoria and organisms producing putrefaction died at once. The albumen of the infusoria coagulated and the membranes burst.		
1·100	The same as before.		
1·300	Infusoria and organisms producing putrefaction died at once.		Infusoria and spirilla died within two minutes.
1·500	Infusoria died within 1½ minutes. Spirilla at once.	Infusoria, spirilla, and bacteria died at once.	Infusoria and spirilla live even after the lapse of several minutes.
1·1000	Infusoria lived for a few minutes. Spirilla died at once.	Infusoria, spirilla, and bacteria died at once.	Infusoria and spirilla lived for thirty minutes to one hour.
1·2000	Infusoria and spirilla lived for a few minutes.	Infusoria, spirilla, etc., died at once or after the lapse of a few minutes.	The organisms lived even after several hours.

From this it would appear that salicylic acid was far less powerful than either acetate of alumina or phenol in its action on organisms producing putrefaction.

It remains now only to give the results of my own experiments regarding the relative disinfecting properties of paracresylic, carbolic, and salicylic acids.

Originally and independently of other publications I pursued a plan similar to that adopted by Professor Zürn. The results, however, could not satisfy me, for the following reasons:—

I first ascertained that bacteria are not necessarily deprived of life, if they have been made motionless. Motion is only one function of the life of these microscopic organisms, and after having been rendered motionless, this function can be restored to them again if they are by some means freed from the restraint put on them by the presence of certain substances.

Then, in the case of salicylic acid, it must be considered that fluids undergoing putrefaction in the presence of bacteria, spirilla, etc., show always an alkaline reaction, and considering the fact that salicylates are no disinfectants, it becomes evident that salicylic acid added to an alkaline solution may be entirely rendered inactive. For the purpose of ascertaining whether a disinfectant has actually killed the organisms or merely made them motionless, I have taken advantage of the fact, that bacteria, etc., are carried off by the evaporating water, and that they will further develop if brought into a medium adapted for their existence. To carry out this plan I proceeded as follows:—

Air purified by filtration through cotton and bottles filled with concentrated sulphuric acid, was allowed to pass through the liquid supposed to have been disinfected by the addition of various quantities of the above-mentioned disinfectants, and thence through a fluid which will render the development of organisms producing putrefaction possible. As such fluid I have adopted Cohn's solution, containing tartrate of ammonia, phosphate of potash, and phosphate of lime.

If air containing bacteria, etc., be pumped through this perfectly clear liquid, it will soon become turbid, and on examination under the microscope will be full of living organisms; at the same time the reaction will change from slightly acid to alkaline.

Cohn's liquid, thus treated, furnished also the material on which the disinfectants were applied. The fluid after such treatment became turbid, the dry residue of 25 c.c. collected on filter was, however, hardly weighable, so that it might be considered that the results obtained are independent of the quantity of bacteria, etc., present in the fluid, and give directly the amount of disinfectant required in solution for the complete destruction of the putrefaction organisms. The three disinfectants which I used were in the shape of 1 per cent. solutions, the salicylic acid solution being obtained by means of hydrodisodic phosphate. The fluid containing the putrefaction organisms was then mixed with the disinfectant solutions in various proportions, and each bottle connected with a flask containing pure Cohn's fluid. The aspiration of *pure* air was then commenced with the aid of a Bunsen air-pump, the air passing first through the fluid supposed to be disinfected, and thence through the test bottles containing pure Cohn's fluid. After twenty-four hours' treatment the aspiration was discontinued. The flask which contained originally pure Cohn's fluid will be turbid by this time, or will become so in the course of a few days, provided the disinfection in the other flask was incomplete. If the disinfection were complete I have kept the bottles with Cohn's fluid clear for more than two weeks. To produce such results, however, the greatest care is requisite, for every portion of the apparatus must be carefully disinfected before use by either heat or alcohol.

The results obtained by this method may be found in the following tabulated statement, from which the following deductions can be made regarding the strength of the disinfectants applied. Cresylic acid will perfectly destroy bacteria, spirilla, micrococci, etc., if contained in the fluid in the proportion of 1 part to 516 parts of water.

Carbolic acid will do the same if contained in the fluid in the proportion of 1 part to 278 parts of water.

Salicylic acid will do the same if contained in the fluid in the proportion of 1 part to 200 parts of water:—

	Quantity of putrid fluid taken.	Quantity of 1 per cent. carbolic acid solution taken.	Proportion of carbolic acid to water.	Days.	State of fluid in the test bottle after standing.
April 23	25 c.c.	25 c.c.	1·200	3	Fluid clear, disinfection complete.
,, 26	25 c.c.	10 c.c.	1·350	2	,, turbid, ,, incom.
,, 28	25 c.c.	11 c.c.	1·327	2	,, ,, ,, ,,
,, 30	25 c.c.	12 c.c.	1·308	7	,, ,, ,, ,,
May 7	25 c.c.	14 c.c.	1·278	12	,, clear, ,, complete.
,, 19	25 c.c.	12 c.c.	1·308	14	,, turbid, ,, incom.
June 4	25 c.c.	11 c.c.	1·327	1	,, ,, ,, ,,

	Quantity of putrid fluid taken.	Quantity of 1 per cent. cresylic acid solution taken.	Proportion of cresylic acid to water.	Days.	State of fluid in the test bottle after standing.
April 25	25 c.c.	25 c.c.	1·200	3	Fluid clear, disinfection complete.
,, 26	25 c.c.	10 c.c.	1·350	2	,, ,, ,, ,,
,, 28	25 c.c.	9 c.c.	1·377	2	,, ,, ,, ,,
,, 30	25 c.c.	8 c.c.	1·412	7	,, ,, ,, ,,
May 7	25 c.c.	7 c.c.	1·457	12	,, ,, ,, ,,
,, 19	25 c.c.	6 c.c.	1·516	14	,, ,, ,, ,,
June 4	25 c.c.	5 c.c.	1·600	1	,, turbid, ,, incom.

	Quantity of putrid fluid taken.	Quantity of 1 per cent. salicylic acid solution taken.	Proportion of salicylic acid to water.	Days.	State of fluid in the test bottle after standing.
June 23	25 c.c.	12 c.c.	1·308	2	Fl'd turbid, disinfection incom.
,, 25	25 c.c.	16 c.c.	1·256	5	,, ,, ,, ,,
,, 30	25 c.c.	17 c.c.	1·247	3	,, ,, ,, ,,
July 2	10 c.c.	20 c.c.	1·150	3	,, clear, ,, complete.
,, 5	10 c.c.	15 c.c.	1·166	4	,, ,, ,, ,,
,, 7	10 c.c.	10 c.c.	1·200	2	,, ,, ,, ,,
,, 9	20 c.c.	15 c.c.	1·233	2	,, turbid, ,, incom.

In addition to these experiments, I have made efforts to reach the same by following another plan. The results, however, are totally different as far as salicylic acid is concerned, from those obtained by the method described above. A number of wide-mouth glass-stoppered bottles (4 oz.) were charged with 25 c.c. of pure Cohn's fluid, and then with varying quantities of 1 per cent. disinfectant solutions. So with cresylic solution with 1, 2, 3, 4 and 5 cubic centimetres, with carbolic solution with 4, 6, 8, 10, 11, 12, 13 and 14 cubic centimetres, and with salicylic acid solution with 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 cubic centimetres. Then to each bottle one drop of putrid Cohn's fluid was added.

The reaction of the contents of all the bottles was acid at the outset. Those containing 1 c.c. cresylic and 1 c.c. salicylic acid became in the course of one week alkaline, which reaction was accompanied by the development of bacteria, etc. After one month's standing the contents of the cresylic acid charged bottle were covered densely with the mycelium of *Aspergillus glaucus*, the reaction of the fluid had again become acid and in consequence the development of bacteria was checked.

The reaction of the contents of the salicylic acid charged flask is now after 35 days alkaline; fungi are developing on the surface (*Mucor Mucedo* and *Aspergillus glaucus*). None of the other bottles charged with either cresylic or carbolic acid show development of bacteria or fungi after 35 days' standing.

The contents of all the bottles containing various quantities of salicylic acid are either infested with bacteria or have developed fungi, the bacteria being confined to the bottles containing least of this substance.

It would be difficult to explain these apparent anomalies if we had not Professor Kolbe's statement that only free salicylic is able to act, and that salicylates have no disinfecting properties. If we add salicylic acid to a fluid containing salts and living bacteria, and then exclude the impure outside air, salicylic acid seems to have sufficient time to destroy all the germs before its reaction with the salts is completed. If, however, salicylic acid is mixed with salt solutions (nearly neutral, as in the case of Cohn's solution) for some time, compounds may form in which the salicylic acid loses its disinfecting properties, and, therefore, cannot exert any influence on germs entering the fluid after such reaction has taken place.

The appearance of fungi on the surface of the contents of glass-stoppered but not hermetically sealed bottles after the lapse of about two weeks, may thus be explained.

From this it is also evident why the results of these experiments differ so far from those made by Neubauer or Kolbe. Neubauer used grape-juice, which contains much free acid and comparatively little salts. In this case it is the excess of free acid which has secured the favourable results.

Professor Kolbe used a sugar solution containing no salts but those accidentally present. It is here the want of salts which has brought his experiments to a favourable result.

Professor Kolbe has stated that with small quantities of salicylic acid he was able to check further fermentation of beer and keep it clear and free from mould, for he operated on natural beer which is always slightly acid. In operating on New York beer he would have met with contrary results, as additions of overdoses of bicarbonate of soda give to all kinds of our beer an alkaline reaction, which is the cause that salicylic acid is made inactive.

In fact, beer of neutral reaction or alkaline reaction cannot be benefited by salicylic acid, and it is only when beer has clearly an acid reaction that such results can be obtained as published by Kolbe (v. Gehren).

This consideration must in the course of time confine the use of salicylic acid to certain industries, and can explain beforehand why certain and desired results cannot be reached in many cases. Salicylic soap is, therefore, an anomaly and a mere waste of material, since the alkaline reaction of the soap insures the inactivity of salicylic acid.

The alkaline reaction of Cohn's fluid after it had been stocked with bacteria is also in my experiments a drawback, for this reaction is not only due to the formation of tribasic phosphates or dibasic tartrates, but also to some ammonic carbonate. I have tried, therefore, to start with an acidified solution.

If a normal sulphuric acid solution 1·1 c.c. were used for 20 c.c. putrid Cohn's fluid to remove the alkaline reaction and produce a colour like that which is due to hydrodibasic phosphates, on examining the fluid under the microscope, bacteria, etc., appeared motionless, yet they were not lifeless, for after another cubic centimetre of the same acid had been added, and after the fluid had been tested in the aspiration apparatus, it appeared that these organisms had not been destroyed, for they soon commenced to develop in the flask containing pure Cohn's fluid.

Using for 20 c.c. putrid fluid 1·1 c.c. normal sulphuric acid solution and 10 c.c. 1 per cent. salicylic solution, a complete disinfection could be obtained. Not so, however, if the quantity of salicylic solution was reduced to one-half.

After the alkaline reaction had been removed, I was able, therefore, to fully destroy the life of bacteria with salicylic acid contained in the fluid in the proportion of 1 to 300. The fact, however, that the bacteria had been rendered motionless by the addition of sulphuric acid, suggested to me the necessity of supplanting sulphuric acid by some weaker acid, for instance, tartaric acid, in these experiments.

THE MYRTLE AND ITS PROPERTIES.*

BY DR. DELIOUX DE SAVIGNAC.

In a recent communication to the Société de Thérapeutique, Paris, Dr. Savignac has called attention to the services the common myrtle (*Myrtus communis*) is, as he believes, capable of rendering to medicine, pertinently remarking that we often seek from afar plants of which the virtues are more or less equivocal, and whose chief merit is that they are foreign, whilst we have near at home those that are quite as worthy of attention. The following particulars respecting the *Myrtus communis* are taken from his paper.

This species is the type of the Myrtaceæ, a family rich in medicinal species. Like all the plants of the family it is permeated in all its parts by an essential oil; and like a great number of them it contains tannin. A plant that contains both an essential oil and tannin is certain, the author thinks, to constitute an active medicinal agent, and he claims that the myrtle has the greater claim to esteem in that in the energy and proportion of its essential oil it is rivalled by that of none but Myrtaceous plants, and with the exception of the clove it exceeds all in the abundance of the tannic principle it contains. This plant is the sole European representative of the family, the other species belonging to countries lying within or near the tropics. It flourishes only in the southern portions of Europe, particularly on the borders of the Mediterranean, in Spain, Italy, and Greece. It is said to have originally come from Africa. Pliny notices the Egyptian myrtle as being the most odoriferous.

The leaves, flowers, and fruits of the myrtle are all perfumed by an essential oil. Besides this the berries and bark contain a very energetic tannin, which gives a black precipitate with salts of iron. The proportion of this tannin does not appear to have been exactly determined, but it must be considerable; since therapeutically the myrtle produces marked astringent effects, whilst industrially it has been used from time immemorial in tanning. It is the plant used in the preparation of Turkey leather; it has also been used for dyeing, the manufacture of ink, etc.

The taste of the leaves is astringent, bitter, aromatic, and slightly pungent; that of the pulp of the berries is rather sweetish; and that of the seeds at first oily, afterwards rough. The essential oil is obtained principally by distillation of the leaves; 50 kilograms of leaves yielding, according to Piesse, about 150 grams of essence. It possesses the characteristic perfume of the plant, mixed with a slight odour of turpentine. The oil is greenish-yellow, and, differently to most essential oils, it becomes lighter with age. It is possible by rectification to obtain it colourless, but the quantity and intensity of the green colouring matter contained in the leaves of the myrtle render this operation very difficult. The oil probably belongs to the class of oxygenated essential oils, but its chemical investigation is as yet incomplete. In France the essential oil of myrtle costs about 35 francs the kilogram.

Besides the essential oil there exists in the berries a fat oil, which was used by the ancients for numerous medicinal purposes.* Spots of this oil may be seen floating on the top of an infusion of the berries.

Not long since there was manufactured in France, both from the flowers and the leaves, a distilled water, known as "*eau d'ange*," which was used by ladies as a toilet water to perfume the skin and render it firm; it has also been employed medicinally. Of the two kinds that prepared from the flowers was the most esteemed.

For medical purposes, Dr. de Savignac considers the leaves and berries to be the most suitable, being more active than the flowers; since besides a larger proportion of essential oil they contain tannin. But as the tannin appears to be more abundant still in the bark, he thinks that ought not to be neglected, since it might be used in preparations in which the predominance of an astringent principle is required.

Dr. de Savignac believes that in addition to the essential oil and tannin, the myrtle contains a bitter principle and one or more resins. Solution of iodine in iodide of potassium does not produce any precipitate in a concentrated infusion of the leaves or berries; probably, therefore, the plant does not contain an alkaloid. Solution of protosulphate of iron determines an abundant bluish-black precipitate in an infusion of the leaves, and one less plentiful in an infusion of the berries.

For pharmaceutical purposes the author states that he has preferred to use the leaves, as containing most uniform quantities of the essential oil and tannin. The two preparations of which he has made the most use are an infusion and the powder. The berries can be used for both these preparations, but are more suitable for the infusion. From both the leaves and the berries an alcoholic tincture can be obtained; as also other alcoholic preparations, such as an alcoholic extract, etc. The following are the forms used by the author:—

(1) *Infusion of the Leaves.*—15 to 30 grams of the leaves to a litre of boiling water, when the infusion is intended for external use. In these proportions it does not appear to be injurious when taken internally; but the taste is rather disagreeable. It is, therefore, better to make the infusion weaker when it is to be drunk. A "myrtle tea" can be prepared with a pint of the leaves to a cupful of boiling water.

(2) *Infusion of the Berries.*—15 to 30 grams of the berries to the litre, either for internal or external use. The sweetish taste renders it more acceptable than an infusion of the leaves.

(3) *Powdered Leaves.*—Passed through a sieve, and preserved in closed vessels in a dry place. The dose employed was from 1 to 2 grams; this quantity could be at least doubled.

(4) *Tincture* or *Alcoholate* either of the leaves or the berries, or of both together, in the proportions adopted in the Codex for preparations of this nature. The alcoholic tincture could be rendered more active by the addition of a certain quantity of the essential oil. From the essential oil a spirit of myrtle can be prepared in the proportions of 5 to 10 parts of the oil to 10 parts of alcohol. It could also be enclosed in *perlés* and capsules. In the absence of such preparations the author has made boluses and pills by incorporating a few drops of the oil with powder of the leaves, and using a little honey or syrup for an excipient.

The bark may be used for *decoctions*, or preferably for infusions, if it be desired to retain the small quantity of essential oil it contains, in the proportion of 30 to 60 parts to 100 parts of water.

The aqueous infusions of the leaves, berries, and bark dissolve the tannin, accompanied by a small quantity of the essential oil which covers the odour of the preparation. The alcoholic preparations, and especially the tincture, contain the tannin, essential oil, and resinoid principles; they are consequently more active, and present advantages in particular cases.

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* *Répertoire de Pharmacie* [N.S.], vol. ii., p. 633.

* Pliny, lib. xv., c. 7, and lib. xxiii., cc. 44 and 81.

The Pharmaceutical Journal.

SATURDAY, OCTOBER 30, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE LOCAL GOVERNMENT UPON THE SALE OF FOOD AND DRUGS ACT.

IT is not often that the heads of a public department so far commit themselves as to become interpreters of and commentators upon the law. The importance of the Sale of Food and Drugs Bill, which came into operation on the first day of the present month, appears however to have been thought by the Local Government Board sufficient to warrant a departure from the usual reticent course which leaves the interpretation of the law to professional men. A circular has been issued, signed by the Secretary to the Board and directed to the County and Borough authorities charged with the execution of the Act, and conveying to them the opinion of the Board as to what are the most material of the amendments in the law affected by the Act in question. Most of the points referred to are already familiar to our readers, we will confine ourselves therefore to those which appear to indicate the spirit in which the Board wishes the Act to be carried out.

With respect to the appointment of analysts the circular points out that the Board has now the power to demand satisfactory proof of the competency of any future nominee to the post of public analyst, but no clue is given as to what form the "satisfactory proof" may take under the direction of the Board. Emphasis is also laid on the fact that an analyst must now possess "competent knowledge, skill and *experience*," as against the medical, chemical and microscopical knowledge required by the former Act. It is further pointed out that the difficulty experienced formerly in obtaining the services of a competent analyst for a small area is now removed by the provision which empowers the town council of a borough to engage the services of the analyst for the county or a neighbouring borough, and a hope is expressed that such local authorities will freely avail themselves of this power. As the Board is of opinion that this provision has "removed any ground which may have previously existed for neglecting to comply with the requirements of the law," it may be presumed that further neglect will bring into operation the compulsory powers of the Board in regard to the appointment of Public analysts.

Allusion is made to complaints which have been received, that the time which has sometimes been suffered to elapse between the taking of the sample and the making of the analysis has allowed for change to take place in articles subject to decomposition. It is pointed out that it is required now that analysis should be made with all convenient speed, and that the analyst has to report whether any decomposition rendering the results of analysis untrustworthy had taken place.

Under the heading "Description of Offences," the circular contrasts the provisions of the present Act with what are styled "the somewhat complicated provisions" of the former Act. It states that the term adulteration has not been admitted into the present Act, because its use without a statutory definition led to a great want of uniformity in the administration of the former law, whilst it is obvious that there might be other fraudulent practices which would not necessarily constitute adulteration; further, that "in future it will constitute an offence to sell, to the prejudice of the purchaser, any article *not of the nature, substance or quality of that demanded.*" Clearly if this is recognized as the official limitation of an offence under the Act, it will have an important bearing upon such cases as the "citrate of magnesia" case reported this week, at p. 358, where the article sold might have been fairly supposed to be what was asked for, and evidently was what was expected. The abstraction from any article of food of any part of it so as to affect injuriously its quality, substance or nature is described as a "new offence." If this be correct, illegal convictions must have taken place under the former Act, for more than one person was fined for the sale of milk from which the cream had been abstracted.

It is important to notice, since there appears to be some misapprehension on the subject, that the previous laws with respect to the adulteration of beer have been repealed with the express intention that proceedings for the offence of adulterating beer should henceforth be placed on the same footing as those in respect of other articles.

As will be remembered, the new Act provides that upon the request of either party the samples may be ordered, in the discretion of the justice, to be sent to the Commissioners of Inland Revenue for analysis by their chemical officers. In order to promote as far as possible accuracy and dispatch in the performance of such analyses, the Commissioners have prepared instructions as to their transmission for the guidance of clerks to magistrates and justices. A copy of these instructions is appended to the Circular, and will be found at p. 357 of this Journal.

After going in detail through the Act the Circular concludes by a summary of the different ways in which, in the opinion of the Local Government Board, the new Act will protect the seller on the one hand and be beneficial to the public on the other. Its final words are, "It will be seen, therefore, that whilst some of the amendments which have been made afford to the trading community the reasonable protection to which they were justly entitled, others have rendered the law much more stringent and effectual in the interest of the public." Perhaps it would have been as well to have waited a little while for some experience of the working of the Act, before officially pronouncing so decided a judgment.

"CITRATE OF MAGNESIA."

Probably if it were necessary to search out the cause which principally led to the supplanting of the last Adulteration of Food Act by the new Sale of Food and Drugs Act, it would have to be attributed to *trop de zèle,* like that against which the French diplomatist is said to have warned his subordinate; an excess of zeal manifested in the prosecution of cases which were manifestly weak. And it is curious to note that this misfortune has followed the Act to its end, one of the last cases, if not the last, to be decided under it, being very similar to one of the earliest that brought disrepute upon it. We refer to a prosecution at Greenock for a sale of "citrate of magnesia," alleged to be adulterated, because it was the preparation commonly known by that name.

The proceedings are reported at page 358; it will therefore be sufficient here to say that the article sold appears to have been a pretty fair representative of that which is now so widely and universally known by the conventional name "citrate of magnesia," and that the prosecution proceeded upon the assumption that every substance present that was not itself citrate of magnesia was an adulterant. To those acquainted with the article, and who know what is asked for almost universally by the public under that name, it must appear ludicrous to find sugar, tartaric acid and carbonate of soda treated as adulterants. Any man proving to be ignorant of so well known a fact as that these are the essential constituents of the only substance met with in ordinary trade under the name of "citrate of magnesia," would show such an unacquaintance as to *ipso facto* prove his unfitness for the post of public analyst. But this does not appear to apply to the analyst at Greenock, for he is reported to have said that he did not apply to the other druggists in Greenock, because he believed he could not get the pure article. If this be a correct representation of what he said, and we see no reason to doubt it, we feel warranted in stigmatizing the institution of such a prosecution as an unwarrantable and vexatious proceeding—the wrong of which is increased by the fact of its being carried on after the Act under which it was taken had been supplanted by another that has been officially explained as "permitting those practices in the established usage of trade with respect to the addition of harmless ingredients not intended fraudulently to increase the bulk or weight of the article, or to conceal its inferior quality."

On the other hand, we do not think that the defendant was free from blame in this matter. Two years since when considerable interest was excited by the conviction at the Southwark Police Court for a similar sale,* there was a general agreement of opinion that such vexatious proceedings could and should be prevented by the insertion on the label of words indicating that "citrate of magnesia" was a popular name, and several suggestions were published in the correspondence columns of this Journal as to the best way of doing this. Since that time, we believe, this course has been very generally adopted, and if, knowing what has occurred, a tradesman trusts only to the zeal of public servants being always tempered with discretion, he owes some thanks to himself for any inconvenient results that may accrue therefrom.

THE EVENING MEETING.

The next Evening Meeting of the Pharmaceutical Society of Great Britain will be held on Wednesday next, when there will be read a paper on "The Analysis of Cinchona Bark," by Mr. E. L. Cleaver; a "Note on the Chemical Formula of Commercial Molybdate of Ammonium," by Mr. N. T. Carrington; and a "Note on Pharmacy in Portugal," by Mr. T. Greenish. A number of live cochineal insects, feeding on their natural food (*Opuntia vulgaris,* Mill.), will be exhibited by Dr. Dyce Duckworth. A dried specimen of the Sumbul plant (*Euryangium Sumbul,* Kauffmann), which flowered for the first time at Kew this year, but did not mature its fruit, has been presented to the Herbarium of the Society, and will also be placed upon the table.

THE CHEMICAL SOCIETY.

The first meeting of the Chemical Society for the session 1875-76 will take place on Thursday next, November 4, when the following papers will be read:—

"Isomeric Terpenes and their Derivatives (Part V.);" and "On the Alkaloids contained in the Aconites (Part I.)." By G. H. Beckett and Dr. Wright.

"A Simple Form of Gas Regulator for maintaining a constant temperature in Air-baths, Water-baths, Incubators, etc." By F. J. M. Page.

"On the Fluorides of Arsenic, Phosphorus, and Iodine." By R. W. Emerson MacIvor.

"On Iolyl-Phenyl, a new Hydrocarbon." By Thomas Carnelly.

"Ethyl-Phenyl Acetylene." By T. M. Morgan.

"On the Presence of Liquid Carbon Dioxide in Quartz Cavities." By W. N. Hartley.

PREPARATIONS OF ASARUM CANADENSIS.

Dr. Schaffirt has recommended (*Pennsylv. Med. Times*), as an anthelmintic a compound syrup of *Asarum Canadensis* (Canada Snake root, or Wild Ginger), mixed with equal parts of fluid extract of senna, assisted in its action by a suppository consisting of two drops of the oleo-resin of asarum, made up with cacao butter. The compound syrup of asarum is made by exhausting an ounce of the root in a percolator with three ounces of alcohol and six ounces of water, adding to the product 1lb. of sugar, 10 grains of cochineal, 20 grains of potassium carbonate, and half an ounce of ipecacuanha wine. The oleo-resin is obtained by exhausting the powdered root with ether and evaporating.

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* See vol. iv. p. 376.

Transactions of the Pharmaceutical Society.

GENERAL MEETING—BENEVOLENT FUND.

ELECTION OF ANNUITANTS.

A general meeting of the Members, Associates in Business, and Associates of the Pharmaceutical Society, and of the Subscribers and Donors to the Benevolent Fund, was held at the house of the Society, 17, Bloomsbury Square, on Wednesday, October 27th, at twelve o'clock, for the Election of Four Annuitants.

Mr. Thomas Hyde Hills, President, in the chair.

The notice convening the meeting was read.

Scrutineers were appointed, who examined the voting papers, and brought up the following report:—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the eleventh election of Annuitants on the Benevolent Fund of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following result:—

—	Votes Polled at		Total.
	Previous Elections.	Election, 1875.	
1. Atherton, William	374	448	822
2. Collins, Annie..................	....	1162	1162
3. **Eastes, Thomas Henley...**	....	1902	**1902**
4. **Linging, Bine.................**	283	1000	**1283**
5. **Markland, Edwin ....**	893	1857	**2750**
6. Naftel, Thomas Pradon...	....	817	817
7. **Phillips, Dorothy ....**	481	768	**1249**
8. Trumper, Susan	....	257	257

3061 voting papers were received, of which 39 were informal, and were disallowed.

Alexander Bottle, *Chairman.*
Thomas Greenish.
C. E. Turner.
Albert Walsh.
Walter Hills.
J. Robbins.

October 27, 1875.

The President then declared the following duly elected annuitants:

Edwin Markland.
Thomas Henley Eastes.
Bine Linging.
Dorothy Phillips.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The opening meeting of the session of this Society was held in the West Hall of Anderson's University, on Wednesday evening, 13th inst. Mr. William Greig, President, occupied the chair. The minutes of the last meeting having been read and confirmed, Mr. William McKenzie was elected Treasurer, *vice* Mr. Murdoch resigned.

Mr. Fairlie (Hon. Sec.) then submitted a report on behalf of the Library Committee, and called attention to the following books which had been added, viz.:—

Attfield's 'Chemistry' (new edition), Cooke's 'Chemistry,' Muter's 'Chemistry,' Jones' 'Chemistry,' Schorlemmers' 'Chemistry,' Watt's 'Chemistry' (second supplement), Miller's 'Chemistry' (three volumes), Wilson's 'Chemical Notes,' Frankland's 'Chemistry' (two volumes), Parrish's 'Pharmacy,' Redwood's 'Pharmacy,' 'Pharmacographia,' Squire's 'Companion,' 'Homœopathic Pharmacopœia,' Cooley's 'Cyclopædia,' Neligan's 'Materia Medica,' 'Letheby on Food,' Wilson's 'Healthy Skin,' Rodwell's 'Natural Philosophy,' Hardwich's 'Photography,' 'Taylor on Poisons,' Ganot's 'Physics,' 'Carpenter on the Microscope;' the *Pharmaceutical Journal*, and the *Chemist and Druggist* for the summer months were also laid on the table.

The President then delivered the following

Inaugural Address.

Gentlemen,—I hope you will bear with me for a few minutes, while I offer you some remarks on our Association, what it has accomplished, and what it has yet to accomplish. In the first place, what led to it being formed at all? To find out this, we must glance at the state of the drug trade at the time. Let me endeavour to give you a picture of it. Shop was opened at 8, and in some instances at 7 a.m., kept open till 9 and 10 o'clock in the evening, and on Saturday night, the door was often just closing as 12 o'clock struck. The prices got for medicine were miserably low, they did not yield more than enough to keep soul and body together, and as for saving money that was altogether out of the question. He was a fortunate man who could pay his way in the world and at the same time keep up a respectable position in society. If the position of employer was bad, that of the assistant was a great deal worse. I have looked up the rate of wages paid, at that time, to young men who had just completed their apprenticeship, and find them to be as follows, £35, £40, £45 for the first three years, then £1 per week, and there they stuck. It seemed an utter impossibility to get further, and many a man has had to support a wife and family on that magnificent salary. It was when the trade was in this state of stagnation that a few enterprising members of it began to move, and I am happy to say they have continued to advance ever since. They first of all attempted to shorten the day's work. This they found no easy matter, as they were met on all sides by the most strenuous opposition; 9 p.m. had been the hour for shutting for fifty years, and 9 it must continue seemed to be the determination, and nothing would shake it. However a few of the principal shops began to close at 8 o'clock, and for a long time they occupied quite an isolated position. Year after year the agitation was kept up, and gradually the movement spread, until 8 o'clock was pretty generally considered to be the shutting hour; of course there were, and are, a goodly number who refused to grant their young men this great privilege. I hope they will soon see the error of this, and like others, manage to do all their business in reasonable hours. Early closing was the foundation of our Association, as without it, all effort to provide means of improvement for the young men were practically useless. What was the use of getting a gentleman to give scientific lectures if he were only to address empty benches? it being an impossibility to mix seidlitz powders behind the counter and attend lectures at the same time. Having partly accomplished their object, they began to provide means of improvement and instruction. Gentlemen kindly came forward to deliver interesting and instructive lectures, which were listened to with attention and profit by numbers of young men connected with the trade. Then came the Pharmacy Act, which made a certain amount of study compulsory, and elevated our trade into the professional rank. It found great numbers quite unprepared for the educational test, and loud and bitter was the outcry against it. Numbers left the trade as they found themselves brought, as it were, to a standstill in their career, and joined other businesses where no hindrance was offered to their starting in business for themselves. This created, for the time being, a scarcity of assistants, and as a consequence, wages improved. Your

Association now commenced to extend its operations; classes were begun where Latin, chemistry, and botany were taught in a most effectual manner, and at a very moderate rate, the Association giving a grant to reduce the expense to the students. A library was next aimed at, and after active canvassing the sum of £40 was contributed, which ought to lay the foundation of a useful and instructive one. We got up classes during the last few years, which we expected to be self-supporting, but were disappointed, as we had to supplement them to the extent of several pounds. We have just got a number of new books added to the library, a list of which has been sent to each of you. We trust they will be often used, and not allowed to lie on the shelf in our bookcase. I shall now refer to what I consider the most important of all the benefits conferred upon the trade by your Society, I mean the issuing of the Glasgow price list. It is difficult to calculate the great good that this has done to the trade. Before it was issued continued complaints were heard about the differences of the charges made for the same medicine. I have heard a customer remark that surely there must be something very "queer" about our trade, as he had got a prescription made up in four or five different establishments, and was charged a different price in each of them. This was very disagreeable, but there seemed to be no help for it; every one had his own private mark, and charged what he thought right, which was often very far wrong. This difficulty has now been done away with; one mark has been adopted; good prices are now got for medicine; and we do not hear many complaints from our customers. I think the druggists of Glasgow adhere very well to the price-list. I do not suppose that in a city like this we shall ever get complete adhesion to it. Businesses differ very much; what is possible in one establishment is often quite impossible in another. Prices even much above the price-list are sometimes got, and again less has to be taken, as occasion may require. It is quite impossible that a hard and fast line can be insisted upon. So much for what we have accomplished. I will now look at what I think may still be done by your Society. I would begin as we did before, by a new crusade against the enemies of early closing. I observe, with the deepest regret, that great numbers are getting very lax in their observance of the eight o'clock movement. I see a great many shops open till nine o'clock, and even later, who used to shut at eight. This is to be found in districts where we might expect that a strict observance of it could be kept. Very often one druggist is the cause of a whole district falling back. He is, perhaps, just commencing business, and is anxious to do all he can to make it profitable. He keeps open an hour longer than his neighbour, who soon follows his example, and so the movement spreads from shop to shop until, as I have said, a whole district is spoiled, while no more business is done. This ought not to be, and I trust every effort will be made to make the eight o'clock movement universal; after this is accomplished, we may begin to entertain the hope of a seven o'clock movement, but we must manage the first before we go further. I would also like to see our Society increase greatly in numbers. There are only forty-four chemists and druggists who are members. This does not say much for the interest taken in it by the trade. I should like to see our membership over one hundred, exclusive of assistants and apprentices. This could easily be obtained. Only let each member induce other two to join and it will be done. I should also like to see a large number of our country friends joining our Society, and adopting our price-list. It would be a benefit to us, and a greater one to themselves. We require to have our funds greatly augmented, as at present we are hampered on every side for want of cash. I should like very much if we were in the position to rent a large and comfortable room, and to have it well fitted with all the various specimens of plants, drugs, and chemicals, which are so useful to our students. Our library will yet, I hope, be largely increased; and I am sure we shall be happy to receive donations of good works from any one who cares to present us with them. When we have accomplished this we shall have the satisfaction of having done something to benefit the trade, both bodily and intellectually. I have been led to make these remarks in consequence of a conversation I had with a druggist of this city. I asked him to become a member of the Society, he replied by asking me what good the Society had done to the trade, as he had never seen any. I was surprised at this remark, as he has been in Glasgow for several years. I had only to mention some of the benefits which your Society had conferred upon the trade, when he at once joined the Association, I hope his example will be largely followed.

Mr. W. Emmerson M'cIver, F.C.S., then read a paper on 'The Growth of Plants,' which he treated from a chemical point of view. Mr. McIver was cordially thanked for his valuable paper, and congratulated on his prospects of future success in Melbourne, Australia, where he is about to proceed as a professor of chemistry.

Mr. McKenzie, treasurer, acknowledged the receipt of the following among other donations, in addition to the annual subscriptions, viz.:—W. Greig (President), £5 5*s.*, A. Kinninmont (Vice-President), £1 1*s.*, Dr. A. M. Robertson, £1 1*s.*, J. M. Fairlie, £1 1*s.*, A. Paul, 10*s.*, J. A. Clarke, 10*s.*, Jas. Whitslane, 7*s.* 6*d.*, etc., etc.

Before the meeting separated several names were then enrolled for Dr. Machattie's practical chemistry class, and as members of the Association.

The opening meeting of the Assistants' Section was held on the 27th inst., and the next scientific meeting will be held on November 10, Mr. William Gilmour, President of the North British Branch of the Pharmaceutical Society, will be the lecturer.

THE ASSOCIATION OF CHEMISTS AND DRUGGISTS FOR WOLVERHAMPTON AND DISTRICT.

The opening sessional meeting of the above Association was held on Thursday evening last, in the Committee Room of the Agricultural Hall. Mr. W. Fleeming, the President of the Association, in the chair. There was a good muster of members and students.

The Chairman, in opening the proceedings, expressed the pleasure it gave him to meet the members and students of the Association at the commencement of the second session. He was very glad, indeed, to see so good a gathering, and he hoped that as one result of the meeting the various classes announced for the ensuing winter evenings, in the circular that had been sent out, would soon be filled up, and that the attendance at those classes would be of such a character as to give every satisfaction to the gentlemen who had kindly undertaken to conduct them. They had a very gratifying retrospect in looking back at the work of last session; it was in every respect a very successful one, the utmost harmony prevailed at all their meetings, the attendance of the students was regular and punctual, and those gentlemen who undertook the teaching of the classes expressed themselves well satisfied with the results. He thought also that they were commencing the present session under very favourable auspices, because from what he had heard he had every reason to believe that increased interest was taken in the Society's operations. Speaking to the students present, he would impress upon them this fact, that before they could fit themselves to pass the examinations of the Pharmaceutical Society, and so obtain certificates as qualified chemists, they had a great deal to learn, and this required of them steady and unremitting study. He might remind them that they had much greater advantages and many more opportunities of obtaining knowledge to enable them to rise in their profession than had the chemists of former days, and he was very glad to see on the table before him the numerous collection of valuable books which their secretary, Mr. Barrett, had received from various gentlemen as donations to their library, which, under certain restrictions, the students of the Association had the privilege of using. In conclusion, he again congratulated all present on the success which had attended the first year's operations of the Association, and he sincerely hoped that still more successful results would be achieved in the future.

Mr. Barrett then read over a long list of the various important works he had received as additions to the Association library, and also the names of additional subscribers to the funds:—From the Pharmaceutical Society, the Journal; 'The Proceedings of the American Pharmaceutical Association;' 'The Canadian Pharmaceutical Journal;' 'First Step in Chemistry,' 'Key to Ditto,' 'Second Step in Chemistry,' and 'Qualitative Analysis,' from Professor Galloway; Volumetric Analysis,' from Francis Sutton, F.C.S.; 'Student's Guide to Materia Medica,' and 'Notes on Asthma,' from Dr. J. C. Thorowgood; 'Commentary on the British Pharmacopœia,' from Dr. W. G. Smith; 'On Light,' from Professor Tyndall; 'Chemistry,' third edition, from Professor Bloxam; 'First Principles of Modern Chemistry,' from Professor J. Kay Shuttleworth; Four Volumes of Botanical Works, from Professor Babington; 'Chemistry for Students,' from Professor Williamson; 'Lessons on Prescriptions,' from Professor W. Handsel Griffiths; 'Syllabus of Materia Medica,' 'Trees and their Nature,' and 'Man's Place,' and 'Bread,' from Professor W. A. Harvey; Four Science Primers, from Professor Balfour Stewart; 'Practical Chemistry,' from Mr. Francis Clowes; 'Practical Chemistry,' from Mr. F. Jones; 'University Science Questions,' and 'Chemistry Questions, with Key,' from C. J. Woodward, B.Sc.; 'Veterinary Pharmacopœia,' from Professor R. V. Tuson; 'Manual of Botany,' from Professor Balfour; 'Analyst's Note Book,' from Mr. Sydney Rich; 'Treatise on Food,' from Dr. Pavy, and several new subscriptions and money donations.

On the motion of the chairman, the hearty thanks of the Association were accorded to the individual donors of the books received, and the services of Mr. Barrett were acknowledged for his zealous labours in obtaining so many valuable additions to the library.

Two gentlemen were then proposed and unanimously elected "honorary and corresponding members of the Association."

After the election of ordinary members and associates the junior secretary (Mr. F. J. Barrett, F.C.S.) proceeded to read a brief report of the proceedings of the Association since the last general meeting in April. He stated that during the summer months classes on Practical Botany had been conducted by Mr. S. T. Severs, which were very well attended throughout. At the conclusion of the lectures the students presented Mr. Severs with a copy of Proctor's 'Practical Pharmacy,' as a token of their esteem and gratitude for his kindness.

The Council had decided to commence classes upon the following subjects, provided the necessary number of students joined:—(1) Latin and the subjects for the Preliminary Examination, Rev. Edward Hastie, B.A.; (2) Pharmaceutical Chemistry, Mr. W. L. Scott, F.C.S.; (3) Botany and Materia Medica, Mr. Stokes Dawson; (4) Practical Pharmacy, Mr. F. J. Barrett, F.C.S. As an extra inducement the Council had resolved, in addition to giving prizes at the end of the session, to pay half the class expenses out of the Association funds, the other half to be paid by the students themselves. The Association rooms would be quite ready for the use of members and associates by the 1st of November, the library and museum committee being energetically engaged in making the necessary arrangements. The following lectures had already been promised:—E. W. J. Jones, F.C.S. (Borough Analyst), "On the Spectroscope;" J. Y. Totherick, M.D., "The Relations of Medical Practice to Pharmacy;" J. E. Morris, F.C.S., "On Starch;" T. H. Davies, "On Bleaching." Besides these lectures, which would, of course, be the principal attraction at the monthly evening meetings, the Council hoped to be able to bring forward various articles of trade interest, and to exhibit novelties and inventions connected with pharmacy which might from time to time be brought out.

The report was ordered to be entered on the minutes, and Mr. Barrett was again thanked for the manner which he had put the proceedings of the Association before them, and for his indefatigable exertions on every occasion to forward the interests of the Association. Votes of thanks were likewise accorded to Mr. Severs for having efficiently and gratuitously conducted the botanical class during the past summer; and to the members of the Association who attended as a deputation at the meetings of the British Pharmaceutical Conference at Bristol.

Mr. W. Y. Brevitt (local secretary of the Pharmaceutical Society) then proceeded to deliver the introductory address to the students. After a few prefatory remarks, in which he humorously noticed the sudden determination of the chemists of the town to start a school of pharmacy (on a very small scale), the hurried commencement of the Association, and the great success which had attended its inauguration, he entreated students to make the best use of their younger days, and to seize every opportunity for improving themselves in the knowledge of the sciences connected with their business. In speaking of the preliminary examination he said it was to be regretted that some lads should be so hurriedly pushed into business without having obtained the knowledge requisite. It would be well if all employers insisted that this test of a boy's education be passed before having him under their care; the apprentices would then be ready at once to commence learning the more practical details of their business, and in preparing leisurely and thoroughly for the subsequent examinations. To be a thoroughly qualified pharmaceutist a man must not only be well instructed in all branches of his profession, but must keep himself well acquainted with all the latest improvements and inventions connected therewith. He must also be a good practical business man, for, with a competition only partially limited by a legal qualification, the number of pharmacists is so great that his legitimate business would frequently be insufficient to afford him a fair return for his education expenses and outlay connected with establishing his business. He was, therefore, compelled to rely upon resources offered him by the sale of articles other than pharmaceutical. If this were the case with the master the assistant must also be well adapted to, and posted up in, this part of the business, and thus, in many instances, a good, intelligent, business-like, unqualified assistant would be preferred to one with but little of this experience, but, at the same time, possessed of the highest pharmaceutical honours. It would be seen, therefore, how necessary it was that during their apprenticeship they should cultivate all those habits of order, perfect cleanliness in work and person, also in the department in which they were employed, and, in short, while systematically, industriously and carefully preparing for the time when they would have to present themselves before the board of examiners, they must not neglect the slightest means of gaining a thorough business education. He reminded them that "order is heaven's first law," that "cleanliness is next to godliness,"—cleanliness had also been called "a virtue,"—but in an occupation like theirs, which has for its primary object the preparation and dispensing of medicines for the relief of their sick and afflicted fellow mortals, it was something more than this—it was an absolute necessity.

After commenting upon the knowledge which may be gained by practical work behind the counter and in the laboratory, and urging his young hearers to endeavour to learn and remember the reasons which have caused the various processes to become adopted, Mr. Brevitt spoke of the ease and comfort by which a practical knowledge of Materia Medica, pharmaceutical chemistry, and botany could be gained, with the assistance of a good text-book and intelligent observation. He suggested that assistants in their leisure moments during business hours, should examine all drugs and chemicals before taking them into stock. He said that most chemists made a practice of testing chemicals and drugs in extensive use, but that it would be well both for themselves and their assistants and apprentices if they could afford the time to examine everything bought, and not being, as many of them are, entirely at the mercy of the manufacturer or wholesale houses. The time might come when chemists in one town would combine together and buy original packages of drugs, have them assayed by some chemist in their own employ, reject the impure, and divide the purest and best articles amongst themselves.

In speaking of the study of botany, Mr. Brevitt enumerated a large number of medicinal plants which he had collected in the immediate neighbourhood of Wolverhampton. In urging the young men present to cultivate habits of thorough industry, persevering study, and self-reliance, he instanced as bright examples for all young men, Michael Faraday and Henry Deane, from whose biographies he quoted some interesting extracts. In conclusion, he stated that the establishment of the Wolverhampton Association had been watched with anxiety, and its proceedings criticized by kindred societies, as was proved sufficiently by the cordial mention made by the President of the British Pharmaceutical Conference in his yearly address, and the friendly notices received in the journals connected with pharmacy. He assured the students that their masters wished to prove to them that they regarded them as something more than ordinary trade assistants; they looked upon them as the young men who might in a few years' time, as they gradually sink into the "sear, the yellow leaf" period of life, fill the positions they now hold. They desire them therefore to become worthy successors, and better educated men and more accomplished pharmacists than they themselves were. The association had for its sole object the students' interest and improvement, and its ultimate success or failure rested entirely with them. Would they make use of the advantages and opportunities now offered, or would they thrust aside with apathy and carelessness the friendly endeavours to benefit them? The employers trusted they would throw their whole heart into the Association work, and make it the success it deserved to be. Wolverhampton has been called "the metropolis of the Black Country;" the employers desired when the young men left them to go forth into the world, that they might become living witnesses of the truth of the borough-motto, "Out of darkness cometh light."

The address was listened to with great interest throughout, and at its close Mr. Scott moved, and Mr. Gow seconded, that the best thanks of the meeting be given to Mr. Brevitt for his very practical and instructive address.

The Chairman, in putting the motion to the meeting, expressed his concurrence with a suggestion made by Mr. Brevitt, in the course of his address, that the chemists and druggists of the town and neighbourhood should unite together in the purchase of bales of drugs from the importers, so that in retailing them out to their customers they would be in a better position to guarantee their genuineness and purity than they were in purchasing them from the large wholesale houses. He hoped that this association might be the means of bringing about so desirable a result.

The motion was then put to the meeting, and carried by acclamation.

At the suggestion of the Chairman, and at the express wish of the meeting, Mr. Brevitt consented to have the paper printed, and copies circulated amongst the members and students. A vote of thanks to Mr. Fleeming for presiding brought the proceedings to a close.

LIVERPOOL CHEMISTS' ASSOCIATION.

TWENTY-SEVENTH SESSION, 1875-6.

The first general meeting of the twenty-seventh session of the Association was held at the Royal Institution, October 21, 1875. The President, Mr. A. H. Mason, F.C.S., in the chair.

The following donations to the library and museum were announced:—Current numbers of the *Pharmaceutical Journal*, the *American Chemist*, the *Canadian Pharmaceutical Journal*, *Muster Zeitung*, 'Proceedings of the Liverpool Geological Society,' etc. A specimen of fine Crystals of Iodide of Potassium, collected by Mr. W. F. Best, F.C.S., and with glass shade, presented by Messrs. Atkinson and Co., London; specimen of Nitrate of Pilocarpine, the new alkaloid of jaborandi, from the discoverer, Mr. W. A. Gerrard, University College Hospital, London; thirty-two specimens of chemicals and pharmaceutical preparations, including a very fine specimen of Glacial Phosphoric Acid, from Messrs. T. Morson and Sons, of London, who intimated that they intended to extend this collection to about a hundred specimens, amongst which would be some recent novelties.

Dr. Symes presented a sample of Araroba, or Goa Powder, and described its use and origin. Araroba, or Goa powder, is a substance which has gained a reputation in the East Indies for the cure of certain skin diseases. It is the produce of a tree growing in Brazil, and is evidently deposited in the heart wood during growth. It has been imported into this country from Bahia in cakes of about 1 cwt., and cases of 200 lbs. weight, each. As it arrives it is in lumps, mixed with fragments of wood. In powdering it is liable to produce great irritation to the eyes, nose, and throat. It has already been used with some success in this country.

Thanks were voted to the donors, with special votes to Messrs. T. Morson and Sons, and Mr. Gerrard.

Mr. A. C. Abraham was elected a member of the Association.

A very large number of questions was found in the question box, some of which were answered at once, and the remainder referred to the next meeting.

This meeting having been called an hour earlier than usual, the President asked the members present their opinion upon the change, and if it should be made permanent. A long discussion ensued, and it was finally resolved, on the motion of Mr. Hallawell, that the hour of meeting should be in future 7·30, instead of 8 o'clock.

The President then read his inaugural address—

PRESIDENT'S ADDRESS.

Gentlemen,—My first duty is to thank you for the honour your Council has conferred upon me, in re-electing me as your President for the session we are now inaugurating, the twenty-seventh session of our Association. With your permission I take this renewal of your confidence as an appreciation of my efforts to further the interests of the Association during the past session, and with this stimulus, I beg to assure you that my best interests to serve you with those abilities with which Providence has favoured me, will again be placed at your disposal.

My next duty is to deliver an inaugural address, and I purpose this evening directing your thoughts to a subject which to my mind appears a suitable one, and by the consideration of which, I trust, we may all profit, viz., "Chemical Investigation as an Adjunct to the Development of Medical Art." It is necessary, perhaps, in the first instance to look back to the early history of the healing art. I shall do this summarily. My principal object is to bring before your notice recent therapeutical agencies which are now coming into frequent use, and which owe their origin to direct chemical investigation, the action of which in many instances depends upon chemical reactions or decompositions.

From the antiquity of the medical art, it is strange how little of value in practice has come from any remote period. Long after sculpture and architecture had attained an excellence which has not since been approached, and literature one which, to say the least, has not been surpassed; after the republics of Greece had furnished the models of all future commonwealths, and the Roman law of all future jurisprudence, the art of healing was in its infancy. It was limited to a few of the more obvious of the mechanical expedients of surgery, hot iron or boiling pitch, where hæmorrhage was incurred, playing the part of the ligature, and to the administration in a somewhat irrational and arbitrary manner of a variety of herbs, many of which are still in use, but of which the poppy is perhaps the only one which could not be spared.

Absolutely ignorant of pathology, the ancients knew disease only by its symptoms, and were guided in the application of remedies by pure empiricism, or in other words, by luck, chance, and random experiment. They were seldom directed by any real knowledge either of the nature of the disease or the action of the drug, they were, however, observant and cautious and used their scanty information with a good sense which does not seem to have been transmitted to some of their mediæval successors. Century after century passed without progress, because there was not any knowledge upon which rational conjectures could be founded. For a thousand years of stagnation the writings of Galen, the great compiler of ancient physic, sufficed to contain the medical knowledge and most of the medical errors of the world. For a long time his books were looked upon as the ultimate appeal in medical questions, and carried as much authority as if credited with inspiration. The mediæval physician was an alchemist, an astrologer, and, in the fashion of his time, a spiritualist. He is easily recognized in old engravings with his celestial globe ready to his hand, and his portrait bordered with the signs of the zodiac. When he was, to use a modern term, summoned to a case, he studied the heavens at the figure of the decumbiture, or the position of the stars when the patient took to his bed, and formed his prognosis, not so much from the state of the patient as from the state of the sky. In directing the treatment he had regard to the planetary connections both of the organ he supposed to be affected, and of the medicine he proposed to prescribe. Physicians of the present day pay tribute to his memory when they head a prescription with the mysterious figure, commonly mistaken for R to abbreviate Recipe, but really the astrological sign of the planet Jupiter, once intended as a direction to the herbalist to collect the ingredients under the influence of that planet. In many other instances the influence of the mediæval physician may be traced to the present time, but we must move rapidly on, come to later days and different modes of inquiry to advance the medical art. The physician must never be unmindful of his obligation to the old astrologer and alchemist. In his search for the philosopher's stone and the elixir of life, he tortured matter, until it gave up, if not the rudiments of chemistry, at least the errors from which those rudiments have sprung. His whole system was erroneous, but his was the error which fathers truth, but the truth was born late. It was not until the middle of the seventeenth century that Sylvius pointed out the antagonism of acids and alkalies, without which discovery our physicians would be at a loss in dealing with some of the complaints that most frequently plague mankind.

The absence of direct chemical knowledge in these olden days is well illustrated in the following quaint prescription which was written by a famous London physician, A.D. 1643, it is headed "Remedie against Fever, Poysons, small pox, the Plague, and such like." "R. In the month of March take Toades, as many as you will, alive, putt them into an earthen pott; cover it with a broad tyle, then overwhelm ye pot, so ye bottom may be uttermost; putt charcoales round about it, and in ye open ayre, not in an house, sett it on fire; when cold take out ye toades, and in an iron mortar, pound them well and tearce them (whatever they may be), a black powder will result. Of this you may give a dragme inwardly in any affection. For prevention, half a dragme will suffice. Moderate ye dose according to ye strength and ye constitution of ye partie." Our pharmacists would hardly appreciate such instruction in the present day, the method of modern medicine being, fortunately for the patient and prescriber, much simplified. In the progress of the sciences which underlie all comprehension of health and disease the last hundred years, since Priestley's and Scheele's discovery of dephlogisticated air, the precursor of oxygen, may well outweigh all that have preceded, and the last few years of chemical investigation have done more than all that preceded them, by putting the physician and the pharmacist (for we must not forget that it is for the pharmacist to develop the chemical art, to enable the physician to develop the medical art) in possession of such fundamental and essential facts, and bringing about such practical issues, that they may well be looked upon as rich in promise for the future health and happiness of mankind. In former times sponge when calcined, was known to have a specific therapeutic action. A few years ago it was shown to possess a portion of the then new and rare element iodine, which had first been detected in the ashes of seaweed by M. Courtois, in 1812. What an important adjunct this element is now to the healing art! Notably, the physician has his iodide of potassium, and increasing experience or pure empiricism tells him what symptoms call for its use.

Chemical investigation has also produced alkaloids, active principles, resinoids, etc., which may easily be dispensed, for internal, subcutaneous, or external application, and thus obviate the nauseous and irritating draughts which formerly had to be administered, giving a large portion of foreign and disagreeable elements to secure the specific which was required.

I have already referred to the poppy as one of the earliest remedies which could not be spared nowadays. The antiquity of the influence of this plant is without dispute. Homer and Hippocrates both mention it; it was known to the Arabs and Persians. What has chemical investigation done for the physician here? The pharmacist of the present day has from the capsules of the poppy his decoction, extract, and syrup, and the physician relies upon these for the active principles which chemical investigation has shown to be present—these being present in opium, which you are all aware is the inspissated juice obtained by incision from the unripe capsules of *Papaver Somniferum*. We will consider this product more fully. Several analyses were made of opium before any just ideas were obtained respecting its constitution. Derosne in 1803 first obtained a saline body. Sertürner and Seguin, the first, a Hanoverian, and the second a French apothecary, both discovered in 1804 another crystallizable substance, upon which subsequent experience has proved the narcotic power of opium to depend. In a second memoir of Sertürner published in 1817 he announced his discovery of the existence of *morphia* combined with *meconic* acid. This was confirmed by Robiquet. Since then, Geiger, Biltz, Peletier, Couerbe, Schmidtz, Mulder, Brown, Smith, Wright and others, have analysed opium, and shown it to consist of a variety of principles, and derivatives from these principles, many of which have a specific therapeutic action. Of these I have twenty-two specimens on the table, viz.:—

Dicalcic Meconate,
Meconic Acid,
Comenic Acid,
Morphia,
 ,, Hydrochloride,
 ,, Hydrobromide,
 ,, Meconate,
Nitrosomorphine,
Apomorphia Hydrochloride,
Codeia,
Chlorocodide,

Narceine,
Thebaine,
Papaverine,
Meconine,
Narcotine,
Methylnornarcotine,
 ,, Chloride,
Dimethylnornarcotine,
 ,, Chloride,
Opianic Acid,
Hemipinic Acid,

These are distinct and purely chemical bodies, giving abundant evidence of what chemical investigation has done for the healing art and showing its dependence thereon. Of course these do not exist in all samples of opium from any source, nor with these even must we suppose that chemical investigation has furnished with the products of the poppy. The laborious and wonderfully patient investigations of Dr. Wright on the derivatives of *morphine* and *codeine* have produced some hard names which it would only be tedious to you for me to enumerate, but the isolation of *apomorphia* has resulted in its being shown to possess a therapeutic action almost invaluable. Its chloride is the most speedy and the most certain emetic known, the tenth of a grain or even less is the dose required; it may be given safely to children, and acts more rapidly when hypodermically administered than when given by the mouth. It has been already shown that no after ill effects follow the administration of this medicine, and if it should have no other medicinal value than as an emetic, it will be a most important addition to the materia medica. No other emetic can be administered hypodermically; and all others are bulky in dose, very uncertain in action, and produce distressing nausea and depression.

I cannot pass over this subject without alluding to the removal of one who for many years laboured with great patience, most enthusiastically, and without any ostentation, experimenting upon these principles of opium. He has passed away since our last session. A just tribute is paid to the memory of the late Mr. David Rennie Brown of Edinburgh, in the *Pharmaceutical Journal* of September 25th. I remember with gratitude his explaining to me the results of his investigations and pointing to a shed in the yard at his laboratories to a heap of what we should perhaps call rubbish, the residue of all the opium used during his career, and saying that he would not have it removed, for he believed there was a great deal left in it yet. *Codeine* has been isolated since that accumulation was saved, and there remains that principle in it. His son successfully continues those labours, and I desire to record my thanks to him for providing me with the specimens on the table, manufactured in the laboratories of Messrs. J. F. Macfarlan and Co., of Edinburgh.

You are all aware that there are many varieties of cinchonas, and that their physical characters are chiefly important as indication of their richness in the principles which make them so valuable as medicinal agents. In 1802, so little was known of these, that Séguin concluded that the active principle was of the nature of gelatine. In 1803 Dr. Duncan detected a new principle, which he named *cinchonine*, which was isolated by Gomez, in 1810. In 1820, Pelletier and Caventou discovered *quinine*, proved that this and *cinchonine* were alkaloids combined with *kinic* acid, subsequently Pelletier and Corriol discovered a third alkaloid, *aricine;* Winckler discovered *quinidine*, and recent investigations of Howard, Hesse, De Vrij, and others have further cleared up the chemical constituents of the cinchona barks, and we now have *quinine*, *quinidine*, quinoidine, *cinchonine*, *cinchonidine*, *aricine*, and further, more recently we have introduced the whole of the alkaloids of East India bark combined, forming "*quinetum.*" Analysis of this shows it to be a mixture of quinine, cinchonine, cinchonidine, and amorphous alkaloid *in indefinite proportions*, and to my mind it is not a satisfactory product; on the other hand, "quinetum sulph." is a mixture of sulphates of quinine, cinchonidine, and cinchonine, containing about 20 per cent. of sulphate of quinine. The question in this case, whether isolated alkaloids have a specific action which is not so desirable or valuable as the combined alkaloids, is one which has yet to be decided by medical art. Certainly, quinine has proved a specific, and has been a favourite for a long time. If the combined alkaloids should prove more efficacious, commercial interest will have done good innocently. I have selected these two examples as the more prominently illustrating the important results which have been attained by the proximate analysis of vegetable substances, and for the production of which principles our country stands pre-eminent.

During the past twelve months no medicine has caused greater interest than "jaborandi," which, you will be aware, is a plant of the natural order Rutaceæ, imported from the Brazils, and said to be the *Pilocarpus pennatifolius* of Lemaire. Chemical investigation has been busy here, and Mr. A. W. Gerrard, of the University College Hospital, London, has discovered and succeeded in isolating the active principle and alkaloid which he has named *pilocarpine.* The physiological experiments with pilocarpine have shown it to possess properties identical with those of jaborandi, a much smaller dose producing the full effects obtained by the use of the plant itself. Mr. Gerrard has kindly sent to me a specimen of *nitrate of pilocarpine* for our museum. We thank him for this, and congratulate him upon the success of his labours. As this substance has not yet been examined chemically, it is an interesting subject for further research.

Coto bark is the latest vegetable product to which medical attention has been called; it is reported to be a "specific against diarrhœa in its most diverse modifications." It is also a reputed remedy for rheumatism and gout. In reading the results of Dr. Wittstein's chemical examination of this bark, it is remarkable to note that one of its constituents is a volatile alkaloid having a herring-like and urinous odour, and resembling propylamine or trimethylamine; this latter chemical body is now being largely prepared from herring-brine, and is in demand for medicina use as a remedy for rheumatism.

Chemical investigation has, however, gone much further to develop medical art than in the instance to which I have called attention. Organic compound have been introduced which are decomposed in the organism, and thus liberate in active form the principles they contain—viz., the compounds of iodine with the alcohol radicals. It has been shown that the iodides of methyl and butyl in solution, administered internally, or by way of subcutaneous injection, have specific action upon the glandular system.

We cannot consider this subject without passing high eulogiums upon the chemical investigation of eminent medical men—more especially in later years. I allude to the investigations of Simpson, Richardson, and Liebreich. Chloroform, nitrite of amyl, anæsthetic ethers, hydrate of chloral, and hydrate of croton chloral, have proved invaluable in their applications to relieve the sufferings of mankind. Chloroform, which enables us without pain, or fear of pain, to undergo those eviscerations and dismemberments which the surgeon regards with so much equanimity, and the patient with so much disquietude. As the corollary to chloroform, the fact that hydrate of chloral (recently only a chemical curiosity), introduced into the system, by contact with the alkalies of the blood, produces, when swallowed, effects like those of chloroform when inhaled, has brought to light a new, and now indispensable chemical—narcotic and hypnotic—besides its being a valuable adjunct to antiseptic surgery. Croton chloral hydrate, another chemical substance, is coming largely into use, as a specific in obstinate forms of neuralgia, diffused muscular pain, and the distressing night cough of chronic phthisis. Nitrite of amyl has proved a specific in "angina," and perhaps no recent chemical investigations have done more to relieve human and animal suffering than those of Dr. Richardson, of whom we as Englishman have every reason to be proud and thankful.

Time will not permit my entering into the details of what chemical investigation has done for antiseptic surgery, with carbolic acid, boracic acid, salicylic acid, and others, or the help that chemistry provides to prevent contagion and putrefaction with disinfectants, deodorizers and antiseptics, but all these at the present time are absolute essentials to develop the medical art, for we must prevent as well as cure, bearing in mind the old adage that "prevention is better than cure."

A great deal has been written for and against salicylic acid since Kolbe produced it artificially, so much so that not only amongst medical men, but everywhere where antiseptics are required experiments are being made with it. It has occurred to me that the divided opinions as to its *disinfecting properties* may be due to the fact, that it is difficult to obtain carbolic acid free from cresylic acid; if such an acid were used to mauufacture the artificial salicylic acid, the ultimate product would be a mixture of salicylic and cresotic acids and disinfecting properties might be due to the latter. This is only conjecture which I cannot verify by experiment.* Kolbe's process for manufacture is now patented. I am informed that this acid is to be used under authority on board ships for keeping drinking water sweet and wholesome. For medical use I should think it advisable to use the *natural salicylic acid* obtained from oil of wintergreen as more reliable.

The administration of phosphorus is an important subject for investigation, and although chemistry has done a great deal a thoroughly reliable method has not yet been suggested.

Before concluding this part of my address I wish to call your attention to the elaborate and scientific paper of Dr. Thudichum, read before the Medical Society of London in February last, on the "Chemical Statics of the Brain." This paper showed careful chemical research and labourious investigation. He premised that the study of brain statics lay at the base of the physiology and pathology of the structure and that without a knowledge of the chemical relation which its various principles bear to one another we should never arrive at the laws for the administration of those medicines which act on the brain. Dr. Thudichum enumerated four groups of chemical principles which he had isolated from brain matter. (1) The albumen group which was only represented to a small extent. (2) The phosphorized group, of which *cephaline* was a type. (3) The fatty group in which neither phosphorus nor sulphur was present. It embraced *cerebrine*, *phrenosine*, and *kerasine*. (4) The *cholesterine* group. Besides these inorganic salts here mentioned, he made the very interesting and important discovery that copper exists naturally in the brain of all animals. A single brain, burnt in a platinum vessel, shows copper easily by treating the ash with ammonia.

The reported discovery of a new chemical element "gallium," by M. Lecocq de Boisbaudran, and the isolation of hypochlorite of calcium by Kingzett are perhaps the only interesting chemical novelties brought to light during our recess.

I fear I have already trespassed upon your patience. Permit me in conclusion to refer to the proposed work of the coming session. It is matter of regret that your Council for the present are compelled to discontinue the classes held under their auspices in the School of Pharmacy connected with our Association; but it is their misfortune, not their fault. During the presidency of Dr. Symes, the Council used every means to endeavour to bring students to avail themselves of the opportunities afforded them, but without success, and as it was intended then as a final attempt you cannot wonder at your Council being disheartened when only three or four candidates apply for admission. There are fortunately, however, many opportunities in this town for young men to obtain a knowledge of chemistry. The laboratory at the Royal Institution is still at the disposal of those who wish to study practical chemistry with Mr. Davies, F.C.S., the schools of chemistry in Duke Street under the superintendence of Mr. Murphy, F.C.S., and Hackins Hey under the superintendence of Mr. Tate, and I hope our associates will avail themselves of these opportunities. I remind them of our excellent library and museum which is for their use in this building.

From the note issued with the circular calling this meeting, you will see that it is proposed to have some original papers read of a distinctly chemical nature at the general meetings of our Association. Mr. Thomas Garside, F.C.S., will read the first, November 18th, on "The Organic Constituents of Sewage." Mr. James T. Armstrong, F.C.S., will read the second, December 16th, on "New Methods for the Chemical Examination of Oils." In all probability Dr. J. Campbell Brown, F.C.S., will read a paper about water analysis, January 20, 1876. Other papers are promised, and I hope some of our more distinguished pharmaceutical members will come forward and illustrate their science. Botany seems to have been deserted altogether by us. A botanical paper will be most acceptable. The intermediate evenings will assume the nature of conversazioni; by this we mean meetings where exchange of ideas may be made between younger members of our Association. Especially short papers, or communications of general interest will be very desirable, but please remember that these meetings are not for younger members only.

A large amount of information must of necessity be acquired in the several chemical and pharmaceutical laboratories in this town; most of this might be communicated to this Association at these meetings, and even published without injury to those immediately concerned. This is especially true of analytical methods, and I think the publication and discussion of these would do much to remove the disgrace to which the science is often subjected by the wide discrepancies of analysts. In November, Dr. Brown will exhibit and explain M. Gram's new magneto-electric machine. Early in January we hope to hold a public conversazione, at which a lecture will be delivered by some eminent scientific man, and objects of scientific interest, etc., will be exhibited. We have not had a public conversazione since 1871, and I think that the Science Lecture Association, though unfortunate, has perhaps paved the way for one lecture to be a success with us.

In conclusion, gentlemen, I am sure it is not necessary for me to remind you that to have a successful session it is essential for *every individual member* to determine to make it such. Remember that "union is strength;" at the same time that if some half-dozen members are to do the whole work of the session, as has sometimes been a necessity, it is not fair for you to blame those who have done the work, or to charge them with being a clique, when you will not take up your share. Gentlemen, I rely upon your support, and I ask you for it. I, for my part, am desirous to do my utmost to further the interest and advancement of our Association. I am deeply sensible of the renewal of your confidence, and again thank you.

Mr. Murphy moved—

> "That the best thanks be given to the President for his instructive and valuable address."

He did this with much pleasure, as the address was one showing more than ordinary thought and research, and because in addition to this excellent address the President had been unwearied in the past in his efforts to improve the position of the Association.

Mr. Abraham said a more interesting or talented address had never been delivered before the Association, and he had much pleasure in seconding the vote.

The vote being carried with loud acclamation, the President returned thanks and the meeting closed.

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* Since this I have seen Dr. Endemann's paper, published in the *Pharmaceutical Journal* of the 23rd. inst., in which he alludes to the same thing.—A. H. M.

Proceedings of Scientific Societies.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The above Association held its first meeting for the session of 1875—76 at 17, Bloomsbury Square, on Thursday evening, October 21, Professor Attfield, President, in the chair. There were present between thirty and forty members and some visitors.

The Secretary reported that during the last session the number of members had been fifty-eight, and there had been fourteen meetings. The first was held on January 21, when Professor Attfield, who had consented to become the permanent president, gave an introductory address, in the course of which he explained the educational aims of the Association and sketched out the mode of accomplishing its object by members reading and discussing essays or papers on subjects connected with pharmacy and the sciences on which pharmacy was based. At the subsequent meetings the following papers were read:—'On Catalysis,' by Mr. Chas. Shapley; 'Antimony and its Compounds,' by Mr. Arthur Hunt; 'Pharmaceutical Ethics,' by Mr. J. M. Broad; 'The Analysis of Urine and its Physiological and Pathological Significance,' by Dr. Senier; 'Fermentation,' by Mr. Chas. R. Riley; 'French Pharmacy,' by M. E. de Franciosi; 'The Life of Count Rumford,' by Mr. Harold Senier; 'An International Pharmacopœia,' by Mr. J. M. Broad; 'Diet as a Therapeutic Agent,' by Mr. Chas. J. Boorne; 'The Correlation of the Physical Forces,' by Mr. W. H. A. Naylor. These papers, the secretary reported, were being transcribed into a book for circulation among the members.

Professor Attfield then spoke of the pleasure felt by members of the Council of the Pharmaceutical Society, and by the Professors of the School in the continued prosperity of the Association, welcomed the old and new members of the Association and the visitors, and addressed those present "On the Best Means of acquiring Education as distinguished from Knowledge." By knowledge, he said, he meant that which they directly learned at school, in the shop, and as students; that in which they could be examined. By education he meant, as he had elsewhere stated, enlightenment of the understanding, mental training and discipline, and general elevation of the intellect. By knowledge they could obtain a licence to practise their calling; education would enable them to practise it with success and with real pleasure to themselves. By knowledge they would get through life; by education they would pass life happily and nobly. Let them not think that a certificate given by their examiners was a guarantee of education—it was only a guarantee of their possession, at the time, of more or less information in certain branches of knowledge. Examination called forth knowledge necessarily, not necessarily education. For the good of pharmacy and all pharmacists he hoped the day would soon come when the Pharmaceutical Board of Examiners would be able to set their seal not only to knowledge, but to a compulsory curriculum of study specially designed to promote education. Meanwhile students must for themselves seize all opportunities for education. The best method of acquiring education was to cultivate their powers of observation, perception, and description. From statesman to shopman, the successful men were first those whose eyes and ears were trained to receive correct impressions, or in other words those who were trained to observe accurately. Next they were those who could best see through men and their motives, as well as nature and her forces, in other words, those trained to perceive intelligently. Thirdly, they were those who could best describe what they had observed and perceived. Let any member of the Association observe carefully the work of a Faraday or a Linnæus; let him endeavour to perceive the aims of such men or the working of the laws they unveiled, and then come to the fortnightly meetings prepared to describe what observation and perception had taught him, and he would help to educate his fellow-members and most certainly would educate himself. And other subjects, such as those discussed during the past year, would equally well serve the purpose. Beyond all personal advantage also, pharmacists were bound to promote their well-being as a brotherhood and the well-being of the calling in which they were engaged. Councillors, teachers, examiners, and other representative men would be required, to fill positions which could only be worthily occupied by the well-informed and well-educated. Every member of the Association should do his best to promote its stated objects; the result would be that each would become a better man and a better member of society.

A Committee was then appointed to examine the voting papers, and this being done, the following were announced officers:—Vice-Presidents, Mr. Arthur Hunt, and Mr. W. A. H. Naylor; Committee, Mr. Harold Senier, Mr. John L. West, Mr. Thomas Slater, Jun., and Mr. Henry G. Greenish; Secretary and Treasurer, Dr. Senier, F.C.S., 17, Bloomsbury Square, W.C. A vote of thanks having been given to the president, the Association adjourned.

SOCIAL SCIENCE CONGRESS.

Address on Health.

BY BENJAMIN W. RICHARDSON, M.D., F.R.S.

(Continued from page 339.)

From the study of the past we are warranted, then, in assuming that civilization, unaided by special scientific knowledge, reduces disease and lessens mortality, and that the hope of doing still more by systematic scientific art is fully justified.

I might hereupon proceed to my project straightway. I perceive, however, that it may be urged, that as mere civilizing influences can of themselves effect so much, they might safely be left to themselves to complete, through the necessity of their demands, the whole sanitary code. If this were so, a formula for a city of health were practically useless. The city would come without the special call for it.

I think it probable the city would come in the manner described, but how long it would be coming is hard to say, for whatever great results have followed civilization, the most that has occurred has been an unexpected, unexplained, and therefore uncertain arrest of the spread of the grand physical scourges of mankind. The phenomena have been suppressed, but the root of not one of them has been touched. Still in our midst are thousands of enfeebled human organisms which only are comparable with the savage. Still are left amongst us the bases of every disease that, up to the present hour, has afflicted humanity.

The existing calendar of diseases, studied in connection with the classical history of them written for us by the longest unbroken line of authorities in the world of letters, shows, in unmistakable language, that the imposition of every known malady of man is coeval with every phase of his recorded life on the planet. No malady, once originated, has ever actually died out; many remain as potent as ever. That wasting fatal scourge, pulmonary consumption, is the same in character as when Cœlius Aurelianus gave it description; the cancer of today is the cancer known to Paulus Ægineta; the Black Death, though its name is gone, lingers in malignant typhus; the great plague of Athens is the modern great plague of England, scarlet fever; the dancing mania of the Middle Ages and convulsionary epidemic of Montmartre, subdued in its violence, is still to be seen in some American communities, and even at this hour in the New Forest of England; small-pox, when the blessed protection of vaccination is withdrawn, is the same virulent destroyer as it was when the Arabian Rhazes defined it;

ague lurks yet in our own island, and, albeit, the physician is not enriched by it, is in no symptom changed from the ague that Celsus knew so well; cholera, in its modern representation, is more terrible a malady than its ancient type, in so far as we have knowledge of it from ancient learning; and even that fearful scourge the great plague of Constantinople, the plague of hallucination and convulsion which raged in the fifth century of our era, has in our time, under the new names of tetanoid fever and cerebro-spinal meningitis, been met with here and in France, and in Massachusetts has, in the year 1873, laid 747 victims in the dust.

I must cease these illustrations, though I could extend them fairly over the whole chapter of disease, past and present. Suffice it if I have proved the general proposition, that disease is now as it was in the beginning, except that in some examples of it it is less virulent; that the science for extinguishing any one disease has yet to be learned; and that, as the bases of disease exist, untouched by civilization, so the danger is ever imminent, unless we specially provide against it, that the development of disease may occur with original virulence and fatality, and may at any moment be made active by accidental or systematic ignorance.

A City of Health.

I now come to the design I have in hand. Mr. Chadwick has many times told us that he could build a city that would give any stated mortality, from fifty, or any number more, to five, or perhaps some number less, in the thousand annually. I believe Mr. Chadwick to be correct to the letter in this statement, and for that reason I have projected a city that shall show the lowest mortality. I need not say no such city exists, and you must pardon me for drawing upon your imaginations as I describe it. Depicting nothing whatever but what is at this present moment easily possible, I shall strive to bring into ready and agreeable view a community not abundantly favoured by natural resources, which, under the direction of the scientific knowledge acquired in the past two generations, has attained a vitality not perfectly natural, but approaching to that standard. In an artistic sense it would have been better to have chosen a small town or large village than a city for my description; but as the great mortality of states is resident in cities, it is practically better to take the larger and less favoured community. If cities could be transformed, the rest would follow.

Our city, which may be named *Hygeia*, has the advantage of being a new foundation, but it is so built that existing cities might be largely modelled upon it.

The population of the city may be placed at 100,000, living in 20,000 houses, built on 4,000 acres of land—an average of 25 persons to an acre. This may be considered a large population for the space occupied, but, since the effect of density on vitality tells only determinately when it reaches a certain extreme degree, as in Liverpool and Glasgow, the estimate may be ventured.

The safety of the population of the city is provided for against density by the character of the houses, which insures an equal distribution of the population. Tall houses overshadowing the streets, and creating the necessity for one entrance to several tenements, are nowhere permitted. In streets devoted to business, where the tradespeople require a place of mart or shop, the houses are four storeys high, and in some of the western streets where the houses are separate, three and four storeyed buildings are erected; but, on the whole, it is found bad to exceed this range, and as each storey is limited to fifteen feet, no house is higher than sixty feet.

The substratum of the city is of two kinds. At its northern and highest part there is clay; at its southern and south-eastern, gravel. Whatever disadvantages might spring in other places from a retention of water on a clay soil, is here met by the plan that is universally followed, of building every house on arches of solid brickwork. So, where in other towns there are areas, and kitchens, and servants' offices, there are here subways through which the air flows freely, and down the inclines of which all currents of water are carried away.

The acreage of our model city allows room for three wide main streets or boulevards, which run from east to west, and which are the main thoroughfares. Beneath each of these is a subway, a railway along which the heavy traffic of the city is carried on. The streets from north to south, which cross the main thoroughfares at right angles, and the minor streets which run parallel, are all wide, and, owing to the lowness of the houses, are thoroughly ventilated, and in the day are filled with sunlight. They are planted on each side of the pathways with trees, and in many places with shrubs and evergreens. All the interspaces between the backs of houses are gardens. The churches, hospitals, theatres, banks, lecture-rooms, and other public buildings, as well as some private buildings, such as warehouses and stables, stand alone, forming parts of streets, and occupying the position of several houses. They are surrounded with garden space, and add not only to the beauty, but to the healthiness of the city. The large houses of the wealthy are situated in a similar manner.

The streets of the city are paved throughout in the same material. As yet wood pavement set in asphalte has been found the best; it is noiseless, cleanly, and durable. Tramways are nowhere permitted, the system of underground railways being found amply sufficient for all purposes. The side pavements, which are everywhere ten feet wide, are of white or light grey stone. They have a slight incline towards the streets, and the streets have an incline from their centres towards the margins of the pavements.

From the circumstance that the houses of our model city are based on subways, there is no difficulty whatever in cleansing the streets, no more difficulty than is experienced in Paris. That disgrace to our modern civilization, the mud-cart, is not known, and even the necessity for Mr. E. H. Bayley's roadway moveable tanks for mud-sweepings (so much wanted in London and other towns similarly built) does not exist. The accumulation of mud and dirt in the streets is washed away every day through side openings into the subways, and is conveyed with the sewage, to a destination apart from the city. Thus the streets everywhere are dry and clean, free alike of holes and open drains. Gutter children are an impossibility in a place where there are no gutters for their innocent delectation. Instead of the gutter the poorest child has the garden; for the foul sight and smell of unwholesome garbage, he has flowers and green sward.

(*To be continued.*)

Parliamentary and Law Proceedings.

Sale of Food and Drugs Act, 1875.

Regulations to be observed in transmitting articles for analysis to the Commissioners of Inland Revenue:—

1. The sample retained by the purchaser, as stated in sections 14 and 15 of the Act, should be carefully sealed up and secured either in paper or in a box, as the case may be.
2. The seal used should bear a motto or device not in common use, to enable its identity to be sworn to.
3. If sent through the post, the instructions issued by the Postmaster-General for the transmission of such samples should be carefully carried out, and the parcel should be addressed to—

"The Commissioners of Inland Revenue,
"Inland Revenue Office,
"Somerset House,
"London, W.C.
"The Principal of the Laboratory."

And in addition to the nature of the contents being stated on the front of the packet, as enjoined by the Postmaster-General, the name of the place whence sent should be stated.

If dispatched by railway or other conveyance, the address above given, with the name of the place from which forwarded, will be sufficient.

4. At the time the parcel is dispatched by post or otherwise, a letter should be sent by post to the Principal of the Laboratory, apprising him of the transmission of the sample for analysis, and stating the nature of the alleged adulteration, and such other particulars as may be considered necessary to facilitate the examination of the sample.

ALLEGED ADULTERATION OF "CITRATE OF MAGNESIA."

On Saturday, October 16th, at the Police Court, Greenock, before Bailie Paton, Mr. James Kerr, druggist, Cathcart Street, was charged under the Act to amend the law for the Prevention of Adulteration of Food and Drink and of Drugs (1872), with having sold two ounces of citrate of magnesia, being an article of medicine, which was adulterated with carbonate of soda, tartaric acid, sugar, and sulphate of soda. Mr. James Auld prosecuted, and Mr. Macdonald (of M'Clure and Macdonald) appeared for the defence.

Mr. Young, Inspector of Weights and Measures, and Ewen M'Intyre, police serjeant, deposed to having purchased the article in question and handing it to the analyst.

Mr. M'Cowan, town analyst, stated that he had analysed the sample bought from Mr. Kerr, and that it contained as an adulteration carbonate of soda, tartaric acid, sugar and sulphate of soda, and that the pure article consisted of citric acid with magnesia. On cross-examination he deposed that he found a trace of citric acid in the sample and also a small quantity of magnesia, that he could not say whether the sulphate of soda was there as an adulteration or that it arose from decomposition caused by the acid; that he considered the stuff sold a vile adulteration, and that the pure article could be got as an article of commerce, and that he had got some. On being interrogated as to where he got the pure article produced he admitted that he had got it from a manufacturer of chemicals for scientific purposes, after applying to Frazer and Green, Druggists, Glasgow, and at the Glasgow Apothecaries' Hall for the pure article without getting it. He did not apply to any druggist in Greenock because he believed he could not get the pure article. He admitted that citrate of magnesia was not to be found in the British Pharmacopœia, but was not aware that citrate of magnesia was the name given to a well-known article of medicine compounded in the same way as the sample analysed by him. On being questioned as to his reasons for calling it a vile compound, he admitted it was not injurious to health.

Dr. Machattie, as an analytical and consulting chemist, and neither a prescriber nor dispenser of medicine, gave evidence that the sample was practically similar to that sold by all druggists under the same name; that the name did not lead him to suppose it a true citrate of magnesia, any more than that a sample of so-called blacklead would contain any lead at all. He was aware that the name was a purely conventional one. Indeed, like many other mere mechanical mixtures, no short intelligible name could be given to it which would describe its true nature. A complete statement of the proportions and nature of the materials entering into its composition could alone correctly inform the public as to what they were purchasing. Such a system carried out to its full extent in dispensing drugs seemed to him as impracticable as it was useless.

Drs. Whiteford and Robertson, of Greenock, gave evidence that they frequently prescribed "citrate of magnesia;" that under that designation they always meant the compound in question; and that they would consider any druggist dispensing a true citrate of magnesia to be acting wrongly, and not according to the intention of their prescription. They agreed that should an occasion arise (which, however, did not appear to be in the least degree probable), when they really wished to prescribe a true citrate of magnesia, they would certainly inform the druggist, orally or in writing, that such was their intention.

Messrs. Alexander Kinninmont, Thomas Davison, Glasgow, and Messrs. Macnaught, Thomas Fisher, Robert Mill, and George Armytage, chemists in Greenock, testified that the citrate of magnesia sold by Mr. Kerr had been known in the trade for more than twenty-five years, first as originally introduced by the late Mr. King as a proprietary medicine, and latterly in the more elegant form invented by Mr. Bishop; that it was the only article known to or used by the public as a domestic remedy, the true compounds of citric acid and magnesium being unknown in the retail trade, and differing so much in dose and medicinal effects as to be entirely unsuitable for the purposes to which the citrate of magnesia in question has been found so well adapted; consequently that this was the only preparation that a chemist would be justified in selling to a customer who asked for citrate of magnesia, unless a specific indication was given that a true citrate was wanted. They agreed that they invariably dispensed a similar preparation to that on which the charge was founded, when a prescription demanded citrate of magnesia. They considered that to do otherwise would be wrong, even if they possessed a true citrate of magnesia, so thoroughly did all members of the medical profession understand the purely conventional character of the name. Moreover, there was no citrate of magnesia mentioned in the British Pharmacopœia. They also instanced several articles, such as cold cream, golden ointment, French chalk, as being well-known by conventional names which did not represent their true nature or composition.

Mr. Cross, agent for the firm who supplied the "citrate" to Mr. Kerr, was examined mainly as to the large quantity of the so-called citrate of magnesia used; also, whether it was probable that any adulteration could take place in it while passing from the manufacturer to the retail dealer. He explained that its peculiar *granular* character and mode of preparation almost precluded any possibility of adulteration after once manufactured. Although he sold very large quantities of this compound under the name of citrate of magnesia, he never sold—and, indeed, had never seen—a true citrate of magnesia. His evidence generally corroborated that of the druggists.

The agents having addressed the court,

Bailie Paton said: I must say that this is a most important case, affecting the whole drug trade. I acknowledge the ability of the agents in mastering a technical subject, and also the great scientific research of the professional witnesses examined to-day. The question is simply this—Was this citrate of magnesia adulterated? Taking the evidence as my guide, I must say that the proof fails to substantiate the charge against Mr. Kerr. Drs. Whiteford and Robertson have stated that if they prescribe citrate of magnesia the article sold by Mr. Kerr is what they wish, and not the article known as pure citrate of magnesia. Although the professional gentlemen differed to some extent, they substantially agree that the medicine before the court, while not pure citrate of magnesia, is the article of commerce known by that name. The term does not appear in the Pharmacopœia. I think that the dispenser of drugs is quite entitled to sell the article known in the trade as citrate of magnesia, when it is made up in the recognized way and acknowledged by the medical faculty. I must, therefore, find Mr. Kerr not guilty of the alleged adulteration.

Mr. Macdonald applied for expenses, but the application was refused, the magistrate stating that the Fiscal was warranted in investigating the case.

The case created considerable interest, not only to those engaged in the drug trade, of whom there was a number present, but also because this was the last prosecution under the old Adulteration Act. All new cases of this description will now be brought before the Sheriff.

Charge of Selling Adulterated Bread.

At the Middlesex Sessions, held on Saturday last, John Robert Moon appealed against a conviction by Mr. F. H. N. Glossop, and Mr. J. R. Hogarth, magistrates sitting in Petty Sessions at Brentford, for selling bread adulterated with allum.—Mr. Poland appeared on behalf of the appellant; Mr. Besley for the respondent justices.—The appellant is a baker carrying on business at Ealing, and in the month of July last he was summoned before the Brentford bench of magistrates by James Gregg, inspector of weights and measures, and also inspector under the Adulteration of Food Act, for selling bread that had been adulterated with alum. It seemed that Gregg had purchased a 2lb. cottage loaf at the shop of the appellant, half of which was sent to Dr. Redwood, the county analyist, for analysis, and the other half was put into a bag, sealed up, and was retained in the hands of the prosecution. After examination Dr. Redwood certified that the bread was adulterated to the extent of 20 grains of alum to the full loaf, but that was not to such an extent as to be injurious to health. The Bench, however, fined the appellant, and against that fine he appealed to this Court. The case came on for hearing at the last appeal day, when the other half of the loaf was produced, and Dr. Redwood gave evidence as to the adulteration of the half of it he had examined. A number of witnesses were called, who were in the employment of the appellant, and they proved that only the purest wheaten bread was baked in the appellant's place of business. It was then decided that the remaining half of the loaf should be submitted to an independent analytical chemist, such gentlemen to be selected by the Court. It appeared that Professor Wanklyn had submitted to him a loaf of the same batch as that sent to Dr. Redwood, who, after making a careful analysis of it, certified that it did not contain alum except such as was necessarily in and always would be in the purest wheaten bread; and when the case was last before the Court Professor Wanklyn gave evidence to this effect in favour of the appellant. It was decided with these conflicting opinions, that the matter should be submitted to a chemical analyst of the highest standing, and Dr. Stevenson, M.D., F.R.C.P., and Lecturer on Chemistry at Guy's Hospital was selected, and was requested to analyse the half loaf and submit the result to this Court on the next appeal day.—This day, on the case being called on, the following communication, addressed to Mr. Nicholson, the Clerk of the Peace, was read to the Court:

"Aug. 13.

"Sir,—I have to report that on the 3rd inst. I received from the hands of Mr. Joseph Ambler, a bag, sealed with four unbroken seals, and bearing a ticket marked "213." On the 11th inst. the bag was cut open in the presence of Mr. J. A. Wanklyn, and was found to contain half of a 2lb. cottage loaf of bread. The bread bore no visible mark. It weighed three-quarters of a pound, and was very dry and somewhat mouldy. As the state of the bread would not have admitted of any satisfactory examination into its nutritive value, it was subjected to analysis for mineral adulteration and impurity only. No loss of alum or other mineral matter could have occurred by the changes which the loaf had undergone subsequent to the baking. The analysis was made by me in the presence of Mr. Wanklyn. The bread contained the usual amount of mineral matter, and this was composed of the ordinary constituents found in pure wheaten bread ash. In fact, I could detect no difference between the mineral matter in this bread and that of genuine wheaten bread, either in quality or amount, the necessary allowance being made for the loss of water which the bread had undergone through drying. The bread contained 15 per cent. of moisture, and since fresh bread contains on the average 42 per cent. of moisture, 100 parts by weight of the original bread may be assumed to have been reduced by drying to 69 parts. The bread contained a small quantity of aluminium, and this is the most important constituent of alum. Genuine unadulterated wheaten bread contained a small quantity of aluminium. The quantity of aluminium in the bread sent to me did not exceed the amount often met with in genuine unadulterated bread. I am of opinion that the bread submitted to me is not adulterated with any mineral substance among which is alum. Were it even assumed that the aluminium in the bread was derived from alum added to the article the quantity of added alum must have been very small, for the whole quantity of aluminium in the bread (0·0037 per cent.) would correspond to only 3¼ grains of alum per 2lb. loaf of the usual dryness. That quantity of aluminium is, however, often found in genuine unadulterated wheaten bread to which no alum has been added.—I am, etc.,

"Thomas Stevenson, M.D., F.R.C.P.,
"Lecturer on Chemistry to Guy's Hospital, etc.

"To Richard Nicholson, Esq., Clerk of the Peace
for Middlesex."

Mr. Besley, who appeared for the appellant, said after this statement he could not support the conviction, and he at once admitted that it must be quashed.—The Assistant-Judge said: It is simply just to observe that the evidence has entirely vindicated the appellant's character as a respectable tradesmen and a baker of pure and unadulterated bread. The conviction must be quashed with costs against the informant.—*Daily Telegraph.*

Charge of Attempting to Poison.

At the Central Criminal Court, on Wednesday, the 27th inst., John Cuthbert, 54, a person of respectable appearance, was charged before Mr. Justice Quain, with administering a quantity of poison to Frederick Bond with intent to murder him. The prosecutor and his wife resided in Camden Road, Camden Town, and the prisoner, who was stated to be a person of independent means, was on intimate terms with them and in the habit of visiting at their house. On the 29th September it appeared that the prosecutor had obtained a mixture containing laudanum and other poisonous ingredients, as a lotion for a sprained ankle, and this bottle was placed on the table in his room. The prisoner appeared to have gone to the house on that day, and having proposed to give the prosecutor and his wife some wine, went out for the purpose of procuring it. The prosecutor and his wife went into another room, and when they returned they found the prisoner in the room, two glasses were on the table, each containing some dark liquid resembling port wine, and he invited the prosecutor and his wife to drink. The prosecutor, upon this invitation, took up one of the glasses, and gulped down the greater portion of its contents. He was immediately seized with a burning pain in his throat and stomach. He at once went to a doctor, who administered an emetic, and he did not sustain any serious mischief. It turned out that the prisoner had emptied the lotion into the glasses, and that the prosecutor had drunk the poisonous matter that was intended to have been used for the sprain. The parties appeared to have been previously on the most friendly terms, and there did not appear to be the slightest motive for imputing to the prisoner the intention to do the prosecutor any injury. The defence set up for the prisoner was that he was insane at the time he committed the act, and evidence was adduced to show that he had been confined in a lunatic asylum, and that for a great many years he had been subject to most extraordinary delusions. It was also proved that he had been in the habit of giving his servants mustard, vinegar, and similar things to drink by way of a "lark," and Mr. Gibson, the medical officer of Newgate, expressed his opinion that the prisoner was not in a sound state of mind. The jury, after these facts, returned a verdict of Not Guilty, on the ground of insanity, and he was ordered to be detained during Her Majesty's pleasure.—*Standard.*

Correspondence.

⁎ No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE PROPOSED PHARMACEUTICAL LABORATORY.

Sir,—I am one with Mr. Schacht in his worthy desire to improve pharmacy by bringing together a collection of pharmaceutical appliances. I think it a most important suggestion, and one to which every pharmacist who values his status should lend his support. Had such a collection been in existence I could often have saved myself and others hours of useless labour and pounds of money.

One of the most common and crying pharmaceutical wants of the day is, a useful stove heated by gas, combining the still, water-bath, evaporating and fusing pan, stirring apparatus, desiccating chamber, etc.; that such a one could be made suited to the general wants of the trade and at a moderate cost is beyond doubt; manufacturers of this class of goods would be glad to exercise their ingenuity in this direction, if allowed to exhibit their productions in a compatible collection.

I agree with Mr. Proctor, that practical pharmacy is not learned behind the counter; neither is it by lectures, but such a collection as is desired by Mr. Schacht would prove the best means to this end. Mr. Vizer argues that the proposal is undesirable. I will quote Mr. Sutton's address to the Association of Norwich Chemists in reply—"I hope the day may speedily come when we may find fewer establishments, but such as there are really good; when each place has a working laboratory with efficient apparatus, and where real practical work can be done, rather than, as is often the case now, all the important preparations purchased of a wholesale manufacturer, so that the occupation of a pharmaceutical chemist is more that of a huckster than of a scientific man." Mr. Vizer also fears that it would not pay because the pharmacist has not the time nor does he find it profitable to engage in the preparation of chemicals. Now if the pharmacist is so fortunate in his business as to be wholly occupied therein, his consumption of preparations must be somewhat extensive, and this is just the case when it does pay to make them; for let him seek well qualified assistance, he will thus not only improve his profits but his reputation, gaining an amount of knowledge and pleasure which a lifetime of measuring, weighing, and selling cannot afford.

A. W. GERRARD.

University College Hospital,

Sir,—I have read with some interest Mr. Vizer's letter, and must confess I should like to have the *entrée* to the kind of exhibition proposed by Mr. Schacht.

There are many things which are much better when freshly prepared, and moreover, I always feel more confidence in preparations of my own.

The objection to going to a special manufacturer would be that you would feel that he expected you not to waste his time, almost a point of honour to purchase something. Now, if the Society could give the requisite space, would it not be feasible to allow manufacturers, under supervision, to exhibit their apparatus with, of course, a view to business, I fancy in that way, instead of twenty years hence having a collection of obsolete articles, we should have one with all the latest improvements and adaptations, and at a very small comparative expense to the Society.

THOMAS HAFFENDEN.

NEW REMEDIES.

Sir,—The old adage, "there is nothing new under the sun," seems to be receiving striking confirmation in the case of some of our "new remedies." The *British Medical Journal* has exhumed from the works of the Hon. Robert Boyle, London, 1772, an early notice of the drug Jaborandi, quoted from Dr. Piso's 'Travels in South America.' The learned doctor seems to call it Jaborand, and to ascribe to it alexipharmic properties, antidotal to poisonous fungi, etc. Whether these properties were owing to its now well-known sialogogue and diaphoretic action he does not state, although these prominent manifestations of its action could hardly have escaped his observation. A reference to this drug, and one more readily available to pharmacists, if not quite so remote, may be found in 'A Supplement to the Pharmacopœia,' by Saml. Fredk. Gray, London, 1818, p. 99, in these words, "Jaborand:—Juice an antidote against the poison of mushrooms and cassuda," giving as its origin *Piper reticulatum;* no authority for this is quoted, and it is now I suppose well settled to be derived from *Pilocarpus pennatifolius.* Perhaps Gray derived his information from the above source and not from a real handling of the drug.

Black alder bark, another late candidate for honours, humbly praying these four years past for a recognition of its merits and receiving withal a considerable share of favour, would seem to have been held in small esteem by our ancestors 250 years ago. Gerarde, 'The Herball or Generall Historie of Plantes,' London, 1633, p. 1470, says, "It purgeth not only by the stoole, but many times also by vomit, not without great paine and trouble to the stomacke, it is therefore a medicine more fit for clownes than for civill people." Why so malignant, good Master Gerarde? We of this day and generation consider it to have mild and gentle ways, as testified by our friend Mr. Ince and others. Gerarde gives an engraving of the tree on the page quoted above. A remarkable and delightful book this of Gerarde's, and one well repaying perusal by those on the look out for "new remedies."

ALFRED E. TANNER.

Fairfield, Liverpool,

[⁎⁎⁎ We do not think our correspondent is correct in assuming that the plant referred to in the quotation in the *British Medical Journal*, or that mentioned by Gray in his 'Supplement,' is identical with *Pilocarpus pennatifolius.* As has been stated before in this Journal the name "jaborandi" is applied in South America to several species of *Piper* also, varying with the locality. The statement of Gray, however, that the juice of *Piper reticulatum* is an antidote to fungoid poison, is an interesting one, and worthy of investigation as to its truthfulness.—ED. PH. J.].

A. P. S.—The term "tar acids" no doubt means carbolic acid and the small proportion of analogous acid with which it is frequently mixed.

We have received from a correspondent in Zurich a copy of the official minutes issued by the town police authorities in reference to the testing of milk for the detection of adulteration.

W. E. Starling.—Iodine cannot be decolorized. The effect you mention may be due to impurity.

E. P. Peele.—Your communication with enclosure has been handed to the publishers, Messrs. Churchill, 11, New Burlington Street, to whom all advertisements should be sent.

G. C. Druce.—(a) *Festuca ovina;* (b) *Bromus erectus;* (c) *Ononis arvensis*, var. *repens;* (d) *Hieracium vulgatum;* (e) probably *Atriplex angustifolia;* (f) *Potamogeton pectinatus:* (g) *Juncus supinus.*

"*October.*"—Each member of a firm of chemists and druggists must be registered.

W. J. Tuck.—A formula for tincture of Gelsemium is given in the American Dispensatory as follows:—"Fresh root of the Yellow Jessamine cut into small pieces, 4 troy ounces; diluted alcohol, 1 pint. Macerate fourteen days, express and filter." There is also a fluid extract of Gelsemium in the United States' Pharmacopœia. See also, *Pharm. Journ.*, vol. iv., p. 998.

T. H.—Strictly speaking, a "patent medicine" would be one protected by Her Majesty's Letters Patent, but the proprietary articles to which the name is conventionally applied do not require registration.

"*Decimal.*"—Dowling's 'Tables for comparing British with Metric Weights and Measures,' published by Lockwood and Co., price 10*s.* 6*d.*

"*Aliquis.*"—(1) Wanklyn's 'Water Analysis' or Sutton's 'Volumetric Analysis.' (2) We cannot say more than that it is a very strong solution.

"*Gallicus.*"—There would be no difficulty in obtaining a French Pronouncing Dictionary from a bookseller.

G. Horne.—(1) The discoloration is due to decomposition and the separation of carbonaceous matter. (2) It would not be possible to make a satisfactory preparation with the ingredients in the proportions ordered. Consult the prescriber if possible.

THE ANALYSIS OF CINCHONA BARK.

BY EDWARD LAWRANCE CLEAVER, F.C.S.
Late Assistant Demonstrator in the Laboratory of the School of Pharmacy, Bloomsbury Square.

The want of a quick and accurate method for the estimation of the alkaloids in Cinchona Barks has long been felt, and although numerous processes have been suggested for the purpose, the author feels justified in saying that there has not been published up to the present moment any method by which a person inexperienced in bark analysis could obtain trustworthy results. A *résumé* of some of the existing processes, in order to point out their defects, will possibly be of some service.

The B. P. method is as follows:—

One hundred grains of finely powdered bark are macerated and boiled in 1 fluid oz. of acidulated water, then percolated with 1½oz. more of similarly acidulated water, or until the percolate is free from colour. The liquor is then treated with subacetate of lead to remove colouring matter, etc., and after filtration, mixed with caustic potash and 12 fluid drachms of ether. The ethereal solution is removed, evaporated and the resulting alkaloid weighed. The chief objections to this method are the following:—

(1) The quantity of bark directed to be taken is too small.

(2) One fluid ounce of liquid is not enough to properly macerate 100 grains of bark in fine powder.

(3) One and a-half ounces is not sufficient liquid to exhaust the bark, and if percolated until the percolate is free from colour, about 10 ozs. of liquid will have to be collected.

(4) The removal of the colouring matter by subacetate of lead ensures loss of alkaloid.

(5) The method of removing the alkaloid by means of ether ensures loss of alkaloid, and also does not guarantee the purity of the residue.

(6) Quinine is not perfectly dried by the heat of a water-bath.

The next method for consideration is that in which the bark is exhausted with dilute acid and precipitated with soda. The precipitate is then washed, treated with some solvent, such as oil of turpentine, coal oil, alcohol, or ether, the liquid filtered and distilled off, and the residue treated with dilute acid, precipitated, dried and weighed. The objections to this process are:—

(1) The quantity generally ordered (100 grains) is too small.

(2) Some barks when exhausted with acid and precipitated with soda give a precipitate which does not subside easily, thus giving rise to loss.

(3) The precipitate so obtained is much contaminated with colouring matter, which dissolves in the menstruum used to exhaust it.

(4) The water used to wash the precipitate dissolves some of the alkaloids present.

Another process is that suggested by Dr. De Vrij, which is as follows:—

Twenty grams of bark are made into a paste with 5 grams of slaked lime and then dried, the resulting powder twice boiled with strong alcohol, and the liquids mixed. It is then acidulated with sulphuric acid, filtered, and the spirit distilled off. The resulting liquid is filtered, precipitated with soda, and the precipitate washed, dried and weighed.

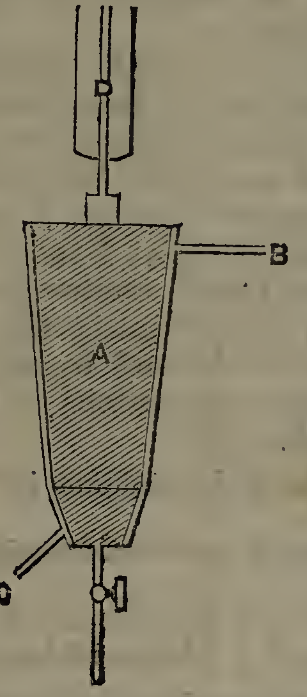
This is certainly the best process hitherto described, as by it the alkaloids are obtained in a very pure condition, but it is open to the following objections:—

(1) The quantity ordered to be used is too small.

(2) In washing the alkaloids some of them are dissolved, and if much water be used the error this causes is considerable.

Bearing in mind these objections, I have endeavoured to devise a process which, even in the hands of inexperienced persons, shall give accurate results in a short time. It is as follows:—Not less than 100 grammes of finely powdered bark are made into a paste with 25 grammes of slaked lime, and dried over a water-bath. The dried mass is then thoroughly exhausted with spirit, which operation I perform as follows, but which can be varied at the will of the operator:—

I put the mixture into a percolator, which has the outlet closed by a tap, and is steam jacketed; on the top is clamped a movable cover having an upright condenser attached to it.



A, Percolator; B, Steam Inlet; C, Steam Outlet; D, Condenser.

The tap at the bottom being closed, a litre of strong methylated spirit is introduced. Steam is then passed into the jacket, and the mixture well boiled for half an hour, the spirit that evaporates condensing and running back into the percolator. At the end of that time steam is turned off and the tap at the bottom opened, when the spirit will flow out. A little fresh spirit is poured upon the top of the mixture to displace that held in the mass, and the above operation is repeated.

The percolates are then united and made faintly acid with sulphuric acid, and the spirit distilled off, which is best done in a small flask, holding about one-fourth of a litre, with an arrangement fitted to secure a flow of spirit equivalent to the amount that distils over. When all the spirit has distilled away the remaining liquid is turned out and filtered into a beaker, the filter being washed and the liquid evaporated to dryness with excess of pure carbonate of barium (which should be well washed before use in order to free it from carbonate of sodium, which would vitiate the results); it is then exhausted with alcohol, and the liquid made up to a measured volume. If only the mixed alkaloids are wanted, a portion of the liquid is evaporated to dryness and dried at 130° C. until desiccation is complete. If, however, the proportions of quinine or other alkaloids are wanted, the operator must adopt one of the undermentioned methods, according to circumstances.

In estimating the amounts of the different alkaloids contained in the barks it must be remembered that quinine exists in two modifications, viz., amorphous and crystalline, and as the commercial value of a bark depends chiefly upon the amount of crystallizable quinine it contains, an alteration of the process is required accordingly as the analysis is made for commercial or experimental purposes.

I will first give some methods by which the total amount of alkaloids can be ascertained.

All the cinchona alkaloids with the exception of quinine are insoluble in pure ether when treated singly with that solvent; but in the presence of quinine cinchonidine is dissolved also, hence in barks containing both quinine and cinchonidine the proportions of quinine found are always too high. Great care must also be taken with regard to the ether used; none but pure, well washed and afterwards dried ether being taken, as the alkaloids other than quinine are perceptibly soluble in the water and alcohol which ordinary samples of ether always contain. The first method for the estimation of the total quinine is that in which the white powder, obtained in the preliminary operation of extracting the total alkaloids by saturating the acid solution with excess of carbonate of barium, is exhausted with ether, the ethereal solution evaporated, dried at 130° C., and weighed. This method when carefully performed gives accurate results, providing cinchonidine is absent from the bark employed, otherwise the results are a little too high. Another method which may be resorted to when rapidity is an object, is as follows:—

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, November 3, 1875.

The alcoholic solution of the mixed alkaloids obtained as described above is divided into three or four equal parts, the first of which is evaporated to dryness, dried at 130° C., and weighed. This gives the total alkaloids. The second portion is evaporated to dryness, treated with ether, and the solution filtered, evaporated, dried at 130° C., and weighed. This gives the total quinine. The third portion is titrated with standard sulphuric acid, and by means of the following equations the proportions of the isomeric alkaloids are obtained:—

Let x = the amount of quinine and quinidine in the weight of alkaloid taken.

The total weight taken—x = the amount of cinchonidine and cinchonine present, then

$$\frac{x98}{648}+\left(\text{the total alkaloids}-x\right)\frac{98}{616}=\left\{\begin{array}{l}\text{The amount of sul-}\\\text{phuric acid used.}\end{array}\right.$$

The quinine found previously is then subtracted from the value of x, which gives the quinidine. That portion of No. 2 which was insoluble in ether is then treated with warm dilute sulphuric acid, and made faintly alkaline with solution of soda. Rochelle salt is then added, and the precipitate that forms after some time collected and weighed: it consists of tartrate of cinchonidine, and contains 80·4 per cent. of cinchonidine.

The cinchonidine found is then deducted from the weight of mixed cinchonine and cinchonidine found from the equation, and thus gives the amount of cinchonine.

The amount of alkaloids found are then multiplied by three or four, according to the number of parts into which the alcoholic solution was originally divided.

This process is comparatively rapid, and if carefully performed gives accurate results.

I next come to those processes in which the separation of amorphous and crystallizable quinine is required. Dr. De Vrij effects this separation by taking advantage of the fact that the amorphous alkaloid does not form herapathite with an alcoholic solution of iodine, and this method is exceedingly good, but it has the disadvantage of not producing the alkaloid in the state of crystalline sulphate which is the condition in which the quinine present is required by the manufacturer. A process for the estimation of the crystallizable quinine has been devised by Carles, who obtains the mixed sulphates in a hot, slightly acid solution. He then says that on cooling the whole of the quinine is precipitated, whilst the other alkaloids remain in solution. This, however, is an erroneous statement, as the other alkaloids are precipitated under similar circumstances with the quinine.

The process I have adopted is as follows:—

The powder obtained by saturating the acid solution of the total alkaloids with carbonate of barium is exhausted with pure ether; this solution is then evaporated to dryness, and the extract dissolved in dilute sulphuric acid; it is then heated to boiling and made faintly alkaline with solution of soda, and on cooling, the sulphate of quinine is deposited in fine white crystals which are collected, slightly washed, dried over a water-bath and weighed. The mother liquor and wash water is then collected and either evaporated down, and the fresh crop of crystals added to those already collected, or it is measured, and one part by weight of quinine sulphate added to that before found, for every 300 parts by volume of the liquid.

The points to be noted in this method are:—

The quantity of dilute acid used to dissolve the quinine should not be more than forty times the amount of the alkaloid present.

The hot solution must be quite clear after the addition of the soda, otherwise the crystals of sulphate obtained are mixed with uncombined alkaloid.

The sulphate should be dried over a water-bath, and not at a higher temperature, as I find that sulphate of quinine gains in weight from 100°C to 140°C, after that it fuses and loses weight till constant.

In conclusion, I must impress upon intending operators in cinchona analyses that the utmost attention be paid to detail when the analyses are undertaken for commercial purposes, as errors, which would not be of any importance in ordinary cases, may cause serious loss owing to the high value of the material concerning which the analysis is performed.

[*The discussion on this paper is printed at p.* 372].

NOTE ON THE CHEMICAL FORMULA OF COMMERCIAL MOLYBDATE OF AMMONIUM.*

BY NELSON T. CARRINGTON,

Student in the Laboratories of the Pharmaceutical Society of Great Britain.

A specimen of crystals of molybdate of ammonium having recently been sent up to the laboratories from the Society's museum, with a request for information as to which molybdate of ammonium it was, Professor Attfield suggested that I should examine it and also analyse specimens from the chief makers of this little-used, or, in commercial language "fine" chemical.

The molybdates of ammonium appear to resemble in constitution the oxalates of potassium, as shown in the following table:—

$K_2C_2O_4$	$(NH_4)_2MoO_4$
KHC_2O_4	NH_4HMoO_4
$KHC_2O_4,H_2C_2O_4$.	NH_4HMoO_4,H_2MoO_4

If molybdic oxide or anhydride be dissolved in excess of solution of ammonia the normal molybdate $(NH_4)_2MoO_4$ seems to be formed; but this, on evaporation, so readily loses ammonia that a more or less acid salt results. Some of these salts are referred to in such chemical works as 'Gmelin's Manual,' and 'Watts's Dictionary,' several of the compounds being stated to have rather complicated chemical formulæ; but in neither of the books I have searched can I find any statement showing which of the molybdates of ammonium is the molybdate used in chemical laboratories. I have, therefore, analysed three specimens kindly furnished to Professor Attfield by the makers, Messrs. Morson and Son, and Messrs. Hopkin and Williams.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, November 3, 1875.

The process of analysis was as follows:—A fairly selected sample of the bulk at disposal was powdered and a portion of the powder placed in a platinum boat in hard glass tubing and heated to low redness in a combustion furnace, a slow current of dried hydrogen gas being passed through the tube. By such means ammonia is driven off, a portion of the oxygen of the salt forming water with the hydrogen also escapes, and the molybdate of ammonium is thus reduced to molybdous oxide, MoO_2.

The results of the analyses are given in the annexed table.

SAMPLE A.—CRYSTALS.

Experiment I.

·2853 of the molybdate yielded ·2032 of MoO_2 or 71·2 p.c.

Experiment II.

·3426 of the molybdate yielded ·2477 of MoO_2 or 72· p.c.

Mean 71·6 per cent.

SAMPLE B.—POWDER.

Experiment I.

·1579 of molybdate yielded ·1113 of MoO_2 or 70·4 p.c.

Experiment II.

·184 of molybdate yielded ·1281 of MoO_2 or 69·6 p.c.

Mean 70 per cent.

SAMPLE C.—CRYSTALS.

Experiment I.

·4350 of molybdate yielded ·3083 of MoO_2 or 70·8 p.c.

Experiment II.

·3733 of molybdate yielded ·2703 of MoO_2 or 72·4 p.c.

Mean 71·6 per cent.

The formulæ already given require:—

	Molybdous oxide.
$(NH_4)_2MoO_4$	65·3
NH_4HMoO_4	71·5
NH_4HMoO_4,H_2MoO_4	75·1

Had I been more practised in quantitative analysis than I am, I should probably have obtained closer numbers in each pair of experiments, and at some future time I should like to examine a larger number of specimens made at different times by the above or any other manufacturers. But, on the whole, the foregoing analyses fairly point, I think, to NH_4HMoO_4, as being the formula for the molybdate of ammonium of trade.

[*The discussion on this paper is printed at p.* 375].

PHARMACY IN PORTUGAL.*

BY THOMAS GREENISH, F.C.S.

In every country that I have yet visited I have found in connection with its pharmacy something worth notice, either in the systematic course of education required of the pharmacist, or in the political laws which govern the practice of pharmacy; even the business character or otherwise of the establishments where pharmacy is conducted is sometimes very significant.

The pharmacopœia of a country affords a very fair criterion of its pharmacy; the 'Codigo Pharmaceutico Lusitano par Agostinho Albano da Silveira Pinto,' revised by José Pereira Reis, 1858, can scarcely be considered a pharmacopœia. It is a compilation, and was made legal by a decree of 14th February, 1861, in these words, "In consideration that the new edition is found expunged of many of the errors and defects which applied to the old one, now extinct; also, taking into consideration that a long space of time must elapse before the legal pharmacopœia which the faculty of medicine of the university in the terms of its statutes is preparing be published, and as a book to teach the practice of pharmacy cannot be dispensed with in that interval, in agreement with the opinion of the faculty of medicine of the said university, do I hereby decree that the new edition of the 'Codigo Lusitano' shall be used provisionally as a legal pharmacopœia until the pharmacopœia now in charge of the university be printed and approved of."

The Codex is written in Portuguese, and in the formulæ there is nothing original or peculiar to the country; it seems a collection of many of those formulæ which have a claim to value in their respective countries. France is largely represented; the London Pharmacopœia has also been drawn upon, and, so careful, apparently, was the compiler, that no good formula should be omitted which could aid Portuguese therapeutics, one is inserted for Morrison's pills.

The Portuguese are not a medicine loving people; they are very abstemious, and probably the climate may be conducive to health. In a country that has so intimate a connection and such frequent communication with Brazil, Rio Janeiro, Pernambuco, and other parts of South America, I expected to find some drugs the virtues of which may not have reached England, but in conversation on this subject with medical men on the spot, I could not hear of anything worth notice; even jaborandi finds little favour in Portugal. Pharmacists appear to obtain their pupils from a lower class of society, as a rule, than in England, and they are usually apprenticed at an earlier age. There is no test of education prior to apprenticeship, but during its term the pupil has to read up and pass an examination in Portuguese, French, arithmetic and geometry. Latin forms no part of the necessary curriculum of his education. When his term of apprenticeship has expired he goes to one of the chief cities, either Lisbon or Oporto, and there gives his services to a pharmacist in return for food and lodging, with the privilege of being allowed to attend lectures on botany, chemistry, and pharmacy, at the Polytechnic School, and here he passes an examination in each subject. He must then work two hours a day for a period of two years in the laboratory of the Medical Chirurgical College either in Oporto or Lisbon. This also is usually done while still holding a situation on the same terms as previously stated. The final examination is conducted by two medical men and a chemist. Apprenticeship with this curriculum of study requires eight years to complete it, so as to qualify for the commencement of business on his own account. There is at present no school where the lectures specially suited for pharmacists are delivered; it is, however, proposed to adapt the Medical Chirurgical College in Oporto to supply the want of a class of assistant surgeons and also pharmacists, and if this takes place, an opportunity will be afforded of obtaining the whole course of education in one establishment.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, Nov. 3, 1875.

Since 1854 the regulations with regard to the examination of pharmacists have been made more stringent, and those who were in business before that time came in under modified regulations, and are now considered pharmacists of a second class. Prescriptions are written in the Portuguese language, Latin for that purpose is not permitted.

The pharmacy of Portugal seems to be superseded by foreign "nostrums" largely imported from France, and also from America; England too is fairly represented. If a medical man wishes to prescribe strychnia he orders some foreign preparation of it, and even the preparations of iron are from some foreign source. Cod liver oil is of foreign manufacture, and being kept an unlimited time in the pharmacy it requires strong faith in its virtues to take it, and a stronger stomach in order to retain it.

In Oporto the British Hospital supported by English subscribers, for the relief of the crews of British ships exclusively, has a dispensary supplied with English drugs and all the appliances usually found in a chemist's shop. Here most of the prescriptions of English families are made up by the resident dispenser, and at a very moderate price. There is a very curious anomaly in the pharmacy laws of Portugal. A tariff of prices is established, corresponding to the Arznei Taxe of Germany, and yet there does not exist the corresponding advantage which obtains on the continent of a limitation of pharmacies, and the consequence is, that whilst throughout Germany the average is one pharmacy to 10,000 inhabitants, in Lisbon and Oporto it is one to about 2,000 inhabitants.

When the necessity for a new pharmacopœia becomes apparent, the faculty of medicine of the University of Coimbra suggests its necessity to the Council of Superior Instruction in Lisbon, and this council addresses the Minister of the Interior, who orders a new pharmacopœia to be prepared, and refers it to the faculty of medicine at Coimbra. The pharmacopœia committee is composed of three medical men, one professor of chemistry, a botanist, and a pharmacist. A new edition is now in course of preparation and its issue is shortly expected.

At present pharmacy in the chief cities of Portugal is not in a satisfactory condition. In the provinces it is much worse, and we must look forward to greater facilities for a sound and systematic technical education on the part of the pupils, and to a more modern pharmacopœia, somewhat abreast of the present condition of the art of pharmacy and chemical science in more favoured countries.

[*The discussion on this paper is printed at p.* 376.]

EXCREMENTITIOUS INDIAN MEDICINE.*

BY SURGEON-MAJOR WILLIAM CURRAN.

Startled by a question put to him by an old native doctor at Peshawur, after the fatal terminiation of a case of ovarian disease, as to why he had not given his patient the benefit of camel's urine, the author was induced to reapply his attention to the subject of the place held by excrements in native Indian medical practice. The result is a paper in the *Practitioner*, which, notwithstanding the repulsiveness of the subject, contains much that is interesting, and from which the following details are taken. For the authorities upon which the statements are made, and other details, reference must be made to the original paper.

To commence with camel's urine, to which reference has already been made. It has been prescribed largely among the Beloochees, and is reputed to have been of great use in cases of dyspepsia, splenic enlargement, and intermittent fever. In fact, the lower classes of natives have great faith in the antiperiodic properties of the fluid. At Lucknow excellent effects are said to have followed the daily application of asses' urine to the heads of two Mohammedan boys, aged respectively ten and twelve, who had suffered for several years from what was called "scabies of the head," and for which all the usual remedies, British and Indian, were tried in vain. Armed with these several testimonies, the author asked the native assistant-surgeon attached to the dispensary if he had seen or heard of any instances in point, and he at once replied that he was then treating two boys for splenitis, with their own urine.

Dr. Temple Wright, late Professor of Medicine at the Lahore Medical College, says:—"Natives use the urine and the fæces of various animals, in various diseases, but only in the same way as the Mussulmans of all countries use pills consisting of texts of the Koran—from an idea of their sacredness. Thus, in Bengal the people use the excreta of the cow, not only from the notion that anything belonging to such a sacred animal will purge them from fever, but also to purify themselves from the stain of any offence they may have committed against caste." And further on he adds: "At Muttra, where an immense colony of sacred monkeys has for ages occupied the tops of the houses and trees in the city, the people—mostly Hindoos—worship the monkeys, feed them, and use their excreta in medicine."

Dr. Chevers, alluding to the use of arsenic as an aphrodisiac in India, adds in a note which is based on native testimony, that "two plans" of modifying the medicinal properties of this drug "are practised near Midnapore. In the first the arsenic is powdered and macerated in cow's urine for thirty-six hours;" and further on he quotes a "Native Surgeon Moodelly" as saying that "in Madras arsenic, as well as all powerful native medicines, is subjected to a series of boilings in milk, cow-dung, urine, the juices of leaves, etc., and is then said to be purified." Dr. Day, of the Madras army, says that he was "informed by an eminent medical officer in Calcutta, that hilsa fish are sold in one part of that city as food, after having been prepared by soaking in stale urine" in another. So that there can be no doubt as to a belief in the virtues of this secretion on the part of the natives of India. As to the other excretion of the same animal, cow-dung has been used medicinally in that country from time immemorial. It is frequently employed as a coating over the forehead and temples for the relief of headache, and several of the remoter hill tribes use it as a protection and covering to their wounds.

To assist in understanding the principles on which the excretions are employed by the Hindoo Baids or Koberajes—physicians—on the one hand, and by the Mohammedan Hakeems or Jurrahs on the other, the author points out that the former derive their knowledge of medicine, such as it is, from the sacred writings or traditions of their priests, while the latter are indebted for any information they possess on these points to the Arabian writers, who, in turn, have borrowed their ideas of it from the Greeks. The two systems may be conveniently classified under the headings of Baidak, or Old Sanscrit, and Yunani, or ancient Greek, and in both the blood, bile, mucus, and urine are recognized as the four fluids of the body. These, if disordered or out of proportion, are supposed to give rise to disease, and as the temperament, in other words the variations of the animal heat, are taken as the gauge of this, all remedies are said to possess, in addition to their other properties, the great attributes of heat and coldness. A book called 'Lushrit,' which is a standard

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* Abstract of a paper in the *Practitioner* for October.

Baidak work, thus describes the properties of urine in general: "The urine of the cow, buffalo, goat, sheep, elephant, horse, ass, and camel is bitter, acrid, and saline, light (i.e., easily digestible) and evacuant;" and as to its uses, it "dispels diseases due to morbid mucus and gas, it removes worms and disorders of the fatty tissue, it acts as an antidote to poisons, and finally aids in the cure or mitigation of flatus, piles, jaundice, and dropsical effusions of every kind." Another Sanscrit work, the 'Bhao-Prakash,' enters into an elaborate description of the properties of the urine of various animals, and for the efficacy it ascribes to this article, as well as for the variety of disorders it recommends it as capable of curing, might pass for an advertisement of Holloway's pills, or Old Jacob Townsend's sarsaparilla. It further states that human urine "neutralizes the effects of poison, purifies the system, and acts as a powerful detergent in foul sores and in scabies purulenta;" and the diseases in which it is said to be efficacious include such widely divergent conditions as colic, costiveness, and tympanitis, jaundice, dysentery, and leprosy, mania and earache. Asses' urine is regarded in both books as a specific against dyspepsia.

In the Greek or Yunani system, the urine of man is taken as a standard, and that of the camel and the ox comes next in point of estimation. According to the 'Makrum-ul-Advint,' or Magazine of Medicine, the urine which thickens under the stimulus of heat, that is, which contains albumen, is unparalleled in its effects on indolent ulcers, and in causing the contraction of fistulous passages, and it is also peculiarly efficacious as a wash or embrocation, in the treatment of itch, impetigo, tinea favosa, and other forms of cutaneous ulceration. It is further credited with antidotal powers against the effects of bites from mad dogs, snakes, and venomous insects of all kinds, and its efficacy in reducing enlargement of the spleen is supposed to be enhanced by its being taken on an empty stomach, or being boiled in a copper vessel. When mixed with honey, it is said to aid in the dispersion of opacities of the cornea and in the cure of chronic ulcers of the conjunctiva. Its virtues are, however, subject to variation under the influence of age, and the urine of boys or girls, under puberty, is said to be endued with a therapeutic potency that is denied to that of their elders. The urine of the horse appears to be preferred to that of the cow, for it is often said to cure a nebula, while that of his congener, the ass, is said to be all-powerful in the treatment of nephralgia and gout. Camel and buffalo urine are prescribed in cases of impotence and earache. Dr. Chevers says that there used to be a rhinoceros at Barrackpore whose urine was in great request, and brought in a little revenue to its owner, and that he is informed that there is now one at Dum-Dum, whose urine has a great repute in asthma.

Mr. Nethercole, a superintending engineer of the Indus Valley Railway, has informed the author that he has frequently seen his camel-driver dismount when travelling in Sindh, and renovate the flagging spirits of his camel by administering to him a pick-me-up of his own urine.

From some of the wild hill-men who bring firewood, etc., to Peshawur, the author learned that the urine of young children and of the cow is frequently used by their women—more, however, by way of external application than as an internal remedy. And the Pathans in that neighbourhood are said to regard buffalo's urine with favour in tertian ague. The first thing a wounded Pathan does is to wash his wounds with his own or a companion's urine—giving the preference, however, to that of the latter; and a poultice made up of wheat flour and boiling urine is a favourite application among them for certain forms of ophthalmia. All the wild tribes on this frontier have faith in the efficacy of camel's urine in ascites and anasarca, and as, from their dirty habits, venereal disease is very common among them, they treat the sores produced by it on the genitals with buffalo's urine. The women are particularly partial to this mode of treatment; and they also steam inflamed wounds and sloughing ulcers with the vapour that is evolved from the burning of children's urine. The later is also not unfrequently employed amongst them as a remedy in cases of bronchitis and sore-throat; indeed, their commonest cure for a cold is a copious draught of warm urine at bed-time, after which the invalid envelops himself in a heap of blankets, then eats a quantity of heated garlic, and is said generally to rise in the morning quite well.

Captain Lowrie, in his 'Wild Races of South-Eastern India,' says: "There is but one medicine current among all the Zoringhia; this is the dried gall-bladder and the dung of the boa-constrictor, which is supposed to be, and is used as, a remedy for everything."

As in the case of the urine, so also in that of the dung or excrements, minute descriptions are given in both systems, as to the manner in which they should be used or applied. Of the several animals whose dung is regarded as curative either outwardly or otherwise, that of the cow holds the first place, and the disorders in which this is said to be beneficial include almost all those to which our flesh is heir. Thus, among the properties ascribed to it, it is stated to be deobstruent, absorbent, styptic, and expectorant; and mixed with honey and long pepper in the one instance, or with vinegar and oil of bitter almonds in the other, or applied locally, it gives relief in such opposite conditions as cough and bronchitis, alopæcia, tinea favosa and epistasis, prolapsus uteri, rheumatism, and sciatica. Burning the dry dung in the lying-in chamber is said to aid the throes of parturition, while its application in the moist state over the hypogastric region of a pregnant woman is supposed to be capable of expelling a dead fœtus or killing a live one; and certainly no application is more frequent in the present day, in this country, than that of cow-dung to the irritable hoofs or swollen fetlocks of horses. A suppository of hare's dung is supposed to favour impregnation; and a tigress's excrements mixed with urine have been found to aid in the suppression of dypsomania. The dung of even the ass has its uses; and those of the elephant and the camel are said to dry up the scars caused by porrigo and other forms of exematous or scabby ulceration, to arrest hæmorrhage, and reduce the ravages of epilepsy and scrofula. Finally, and to close this rather odorous enumeration, the human excreta, and especially so those of a child, are said to be useful, by way of insufflation as a powder, in cynanche tonsillaris, and also as an outward application in cases of erysipelas, foul smelling ulcers and for the bites of venomous insects. Describing the remedies employed by the "barber-surgeons" who practise on the Peshawur frontier, Dr. Lyal says, in allusion to the hæmorrhagic complications of the fever that obtains in those parts: "When they suffer from hæmorrhage from the nostrils, the mode adopted is to grind asses' dung into fine powder, and use it as snuff." Taken internally in drachm doses, or rubbed, after being burnt, on the jaws, it is said to remove the fœtor caused by a cancrum oris, to relieve jaundice, or stop a colic or diarrhœa; and on the *similia similibus* principle, probably, to assist, when applied in combination with yeast over the belly, in the cure of constipation.

The author refers to the remarkable fact that urine is used with a therapeutic purpose, in one form or another, throughout the length and breadth of the Indian peninsula, and that this use is not solely, or even in great part, due to the suggestions of superstition. He remarks that it is known that the character of the food largely determines the quality of this secretion, and that while the "urine of carnivorous animals does not differ essentially from that of man, the urine of herbivorous differs considerably from that of carnivorous animals." On the other hand, the urine of birds and of amphibious animals, reptiles, etc., differs so much from both the above as to show "that the organization of the animal exercises a distinct influence over the composition of its urine;" and the greater predominance of the chlorides, urates, and phosphates in the former is placed by chemistry beyond the reach of doubt. How far the food or constitution of the cow may affect her secretions he is unable to say. But the action of the excrements on the economy can be more easily gauged, inasmuch as they are known to "consist of a mixture composed of undigested particles of food, such as cellular-tissue, fragments of tendon, skin, half digested muscular fibre, etc., etc., and not unfrequently of fat, starch, and sugar," the very elements from which those who are inclined to obesity ought to abstain. So much is this the case that animals have been known to thrive on them alone, as was shown by the Commission which sat in '61—62, under the orders of Sir Hugh Rose, to investigate the subject of commissariat supplies to our troops in this country, whose inquiries elicited the extraordinary fact "that in many of the largest stations in the North-west Provinces, commissariat sheep were fed on human ordure, contracted for by commissariat butchers with the conservancy establishments attached to troops in the stations."

Finally, the author states that he himself has seen the fresh dung of a cow applied with benefit over the sloughing bubo of a European soldier; and combinations of this animal's discharges have, and he fears will, ever continue to be in request among Hindoos. In fact, this constitutes the very basis and essence of Hindoo pharmacy, and their "Phunsaries," or druggists, openly say "that the efficacy is not in the substance itself, but in the combination" of it with the various and often utterly incompatible articles they use.

THE LATE SIR C. WHEATSTONE.

At the funeral service in the English chapel in Paris over the body of the late Sir C. Wheatstone, M. Dumas, perpetual secretary of the French Academy of Sciences (of which the deceased was an Associate), delivered a brief address, in which he referred to the labours of Sir C. Wheatstone, and of which *The Times* gives the following translation :—

"Neither place nor circumstances will allow us to enumerate all the works which have marked the industrious life of Sir C. Wheatstone, nor to show their harmonious connections, their immediate results, and their remote consequences. How can one recall without emotion those pleasant hours spent in the laboratory filled with so many marvels of the fruit of the labour of his hands and of the inspiration of his genius? There were no delicate questions relating to acoustics, to optics, and particularly to electricity, which he had not grappled with and thrown a clear light upon. In several instances his studies led to discoveries most valuable to science and of a practical character which rendered them popular. When we survey through the stereoscope those astonishing views of distant scenes or inaccessible mountains, those reproductions of the grand monuments of Egypt, Greece, or Italy, we cannot but remember that the instrument which presents them thus with their perspective, their surface, their solidity, was invented by Sir C. Wheatstone, not by a happy accident, nor by painful struggles, but through a course of delicate and profound study of the physiology of vision. Thence has sprung the new industry which, brought to perfection by his illustrious fellow-countryman Brewster, affords employment to-day to thousands of artists and workmen, and contributes to the intellectual enjoyments of millions of civilized beings. About the same period of his life Sir C. Wheatstone gave a practical form to the idea of Ampère. His electric telegraph, one of the first which was worked over a line of any length, has been replaced by more convenient arrangements, but the name of our colleague will retain its place in the history of the new telegraphic system. He has entitled himself to that, not only by this effort, but by a long and persevering succession of studies and inventions intended to render the arrangements of telegraphic apparatus more certain, their working more easy and simple. It was thus that Sir C. Wheatstone was led to inquire into the speed with which the electric wave passes along a metallic wire, by what causes its passage may be retarded or diverted back to its starting-point. It was thus by changing the nature of the metals along which the electric current passed that he ascertained that the sparks given forth by each emitted several special coloured rays, thus shadowing forth the discovery of the spectroscope, which was soon to surprise the scientific world. Again it was while engaged in measuring the rapid passage of electricity over a metal wire—equal to that of light—that he invented the admirable method of revolving mirrors, of which Arago who has thus described them and his fellow workers were to make such noble use. The admirable plan, indeed, enabled Arago—crowning the work of his scientific life—to trace with certainty the plan of fundamental experiments which should decide whether light is a body emanating from the sun or the stars, or an undulatory motion excited by them. Carried out by a consummate experimentalist they put aside the theory of emission. This method, therefore, has supplied to the philosophy of science the certain data upon which rest our ideas of the nature of forces, and especially of that of light. By the aid of this or a similar method we have been enabled to ascertain the rapidity of light by experiments purely terrestrial, which, carried on by a skilful physicist, have governed the admeasurement of the distance of the earth from the sun. The duration of movements rapid as thought, or even more rapid still, is then measured with certainty by the method of revolving mirrors, or by other methods of analogous principle. This method, which will render the name of Sir C. Wheatstone immortal, marks a date and characterizes an epoch in that difficult art of consulting nature, the solid basis of modern science. It is thus that Sir C. Wheatstone associated by his most brilliant discoveries with the labours of the French School, and honoured by the friendship of Arago, was in the habit of coming among us sometimes for recreation, but more frequently to favour us with the first fruits of his recent labours. The noble traditions which for more than two centuries have caused so close an union between the Paris Academy of Sciences and the Royal Society of London were personified in our illustrious colleague. If the *savant* has always a country to which he belongs exclusively, it is not so with science; the light of genius is the common property of civilized nations; the gratitude which they feel and evince affords at once the measure of the benefit they have received, and of the moral and intellectual height to which they have attained. To render to genius the homage which is its due, without regard to country or origin, is to honour oneself. The Paris Academy of Sciences, always sympathizing with English science, did not hesitate during the troubled times of the wars of the Empire to decree a grand prize to Sir Humphrey Davy. Now, in a time of peace, it comes to fulfil with grief a duty of affection towards one of his noblest successors by gathering around his coffin to offer him a supreme homage. A foreign Associate of the Academy, exercising by a rare privilege in virtue of that title all the rights of its members during his life, we had to render to his mortal remains the same duties which we render to fellow-countrymen who are our colleagues. The memory of Sir C. Wheatstone will live among us, not only for his discoveries and the methods with which he has endowed science, but also by the recollection of his rare qualities of heart, the uprightness of his character, and the agreeable charm of his persona demeanour. The friends whom he has left among us, unable to avert destiny, hope that they were at least able to soothe the last hours of his life—of that life, alas! which was closed away from his beloved country, from his home, from that family circle the sweet recollection of which animated his last hours, and to which the eye of the dying one turned once more before his soul, quitting its earthly tenement, took its flight to a better world. Adieu! Wheatstone; adieu, in the name of the Academy and of Science; in the name of the friendship which united us for forty years, adieu!"

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 6, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL AND THE EXAMINATIONS.

Although there does not appear to have been any "burning question" before the Council on Wednesday last, there were one or two subjects dealt with to which it may be useful to give a little more than the usual prominence of an ordinary report. One of these had been the cause of more or less agitation extending over a considerable period, which has now resulted in an important alteration in the method of conducting the Preliminary examination; we refer to the transfer of this strictly scholastic examination to the hands of the College of Preceptors. The principle of such an arrangement has never been seriously disputed; though undoubtedly obstacles existed in the way of its earlier adoption. It is therefore gratifying to learn that the final details have now been settled between deputations from the Council and the Board of Examiners and one from the College of Preceptors.

It will be noticed that at this conference it was unanimously decided to include simple and compound proportion in the arithmetical portion of the Preliminary examination. It may be remarked that this is really no innovation, as would be shown by a reference to former examination papers; but it would seem to be intended now to give a fuller intimation to future candidates of their liability to examination in those rules. The necessity for the possession of this amount of arithmetical knowledge is so obvious that the resolution must meet with general approval, and a similar remark may be made with respect to the determination that henceforth the handwriting of the candidates shall be taken into account in awarding marks.

It should be most clearly understood that the Council has in no wise parted with the control of the examination, and that all the business connected therewith will continue to be transacted at the Society's office in Bloomsbury Square. All applications respecting the examination must still be addressed there to Mr. Elias Bremridge, who will communicate with candidates respecting the time and place of the examination, etc.

A decision was also come to by the Council respecting the subject mentioned by Professor Attfield, in his report at the opening meeting of the session, as having caused some dissatisfaction amongst the students in practical chemistry,—the regulation that limited the competition for the medals to those students who attended at least a five months' course six hours daily in the laboratory. A proposition by Professor Attfield that students who have worked in the laboratory three hours a day for five months shall in future be eligible to compete for the bronze medals was acceded to, so that the students in practical chemistry will now possess equal privileges in this respect with those who attend the lectures. The restrictions respecting the competition for the silver medal remain unaltered.

INDIAN HOME-MADE QUININE.

We have received a letter from Dr. De Vrij, in reference to the article that appeared under the above title, in the Journal of September 18, page 223, protesting against the remark that "Continued misfortune appears to attend the attempts to manufacture quinine in India." Dr. De Vrij says that if instead of the word "India" we had said "Ootacamund," we should have been quite right, but that by using the word "India" we have generalized too much, and have, for instance, done some injustice to Mr. Wood, who is actively engaged in Calcutta in manufacturing the mixed alkaloids of *Cinchona succirubra.*

We are glad to receive this correction at the hands of our esteemed correspondent, and rejoice to learn that misfortune is not universally the result of the efforts made to utilize Indian bark on the spot. But at the same time we must plead in justification of our remarks, that at the time they were made we spoke according to the information at our disposal. Nothing was then to be learnt of the work being carried on in connection with the Darjeeling plantations. Since that time, however, we have received very satisfactory accounts of the progress made by Mr. Wood, and are indebted to Mr. R. C. Markham, of the India Office, for permission to publish them, which we purpose doing at an early date.

Dr. De Vrij also objects to the statement in the article before referred to that the attempts to manufacture quinine in Java have failed; but this statement was only given as one of the arguments made use of by writers in the Indian press who are contending for the abandonment of the attempt to manufacture bark alkaloids in India. If the statement be incorrect, their argument goes for very little, and having given it publicity, as urged by the Madras papers, we readily do the same for Dr. De Vrij's contradiction of the statement. The Doctor writes that only in September last a young military pharmacist went out to Java, after having been instructed by him, at the request of the Dutch Colonial Minister, to manufacture the mixed alkaloids from the bark of *Cinchona succirubra* grown in Java, and he adds that before the results to be obtained by this gentleman are known, it is premature to state that the attempt has failed.

THE INDIGENOUS MATERIA MEDICA, ETC., OF VICTORIA.

With the object of facilitating a good appearance in the Philadelphia Centennial Exhibition next year on the part of the Australasian colonies, a Second Intercolonial Exhibition was opened in Melbourne in September, after an interval of only three years from a former one. The catalogue of exhibits covers nearly three hundred pages; and amongst them occur several instances of the utilization of indigenous products that have special interest for our readers.

One case, exhibited by Mr. Bosisto, contained twenty-seven chemical and pharmaceutical preparations obtained from indigenous vegetation. Among them there were eucalyptus oil, which is now becoming an article of considerable export, being employed largely in the perfuming of soap, and also as a solvent; mallee oil, obtained from the "mallee scrub," which is used instead of oil of turpentine in the manufacture of varnishes that are said neither to "bloom" or crack, and serves also as a good solvent of india-rubber without heat; besides various other essential oils and resins. Cigarettes of "blue gum" were shown for smokers suffering from bronchial and asthmatic affections; and there was also a sample of opium grown in Gipps land, with alkaloid prepared from a similar source.

Another case, exhibited by Messrs. Hood and Co., contained iodine extracted from colonial seaweed, though not remuneratively; oil of sandal wood from West Australian timber; oils of peppermint and lavender from colonial grown herbs; tannin from "wattle" bark; and opium from Smyrna seed grown in Victoria. Mr. Wood exhibited the tincture of orange peel of the 'Additions' to the B.P., made from the fresh peel of the "Australian Seville orange grown in New South Wales."

The Director-General of the Melbourne Botanic Gardens forwarded roots of the native sarsaparilla (*Kennedya monophylla*), and also a number of products from colonial trees. These included resins exuded freely from the messmate, weeping gum, box, milk white gum, iron bark, peppermint, and stringy bark trees; and gums from the elder berry, the ash, the golden, silver and black wattles, the native cypress, the turpentine and bottle trees, the silky oak, the Murray and Moreton Bay pines, and the New Zealand laurel. Gum from the golden wattle is stated to be a good substitute for gum arabic, and that from the silky oak is described as of a pale yellow colour and very tenacious.

The chief inspector of distilleries, Mr. Moody, displayed a case containing more than a hundred samples of Australian wines and their distillates. In order to set at rest a doubt as to the percentage of spirit naturally present in Australian wines, which had been alleged to be very high, Mr. Moody had the alcoholic strength of this large number of wines carefully tested. The result proved that it ranged from 18 to 34 per cent. of proof spirit. The wines from along the Murray river averaged 29 per cent.

THE CHIEF SECRETARY FOR IRELAND AND THE IRISH PHARMACEUTICAL SOCIETY.

The *Medical Press and Circular* understands that at a meeting of the Council of the Pharmaceutical Society of Ireland, on Monday week, a letter from Sir Michael Hicks-Beach was read, in which he expressed himself as being decidedly unfavourable to the creation of a grade of chemists and druggists in Ireland. We have not yet been favoured with a report of this meeting; but if our contemporary's information be correct there can be little doubt as to its assumption that the Irish Government is, to a certain extent, at variance with the Council of the Irish Society being equally true.

CHEMISTS' BALL.

A meeting was held at 17, Bloomsbury Square, on the evening of Monday the 1st instant, to appoint a Committee to make preliminary arrangements for the 10th Annual Ball. It was decided that the Ball should be held at Wills's Rooms on January 19, 1876. The Chairman of the Committee is Mr. Carteighe; the Treasurer Professor Attfield; and the Secretary Mr. R. B. Warrick, of Old Swan Lane, E.C., to whom the names of gentlemen who wish to act as Stewards should be sent.

EXPLOSION IN A CHEMIST'S SHOP.

On Wednesday, the 27th ult., the premises of Mr. Smith, chemist and druggist, Friargate, Preston, were considerably damaged by the explosion of a five-pound canister of "red light."

In view of the approaching termination of his year of office as Mayor of Salisbury, Mr. S. R. Atkins, whose name is well known to most of our readers as an active worker in the cause of pharmaceutical education, last week entertained at dinner a numerous company of the most influential citizens and inhabitants of the neighbourhood. The Earl of Pembroke, several of the Cathedral clergy, and the members of Parliament for the city, were among the numerous company who responded to the invitation. By the speakers Mr. Atkins was generally congratulated upon the manner in which he has fulfilled the duties of the post. Dr. Fox, in replying to a toast on behalf of the visitors, said that there was a notion abroad that a man connected with medicine was generally unfit for a public office, but he was glad to see that the Mayor, a "medicine man," had held the office, and if the list of mayors were examined it would be found that none had filled the office with greater dignity, ability, or impartiality than Mr. Atkins had done.

☞ The Second Part of Bentley and Trimen's 'Medicinal Plants,' which has just been issued, contains coloured figures of *Theobroma Cacao*, *Rhamnus catharticus*, *Prunus Amygdalus*, *Pyrus Cydonia*, *Lobelia inflata*, *Gaultheria procumbens*, and *Cinnamomum zeylanicum*. This part appears to quite attain the high standard established in the former one.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, November 3, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Baynes, Betty, Cracknell, Greenish, Hampson, Hanbury, Mackay, Owen, Rimmington, Robbins, Sandford, Savage, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

ELECTIONS.

ASSOCIATES.

The following having passed the Minor examination were elected "Associates" of the Society:—

Harriman, Edwin	Liverpool.
Hodgson, Ralph	Brixton.
Holmes, George	Sheffield.
Kidd, William Champley	Malton.
Parrott, William Searle	Falmouth.
Pashler, William Ingram	Cambridge.
Smith, George	Sunderland.
Wills, Joseph	Carlisle.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Ferriday, Edwin Joseph	Oakengates.
Harrison, Stephen W.	North Shields.
Holmes, William Albert	Kendal.
Murchie, William G.	Lockerbie.

The following being duly registered as "Pharmaceutical Chemists," were respectively granted a diploma stamped with the seal of the Society:—

Coles, William
Thompson, George Alfred.

Three persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The name of Jonathan Langman, of 41, Church Road, Tranmere, was restored to the Register of Chemists and Druggists.

FINANCE.

The report of this Committee was read and adopted, and sundry accounts ordered to be paid.

NORTH BRITISH BRANCH.

Mr. MACKAY laid before the Council plans and estimates for erecting in the laboratory attached to the Society's rooms in Edinburgh, a sand-bath, furnace, and fume chamber. He said that the want of these conveniences caused great discomfort, and Dr. Maclagan had stated in a letter to him that their being provided would enable the examiners in practical chemistry to do their work more comfortably and efficiently. An estimate had been obtained to do the work for £28 5*s.*, the construction being entirely of wood and iron; but on looking at the fume chambers in the Society's laboratory upstairs that morning, he noticed that the doors were glazed, which, he thought, was an improvement.

Mr. SAVAGE thought this would not cause any additional expense.

The PRESIDENT said it was very important to give the examiners the means of efficiently conducting the examinations.

Mr. BAYNES thought that the Council should do everything in reason which the Board of Examiners required, and this seemed a reasonable request.

Mr. SAVAGE moved—

"That a sum not exceeding £30 be expended in constructing a fume chamber, furnace and sand bath for the purposes of conducting the Society's examinations in Edinburgh."

Mr. SUTTON seconded the motion.

Mr. SCHACHT asked if this apparatus would be simply used for examination purposes only, or would it be used also for instruction.

Mr. WILLIAMS said that the Society had no school of instruction in Edinburgh.

Mr. SCHACHT could not help rejoicing that even this scheme which had been elaborated in Edinburgh had been found capable of improvement on viewing the apparatus in the Society's laboratory.

Mr. WILLIAMS understood the necessity of a fume chamber, but not of a sand-bath and furnace.

Mr. MACKAY not being an examiner in practical chemistry could not state what the examiners' views were. He might say however that the idea emanated from Mr. Gilmour and Professor Maclagan, and that at present the atmosphere of the laboratory on examination days was quite unbearable.

Mr. BETTY thought that as this was a money vote it should, according to the usual custom, be considered in Committee and reported upon to the Council. He would move that it be so referred.

Mr. SCHACHT said that he would second the amendment.

Mr. MACKAY said the only reason for pressing the matter was, that if the vote was not passed at once the apparatus could not be used at the December examination.

On the amendment being put it was negatived, and the original motion was then put and carried.

LIBRARY, MUSEUM, AND LABORATORY.

This Committee reported that it had held two meetings, one on the 13th and one on the 20th October.

At the first meeting Professor Attfield had reported that there were already fifty-nine entries in the laboratory, being the largest number ever entered in October. He also asked that six unfinished benches in the laboratory might be completed. This the Committee thought desirable, and requested the Secretary to obtain an estimate. Professor Attfield had also suggested that students who had attended in the laboratory three hours daily for five months should be allowed to compete for the Bronze Medals. The Committee recommended that these suggestions should be acceded to.

Professor Redwood had stated that there were thirty-six entries in his class, and Professor Bentley had reported forty-four entries.

The Librarian had reported that thirteen books were missing from the library, the names of which he gave; and the Committee recommended that the list of missing books be exhibited in the library and advertised in the Journal. The average attendance in the library during the preceding month had been:—day 9·4; evening 8·8. The circulation of books had been:—in town 7·2; in the country 30.

The Curator had reported that some small repairs were required in the museum; that many jars had been returned from the lecture room broken or chipped; and that many stoppers fitted badly in the bottles owing to having been changed in the lecture room. The apparatus in the old Council room had been cleaned and was being labelled. The catalogue of the materia medica portion of the museum had been completed and revised, the first portion by the late Mr. Daniel Hanbury and Professor Bentley, the last portion by Professor Bentley alone. The catalogue of the chemical portion was being proceeded with, and had progressed as far as the list of alkaline metals.

At the second meeting an estimate had been presented for completing the benches in the laboratory for £12, which the Committee recommended should be accepted. Professor Attfield had reported that every bench in the laboratory was then occupied, and he hoped the Committee would allow the six unfinished benches to be completed at once. On this point the Committee decided to await the decision of the Council.

Two communications had been read from Professor Redwood with regard to revising the chemical portion of the catalogue, to the effect that he was not willing to undertake the responsibility; after an interview with the Committee, however, he consented to look through several sheets, making such alterations as he might think necessary.

A communication had been read from the Curator, again drawing attention to the injury resulting to the museum from the use of specimens in the lecture theatre, and adducing reasons why the specimens in the museum should not be used for lecture purposes.

The Committee considered it very desirable to make the alteration suggested by the Curator, on the ground that it was essential to the maintenance of the usefulness and value of the museum that the specimens therein should not be damaged.

The Committee also recommended that certain specified repairs should be done.

A draft of the duties of the assistant secretary for Scotland, as settled by the Committee in consultation with the Council in Edinburgh, was submitted.

On the motion of Mr. Sandford, the report was received, and specific resolutions were passed dealing with the various branches of it as follows :—

Additional Accommodation in the Laboratory.

It was unanimously decided that this recommendation should be carried out, and the estimate which had been obtained accepted.

Mr. Williams added that three of the additional benches had already been filled up.

The Vice-President said he had on his own authority sanctioned the erection of some shelving in the laboratory in order to give more accommodation.

The Bronze Medals.

Mr. Greenish moved the adoption of the recommendation that students in practical chemistry, who had worked for three hours a day for five months in the laboratory, should be allowed to compete for the Bronze Medals at the end of the session.

Mr. Williams in seconding the motion explained that the Committee made this recommendation in order to place laboratory students on an equal footing with those attending the lectures. The motion was carried *nem. con.*

Missing Books.

A considerable amount of discussion took place on this subject, Mr. Williams recommending that the shelves should be enclosed by wire doors so that no one could take down a book except with the aid of the librarian.

Mr. Hanbury suggested that this plan should be adopted in the case of the more valuable books only, the ordinary text-books being left open as at present.

After some further conversation it was resolved to advertise the missing books as suggested by the Committee, and it was referred to the Committee to consider what steps could be taken to prevent such losses in future.

Assistant Secretary in Scotland.

The list of duties for the Assistant-Secretary in Scotland, as recommeded by the Committee, was agreed to.

The Museum.

Mr. Hampson moved and Mr. Greenish seconded the following resolution :—

> "That this Council considers it desirable that the Museum specimens be not used for lecture purposes, and refers the communication of the Curator to the Library, Museum, and Laboratory Committee, to consider and report to this Council what arrangements can be made to provide distinct specimens for lecture purposes."

Mr. Hampson thought the reasons adduced by the curator were so clear and convincing that it was impossible for the Council not to adopt his proposal. It was quite evident that a change was necessary, that the museum must be kept distinctly for museum purposes, and that other specimens must be provided for the use of the lecturers.

Mr. Williams hoped this question would again be referred to the Committee, in order that it might consult the professors upon the subject, before any final arrangement was adopted.

Mr. Savage supported the same view.

Mr. Betty said this subject had been well considered by the Committee, and there was a unanimous decision that the museum should be kept distinct as a museum. The Committee might confer with the professors as to the best way of carrying out the proposed alteration, but as to the basis of it he did not think any conference could alter that. It could not be questioned that the Society should keep its museum intact, and if the resolution were passed the Committee and professors could, without difficulty, settle all points of detail.

Mr. Sandford agreed with the recommendations of the Committee; but he did not apprehend the Council would carry out the resolution without the co-operation of the professors.

Mr. Robbins thought the resolution a very desirable one for general adoption, but the curator might be empowered to lend unique specimens on special occasions.

Mr. Hanbury thought the general principle had better be settled at once.

Mr. Schacht was of opinion that the principle itself ought to be more ventilated. No doubt the Society had a museum of great interest and value, which it behoved it to take care of, but the question arose, To what purposes should it be devoted? It was not merely to be looked at with the eyes alone, but should be made a means of instruction; and it occurred to him that one of the uses of a good museum was that it should enable good teaching to be given. He was not quite clear that it would be wise to prevent the very best specimens, even the typical specimens, such as those written upon by Pereira and Soubeiran, being placed upon the lecture table. They might run a certain risk, but precautions should be taken to prevent injury. He did not think specimens need necessarily be damaged.

Mr. Robbins said pharmaceutical preparations might not be injured, but chemical specimens might be completely spoiled by being exhibited only once or twice. He had known a beautiful specimen of iodide of mercury quite destroyed in this way.

Mr. Mackay thought there could not be a difference of opinion as to the necessity for keeping the museum intact. Even in the comparatively small museum at Edinburgh it was found that some of the specimens when carelessly handled came to grief. That museum contained some valuable specimens, and on more than one occasion lecturers in Edinburgh had asked permission to remove such specimens on the morning of the lecture-day, upon the condition of carefully returning them in the afternoon. He thought some such arrangement might be understood to exist, the curator being empowered to give specimens on any special occasion, and see them replaced safely. He could not believe that any real damage could occur during an hour's lecture, to any special specimen used for the illustration of a lecture, although he advocated the adoption of a set of specimens for general use in the lecture-room.

The Secretary said he understood that it was not during the lecture, but afterwards that the injury occurred.

Mr. Betty reminded the Council that the Committee recommended the providing of duplicate specimens for the lecturers' use.

Mr. MACKAY thought the lecturers might be allowed to place before the students even valuable specimens on special occasions, and for particular purposes, if the duplicate set were not sufficient for their purpose.

Mr. HAMPSON said the museum was on the same premises, and could be inspected by the students at any reasonable time.

Mr. WILLIAMS said he understood the practice was for the professor to take from the museum sometimes as many as seventy or eighty specimens at a time to illustrate the whole of a natural order, and it was during the carrying of them backwards and forwards and the handling of them by the students that much of the damage occurred. After the lectures they were frequently put into a cupboard to avoid the trouble of bringing them from the museum again for the next lecture. He did not quite know where room could be found for duplicate specimens.

Mr. GREENISH thought the last-named difficulty could be got over, and that they could without much inconvenience provide as many duplicate specimens as the professors required. The museum was the finest of the kind in Europe; it should be the effort of the Council to keep it so, and to make it still more valuable; but he knew gentlemen who were willing to send unique specimens to it, only they did not consider that due care would be taken of them. He hoped the Council would unanimously approve the principle, and that there would be no difficulty in carrying it out.

The resolution was then agreed to.

PHARMACEUTICAL LABORATORY.

Mr. SCHACHT inquired if the idea had at all presented itself to the mind of the Committee whether it was desirable to add anything to the museum of pharmaceutical apparatus, or whether it had noticed any place in which such apparatus could conveniently be located. It had occurred to him that the store-room next the balance-room might be used for such a purpose to begin with. He should not have mentioned this subject again, but that four or five gentlemen of eminence had written to the Journal advocating similar views to his own, though he begged to say without the slightest communication with them on his part.

Mr. HAMPSON said he sympathized very strongly with Mr. Schacht's desire, but thought this somewhat lengthy question which he asked was hardly a regular way of bringing it forward. He would suggest that Mr. Schacht should give a notice of motion on the subject.

Mr. GREENISH feared that if pharmaceutical apparatus were placed in the room mentioned by Mr. Schacht it would be difficult, if not impossible, to use the adjoining balance-room for its legitimate purpose.

Mr. SUTTON suggested that Mr. Schacht should draw up a more detailed sketch of what he wished, as it could then be discussed more satisfactorily.

Mr. SCHACHT said he would endeavour to do so, and he should probably move for a special committee to consider the subject.

BENEVOLENT FUND.

The report of this Committee was read, recommending the following grants—

£5 to the widow of a registered chemist and druggist, whose husband had been in business on his own account at Birmingham, and who had two daughters dependent on her. Applicant was granted £10 in March last. The Secretary was also requested to inquire if the applicant has any friends, who are willing to assist in the education of the children by getting them into an orphan asylum or otherwise.

£5 to the widow of a late member, with five children dependent upon her.

£15 to the widow of a former member, having no present means of subsistence.

£10 to a registered chemist and druggist, some years in business, but now suffering from general ill-health and paralysis of the spine. Applicant has had two previous grants of £10 each.

£10 to William Atherton, an unsuccessful candidate at the late election of annuitants.

The consideration of three other cases was deferred.

Mr. BETTY, referring to one of the deferred cases, that of a widow with four children, said he could give any information which was necessary, and he hoped a grant would be made so as to enable two of the children to remain at a school where they had been for the last twelvemonth.

The Council, after some discussion resolved itself into committee and after hearing the particulars of the case, it was resolved that a grant of £10 be made in this case, the money to be placed in Mr. Betty's hands, to be used for the education of the children. The other recommendations of the Committee were adopted unanimously.

The Treasurer was also directed to pay £5 to each of the annuitants recently elected, being the amount of their annuity to Christmas next.

Mr. SHAW inquired how many voting papers were issued for the last election of annuitants.

The SECRETARY said about 5000; 3300 had been returned in time, but others were still being received.

LAW AND PARLIAMENTARY.

The report of this Committee stated that the opinion of the authorities at Somerset House had been asked as to the legality of preparing tincture of opium with methylated spirit. The reply was that as the preparation might be taken internally, it was clearly illegal to use methylated spirit in its preparation, and the Secretary was requested to write to the party who had made inquiry to that effect. The Solicitor had presented a report detailing the progress he had made in various matters which had been entrusted to him. The report was adopted.

LIBRARY OF THE NORTH BRITISH BRANCH.

Mr. MACKAY laid before the Council a list of seventeen volumes which the Committee of the North British Branch thought should be added to the library, and also an estimate for re-binding some of the books it already contained, most of which had been presented to the Society. He suggested that the matter be referred to the Library Committee. This was agreed to. Mr. Mackay also presented a written copy of a catalogue of the Society's library in Edinburgh.

HOUSE.

This Committee reported that it had held two meetings, at the second of which the question of the insurance of the premises and contents from fire had been considered. The Secretary reported that the surveyor of the Phœnix Fire Office had inspected the alterations which had been made in the premises, to which he made no objection, and that the office had expressed its willingness to receive any proposal for increasing the amount insured on the present terms. The Committee recommended that the policy on the building be increased from £5,700 to £7,000 and that on the contents from £4,150 to £5,000.

The report and recommendations were unanimously adopted.

THE YORKSHIRE COLLEGE OF SCIENCE.

On the motion of Mr. Hampson it was resolved unanimously that in response to an application from Mr. Reynolds, of Leeds, the Honorary Secretary of the College, the Journal and Proceedings of the Society be regularly forwarded as published to the Yorkshire College of Science.

Report of Examinations.

October, 1875.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major	3	2	1
Minor (14th)	5	1	4
„ (15th)	18	11	7
	— 23	— 12	— 11
Modified	9	5	4
Preliminary	177	80	97
	212	99	113

Certificates received in lieu of Preliminary.

1 College of Preceptors.
5 University of Cambridge.

SCOTLAND.

	Candidates.		
	Examined.	Passed.	Failed.
Minor	12	6	6
Modified	2	0	2
Preliminary	25	20	5
	39	26	13

Preliminary Examination.

There had been during the month, a conference between deputations from the Council and the Board of Examiners and a deputation from the College of Preceptors, as the result of which it was unanimously decided to include "simple and compound proportion" in the arithmetical portion of the Preliminary examination, and also "to take into account the handwriting of the candidates in awarding marks." The College of Preceptors had undertaken to carry out the present arrangements, setting the questions, supplying them to the Secretary before the day of examination, and afterwards examining the answers and assessing their values.

Major and Minor Examinations.

With regard to these examinations the English Board of Examiners had drawn up certain proposed alterations in the regulations; these had been submitted to the Board in Scotland, which concurred in some of the proposed amendments but not in all, but as the English Board still adhered to its opinions, the matter was referred to the Council for determination. After some discussion, a special Committee was appointed to confer with deputations from both Boards upon the subject, and report to the next Council. The conference was fixed to take place at 9·30, on the morning of December 1.

Board of Examiners, 1876.

It was also resolved—

> "That as the Board of Examiners for the ensuing year must be appointed at the next Meeting of the Council, it is desirable that any Member of Council desirous of nominating any Pharmaceutical Chemist as an Examiner should send the name of such person to the Secretary before the 23rd instant. That the Secretary be instructed to communicate with any persons whose names may be suggested as suitable persons for Examiners, asking if they will accept office if elected."

Mr. Williams gave notice that he should probably suggest the desirability of reducing the number of examiners, or making such alterations as would prevent the examinations becoming a financial loss to the Society.

The President, Vice-President, and several other members thereupon expressed their conviction that the examinations could not be properly conducted with a less number of examiners than at present.

PHARMACEUTICAL MEETING.

Wednesday, November 3, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting were read and confirmed.

The following donations were announced, and the thanks of the Society awarded to the donors:—

To the Library:—'Calendar of the University of Michigan, 1873-4, and 1874-5,' from Alfred Senier, jun., M.D. (Michigan University); 'Calendar of University College, London, 1875-6,' from the College; 'Calendar of the Royal College of Surgeons of England, 1875,' from the College; 'Medico-Chirurgical Transactions,' vol. lviii, from the Royal Medical and Chirurgical Society; 'Botany' (Manuals of Elementary Science), by Professor Bentley, from the author.

To the Museum:—Specimens of Medicinal Seeds, from Borneo, by Dr. Farre; a Poppy head, showing the method of incision used in Asia Minor in producing Opium, from Mr. J. A. Wink; a Specimen of genuine Russian Rhubarb, from Mr. Alfred Squire.

To the Herbarium:—A specimen of the Sumbul Plant.

The Cochineal Insect.

Mr. M. Carteighe called attention to some specimens of the cochineal insect, feeding on their natural food, a leaf of the *Opuntia vulgaris*, which had been brought from the Canary Isles by Dr. Dyce Duckworth and kindly lent by him for exhibition at this meeting. This, he said, was not a new subject, a former secretary of the Society having taken some interest and trouble in watching the growth and development of a series obtained from the Canary Isles in 1847, an account of which appeared in vol. vi. of the old series *Pharmaceutical Journal.* There was also an interesting account, by the English Consul there, in vol. ii. of the 3rd series, giving the commercial value, habits of the insect, etc. He might add that the natives of the Canary Isles found it more profitable to devote themselves to the cultivation of these insects than to the production of the necessaries of life, which were to a considerable extent imported. He thought the Society was much indebted to Dr. Duckworth for his thoughtfulness in taking the trouble to bring over this specimen. It would be noticed upon examination that from some of the insects which had been punctured the red colouring matter was exuding in considerable quantity.

Coto Bark.

Mr. Martindale drew attention to a sample of Coto Bark which had lately been noticed in the *Pharmaceutical Journal* as being used in Bolivia for diarrhœa. It had also been employed in Germany with some success. At present there was none in the market, but probably in the course of a few months there would be a supply, when they would be able to judge better of its value. The botanical source of the bark had not yet been determined. He had been favoured with the sample exhibited by Messrs. Baiss Brothers.

Mr. Greenish asked in what form it had been administered in Germany, and what was the dose.

Mr. Martindale said it was recently stated in the Journal that the dose of the powder was about ½ drachm; it was also used in a tincture made, he supposed, with rectified spirit of the strength of 1 in 10. The drug had been employed in Munich with some success.

A fine specimen of the bark was exhibited also by Messrs Domeier and Co.

The Analysis of Cinchona Bark.

A paper on the Analysis of Cinchona Bark was then read by Mr. Edward Lawrence Cleaver, F.C.S. The paper is printed at p. 361. At the close of the paper the Chairman requested Dr. Paul to open the discussion.

Dr. Paul said he had had some little experience in connection with the analysis of bark, and his view was rather, that it was a subject on which there was a good deal to be done, but very little to be said. He thoroughly concurred in the proposition with which Mr. Cleaver started, that there was need for an accurate and expeditious method of analysing bark; for even in following the best methods known, one was frequently at a loss to know certainly whether the results correctly represented the value of the bark. There were persons who had special experience in connection with bark analysis, and any information obtained from them, or from those who had specially studied the subject, would be valuable; but, unfortunately, those gentlemen were occupied in such spheres as did not induce them to bring forward the results of their experience. Mr. Cleaver seemed to have criticized several of the methods which had been proposed, and it was quite evident that he was a positive philosopher, for he gave very positive opinions, although he did not support them by facts or arguments. For instance, with regard to the B. P. process, which probably did not aspire to any high scientific accuracy, but was rather to be regarded as a means of obtaining a minimum result which would give some criterion as to the value of a bark for pharmaceutical purposes, and was applied, moreover, to a particular variety of bark, containing only quinine with very little cinchonine, Mr. Cleaver condemned it in every phase. Dr. De Vrij's method also met with his censure. It appeared to him that in thus condemning two methods—one an official one, and the other recommended by a very high authority—Mr. Cleaver should have brought forward some evidence in support of his opinions; but he had not done so, either in regard to the statement that 100 grs. was too small a quantity, or as to the loss of the alkaloid. With regard to the details which Mr. Cleaver himself recommended, the percolation in boiling alcohol was a method which had been practised for years—he believed for ten years, at least—in German manufactories. Again, in regard to some of the points mentioned there were positive inaccuracies; to judge from the expression made use of as to the separation of the alkaloids, one would gather that there were positive differences between quinine and the other alkaloids present in some kinds of barks, and that quinine was soluble while the others were not. But that was not the case; the only difference with regard to solubility in ether was one of degree; and this was the case in regard to all the characters of cinchona alkaloids which were taken advantage of for the purpose of analysis. This was much more the case than in any other kind of analytical operations. If baryta was in solution, together with lime, they could be separated almost absolutely by observing certain conditions, but that was not the case with the alkaloids of cinchona bark; one must always bear in mind and be able to estimate the probabilities of the quantities one had to deal with, and regulate the quantities of the solution, whatever the solvent employed, accordingly; and it was upon the success with which one's judgment was applied in this way that the value of the result would very materially depend. The determination of quinine, as given by Mr. Cleaver, would be defective for this reason, that whenever the bark contained cinchonidine or quinidine as well, the ether solution would contain cinchonidine, quinidine, and amorphous alkaloid as well as quinine; and, therefore, it would be a fallacy to evaporate the ethereal solution to dryness and weigh it. Dr. De Vrij had distinctly pointed out another fact, that the alkaloids precipitated from solution always contained, in addition to the total alkaloids, another substance somewhat undefined, but possibly quinovic acid, or something allied to it. This sometimes amounted to 10 or 15 per cent. of the total precipitate. So far as his own experience and information went, the only satisfactory way of determining the quantity of quinine was by crystallization of the neutral sulphate obtained by dissolving the residue of the ethereal solution in dilute acid. By dissolving the alkaloids in ether the quinidine and cinchonidine were reduced to a minimum so small that if a crystallization were obtained from the water solution of the sulphate, one might be sure that quinine was present. If, however, on reducing that water solution to about 30 cubic centimetres no crystallization was obtained, there was trustworthy reason to believe that the amount of quinine in the bark was exceedingly small. He had made these remarks because he thought the publication of this paper was calculated to establish a mischievous precedent. There was no doubt plenty of room for young men connected with pharmacy to devote their attention to the elucidation of scientific subjects, more or less intimately connected with pharmacy, and, if properly conducted, such investigations would be of great value; but this sort of work, to be of any real service, must be carried out thoroughly and with a due regard to the value of the result to be obtained. The details of the manipulation were very simple, being little more than measuring, weighing, and observing certain results from solutions; they might be undertaken in spare time, and be left and resumed again; but they must not be hurried through with the intention of merely making a display. There had been great efforts made to put down the cramming system for examinations, but the pretence of knowledge was not the only sham in connection with pharmacy which ought to be suppressed, and if the exorcised spirit of cram were to be rehabilitated in the form of spurious research, there would be a still greater source of mischief to eliminate.

Mr. Linford said he had not had much experience in these analyses, but some time ago he had occasion to analyse some barks, and the main difficulty he found was the separation of the crystallizable and non-crystallizable quinine in the solutions obtained after treating with the slaked lime and exhaustion by boiling alcohol, subsequent solution in sulphuric acid and precipitation. On that occasion he tried a process which was based on this fact, that amorphous quinine and crystalline quinine were atomically the same; he therefore weighed exactly the quantity obtained and divided it into two portions, dissolved half in exactly sufficient sulphuric acid to make an ordinary acid sulphate, precipitated it with the remaining half and found that the disulphate of amorphous quinine appeared quite insoluble in water. The disulphate of crystallized quinine was to a known extent soluble, and by adding sufficient boiling water to dissolve the crystalline, the amorphous quinine separated in a somewhat resinous mass at the bottom, from which the solution was easily decanted and crystallized on cooling. The calculation of the amount remaining dissolved in the mother liquor gave them so near an approximation of the absolute amount that the product from that sample of bark did not vary 3 per cent. That seemed a simple method. The main object was to dissolve the residue from the ethereal solution in only just sufficient sulphuric acid to form the disulphate, then evaporating to crystallization, a result was obtained so close that he thought it would be a process which most manufacturers would find sufficiently near for practical purposes. In order to check the process he experimented with some solution of amorphous quinine to ascertain if the amorphous quinine when separated, half of it being precipitated with ammonia, would dissolve any more disulphate than plain water, and he found it did not. Therefore the amount of amorphous quinine did not interfere with the accuracy of the result. He reprecipitated that with ammonia, and obtained as pure quinine a result which very closely agreed with the result given by the crystallizable disulphate.

Professor Redwood said that some years ago most of the bark analyses in London were performed by him, and his experience was therefore somewhat extensive, but he must confess that it was by no means recent, and he could not say that it related altogether to the class of barks which now principally come under the notice of analysts. He thought it a pity that Mr. Cleaver had not a little more confined himself to explaining his own process, leaving others to draw a comparison between it and those which had been proposed by men of great experience and eminence. It was also to be regretted that he had not drawn a greater distinction than he had between the objects which always must influence those who undertook bark analyses, one being that of a pharmacist to satisfy himself of the value of the bark he was about to use in medicine, and the other that of the manufacturer or merchant who wished to estimate the value of the bark for commercial purposes especially with reference to its use in the manufacture of salts of quinine. With reference to the first object, the great point to be aimed at was that which was the aim of the authors of the Pharmacopœia, to give a process which should be simple and of easy performance, and which gave approximately a practical result and indicated the value of the bark for pharmaceutical purposes. If it were possible to devise a method applicable for both purposes, that which would be at once simple and easy of application, and, at the same time would admit of a more strictly accurate result being obtained than was contemplated by the Pharmacopœia process, it would be a great advantage; but he could not say that he found in the process recommended anything likely to become practically useful in the hands of pharmacists. The method proposed was too recondite and too difficult for use in such a way. Mr. Cleaver seemed to have started with the idea of indicating a method which would enable an unpractised person to do all this with ease, rapidity and accuracy; but he did not think he had succeeded, the process he had proposed being far more suitable for the analysis of bark for commercial purposes, and indeed it resembled in many respects the method usually adopted by bark analysts. The great difficulty which had always been experienced arose from this fact, that if barks were used in manufacturing operations which were quinine barks on the one hand, or cinchonine barks on the other hand, the operations would not be so difficult as when the barks to be operated upon contained, as they usually did at the time he was referring to, a considerable quantity of quinidine as well. The Carthagena barks were of that class, and the difficulty always had been to indicate the quinine as distinct from the quinidine. And not only so, but towards the latter part of the period referred to, quinidine itself became a commercial article, and then it was necessary, and he believed it was so still, that the proportion of quinidine, distinct from cinchonine as well as quinine, should be indicated, which rendered the operation more difficult. He quite agreed with what had been stated by Dr. Paul, that ten years ago, in this country, it was usual to exhaust the bark with alcohol, to adopt, in fact precisely the plan now indicated, which was claimed more prominently since by Dr. De Vrij, though it was introduced to his (Dr. R.'s) notice eight or ten or more years ago, by Mr. Edward Herring. The process then adopted was to mix the bark with lime, exhaust with alcohol, then distil off the spirit, after which the alkaloids were separated, and he knew of no better mode than by means of ether. But ether dissolved them all to a greater or lesser extent. It was not that there were alkaloids soluble and others insoluble. All were soluble to some extent, and, besides quinine, quinidine was soluble to a very appreciable extent. Then, again, in the separation by crystallization, if you had any quantity of quinidine present, you could not sharply crystallize the quinine away from it. It was a question not only of the fact of the salt crystallizing out, but of the manner of its crystallization, and therefore it became really an operation in which not only a considerable amount of knowledge was required, but also of practical experience, so that the analyst should be able to distinguished by certain characters between quinine in a pure state, and when mixed with quinidine. He might just allude to the fact that a great deal of confusion had been introduced into the subject, in consequence of names applied to the alkaloids not always being used in the same sense. Some chemists applied the term cinchonidine. or conquinine, where others used the word quinidine, and he should like to know whether Mr. Cleaver, in speaking of cinchonidine, referred to the alkaloid which had the same composition as quinine, or the one which had the same composition as cinchonine. It was quinidine, meaning the body which corresponded with quinine, which, in his experience, presented the greatest difficulty in carrying out these analyses. He should certainly like to see a uniform practice adopted in the application of the names to these bodies; there were four alkaloids, all of which were capable of yielding crystalline salts, irrespective of the uncrystallizable quinoidine, namely, quinine, quinidine, cinchonine, and cinchonidine. The first two corresponded in composition, and so did the latter two, and if they were always used in that sense it would greatly tend to simplify the subject. He could not conclude without adding an expression of thanks to Mr. Cleaver for having devoted time and attention to this most difficult subject, one, in fact, which could only be successfully investigated by those having considerable experience. He therefore thought it was rather too much to attempt suggesting a mode of analysis which should be applicable in the hands of inexperienced persons.

Mr. **Umney** thought they were all indebted to Mr. Cleaver for having brought this matter forward, and presenting in a condensed form the deductions of previous experimenters. He noticed one or two novelties in Mr. Cleaver's method of analysis, and the percolating apparatus was certainly well adapted to the exhaustion of cinchona bark; but he did not think it was one which could be put into the hands of a pharmacist. In determining the amount of alkaloid in a quinine yelding bark for pharmaceutical purposes, he himself should prefer to adopt a process for determining the proportion of quinia, which would give the alkaloid in a comparatively pure form A process, by M. Guillermond, was published in the Journal some years ago (*Phar. Jour.* vol. i., 245), which consisted in taking a convenient quantity of bark, say 100 grammes, thoroughly moistening it with spirit of a strength not exceeding 45 overproof, heating it until the bark became quite soft, then throwing into it a quarter of its weight of hydrate of calcium, drying and powdering, transferring to a small percolator and exhausting with successive small quantities of ether. In this ethereal percolate almost absolutely pure quinia was obtained, amorphous and crystallizable, though it would contain a little fatty matter which the ether abstracted from the bark, and could be weighed after drying at 150° C. If it were necessary to carry the process further, it might be dissolved in a small amount of alcohol, treated with sulphuric acid and crystallized. Manufacturers only believed in the crystallizable sulphate of quinine which they could see and weigh. If the alkaloid were sulphated with acid of a known strength, the one he used containing a little over 1 per cent., so that 10 cubic centimetres equalled 1 gramme of sulphate of quinine, evaporated to dryness, treated with boiling water, and a little more sulphuric acid added, the whole of the sulphated alkaloid could thus be obtained in solution. By pouring on a filter the fatty matter was taken out, and the filtrate falling into a small dish of about 150 cubic centimetres' capacity, the solution was then obtained in a state in which it could be set aside to crystallize. This could be done by placing it over a little spirit lamp, bringing it to the boiling point, and cautiously adding a caustic alkali, ammonia or soda, the latter by perference, until it is nearly neutralized, being always careful to leave it faintly acid If it be quinine sulphate, when the neutralization has reached a certain point it would instantly shoot out into a mass of crystals of sulphate of quinine. These crystals could be thrown on a filter, washed with water, dried, and estimated at 87 grammes = 100 grms. sulphate of quinine He thought the standard of 2 per cent. of alkaloid in Calisaya bark as mentioned in the B. P. was much too low, and that no manufacturer would ever recognize a sample as good Calisaya bark which contained so little

True, the Pharmacopœia process was only intended to give an approximate result, but he believed Professor Redwood would bear him out that many other cheaper varieties of bark contained probably 3 per cent. of quinia. He concurred in what Mr. Cleaver had said in reference to the drying of quinia; he himself had stated on a former occasion, that it could not be dried at 100° C., at any rate unless by 10 or 12 hours' drying, whereas it could be dried tolerably rapidly at 125° C. As regards the construction of the apparatus he thought the steam going in at the top would make the spirit boil at first at the surface only, and therefore he should prefer to introduce it at the bottom, so that the vapour should rise. Another novelty he noticed was treating the residue after distillation with alcohol, with carbonate of barium. He had generally treated that residue, consisting of acid sulphate of the alkaloid, with water, which in limited quantities would not dissolve the sulphate of lime present or much of the colouring matter. He should like to know when the carbonate of barium decomposed the compound, whether on boiling the residue in alcohol he obtained it free from colouring matter; if so this was a very important point. He could not agree with Mr. Cleaver, but rather with Dr. Paul, about exhausting the mixed alkaloids with ether; one could not go on adding ether to any amount without dissolving the other alkaloids associated with it. Mr. Cleaver had also questioned the statement of M. Carles, that upon cooling a solution of mixed sulphate, the whole of the quinine sulphate was precipitated, while the other alkaloids remained in solution—he certainly was of opinion that Mr. Cleaver's opposite opinion was incorrect—at any rate as far as sulphate of cinchonine was concerned. Again, Mr. Cleaver said that after washing the sulphate on a filter, one could take the mother liquors to contain 1 part of the salt in 300. He should like to ask whether those figures were fixed from the solubility of ordinary sulphate of quinine in water; if so he should like to remind Mr. Cleaver that the solubility of sulphate of quinine in water was much affected by the presence of sodic or ammonic sulphates. Lastly, with regard to quinidine and cinchonidine, he believed the former to be a very rare alkaloid, though the latter was very common; and at the present time some of the sulphate of quinidine sold as such in the market was really sulphate of cinchonidine. This latter alkaloid was largely produced from the East Indian barks now being imported, and it was high time that the difference between it and true sulphate of quinidine was understood.

Professor **Attfield** said he should like to make a remark or two on this paper, not now as an analyst or as a professor, but as an inquirer. It had been rather severely criticized, perhaps, though no doubt there was ample room for more thorough and fuller work should Mr. Cleaver be inclined to spend more time and labour on the subject. Nevertheless, their thanks were due to him, not only for having elicited valuable remarks from other workers, like Mr. Linford and Mr. Umney, but also for having given them what all inquirers for processes of bark-analysis had been looking for, namely, something positive, whereas most of those who had criticized known processes, not excepting Dr. Paul or Professor Redwood, had confined themselves to a little talk about the positive and to the communication of what was only negative. Chemists had been looking out for many years for a bark process which should be at once rapid and trustworthy; he himself had tried most of the known processes, and had read critiques on them. He had also heard that there were gentlemen to be found who could already analyse bark with approximate accuracy, and when Dr. Paul rose, he did hope that he should find what he had been inquiring for, some positive information. His hopes had, however, been disappointed, and even Professor Redwood in the observations he had given respecting the numerous analyses he had made in years gone by, had somehow, probably for want of time, forgotten to mention the processes he adopted. Mr. Cleaver, however, in the true spirit of science had apparently stated all he knew on the subject, and he therefore deserved the thanks of all chemists and pharmacists.

Mr. **Cleaver** in reply said he was much obliged to Dr. Paul for his remarks, which he should endeavour to profit by. He stated that the quantity of bark ordered to be taken was too small, because 100 grains of Calisaya bark would often not contain more than 2 per cent. of total alkaloids, or 2 grains, and if there were a slight loss at each stage of the manipulation it would be very material at the end of the process. Another point was that in washing any alkaloid by water, a large quantity, comparatively speaking, was dissolved; the alkaloids were not very soluble in water containing free alkali, but they were perceptibly soluble in pure water; and if when washing alkaloids which had been precipitated from an alkaline solution, the point at which the alkali was removed was noticed, it would be seen that a decided opalescence was given to the water by the solution of the alkaloid in it. The cinchonidine he had spoken of throughout was the alkaloid isomeric with cinchonine. His process was devised chiefly in order to prevent this loss of alkaloid by washing; he did not claim any great novelty for it, but he did not think it was generally known before Dr. De Vrij published his process. Though the process might appear to take a long time on paper it did not occupy much time in practice. The reason he took carbonate of barium to saturate the sulphate solution was that carbonate of sodium was perceptibly soluble in the spirit afterwards used to extract the alkaloid, and then a correction had to be made for the carbonate of sodium. The carbonate of barium was perfectly insoluble, and it gave a liquid of a light straw colour—he had never found it at all dark. As to the amount of quinine sulphate in the wash water the quantities given were established by absolute experiment. He had not paid any attention to the statements in the text-books on this point.

The **President** said the Society was indebted to Mr. Cleaver for bringing forward a paper on so important a subject.

Commercial Molybdate of Ammonium.

Mr. S. **Plowman** then read a Note on the Chemical Formula of Commercial Molybdate of Ammonium, by Mr. N. T. Carrington. The paper is printed at p. 362, and gave rise the following discussion:—

Mr. **Linford** said he had made a good deal of molybdate of ammonium, and it all contained an excess of molybdic acid. He thought Mr. Carrington was quite right in his statement of its composition. On one occasion he tried to evaporate some in a stream of ammoniacal gas, but could get no crystals, and his impression was that the neutral salts did not crystallize at all. He found his product getting acid and tried to make it neutral, but he could not then get it to crystallize.

Professor **Redwood** said they were much indebted to Mr. Carrington, and to the professor in the laboratory, for having carried out this analysis, and he thought it would be of great service to the Society if many other specimens in the museum were submitted to a similar scrutiny. There were some things in the bottles with very definite names, but they were not always sure that those names correctly represented them.

Professor **Attfield** said that now some students entered the laboratories for longer periods than formerly, and, therefore, he thought there was a likelihood of more of this work being done in the future—that was, even more than had been done already.

Mr. **Davies** with regard to Mr. Linford's remark, said that an earlier sample analysed by Mr. Carrington, although apparently in fine powder, was really, when closely inspected, a mass of small crystals. He thought it was the neutral variety of the salt, because the result obtained by Mr. Carrington approximated more nearly to

65·3 per cent. of molybdous oxide, than to the percentage required by either the acid molybdate, or the one corresponding to the salt of sorrel.

PHARMACY IN PORTUGAL.

A Note on Pharmacy in Portugal was then read by Mr. Thomas Greenish. The paper is printed at p. 363, and gave rise to the following discussion:—

Professor **ATTFIELD** said he had listened with great interest to the paper, and would have liked to have heard more. From what he read in the *Pharmaceutical Journal* of twenty years ago it appeared that Portuguese pharmacy must have degenerated in a most remarkable manner. That article gave an historical summary of Portuguese pharmacy, showing that 400 years ago physicians and surgeons in Portugal were precluded from making up medicines in order that pharmacists might alone possess that privilege; at the same date an Adulteration Act was passed; 350 years ago they had a compulsory examination, and from that time to about fifty years later pharmacists seem to have been quite the pets of the legislators, all sorts of privileges and exemptions having been conferred upon them. For some 200 years after that period little seemed to have been done for them, but 100 years ago a definite curriculum of study was introduced; eighty years ago they had the first pharmacopœia; forty years ago a second one came out, and at the same date a Pharmaceutical Society was established. In a number of the Journal for July 29, 1871, appeared a statement showing that opportunities were provided for pharmacists in Portugal to go through five years of study at the university of Coimbra, the course being—first year, inorganic chemistry; the second, organic chemistry, and botany; the third, natural philosophy, part 1, and botany; the fourth, natural philosophy, part 2, and zoology; the fifth year, mineralogy, geology, and mining. In addition, the pharmaceutical course in the laboratory lasted two years, and then there was two years' practice in the dispensary, though perhaps these courses were carried on concurrently with the former. Now, as there were some individuals, including himself, who never lost an opportunity of urging the importance of pharmaceutical education in Great Britain, he thought it was well to notice that it appeared as if there might be such a thing as excess in that education as well as deficiency. He should like to know therefore what sort of man this curriculum produced. The writer of the article stated that as a special branch of science, pharmacy in Portugal was far behind England, Germany, and France, and with this view, Mr. Greenish seemed to concur. He should like to know, therefore, how pharmacy had dropped from the high position it held 400 years ago to the sad condition which it now was stated to hold. Perhaps the secret was that the education had not been compulsory on all pharmacists. It was desirable to know also the relations which existed between pharmacists and medical men; whether the one pharmacist to each 2000 inhabitants was able to make a living out of pure pharmacy, or whether he had to add confectionery, perfumery, etc., to his business; also if he was not only a druggist, but a chemist, whether he was a public analyst under the Adulteration Act, 1456; and whether these highly qualified men did anything towards promoting the well-being of the calling of which they were followers, and whether they engaged in original research. It appeared there were several pharmaceutical journals in Portugal, and he hoped some one would be able shortly to give them some further information on this interesting topic of Portuguese pharmacy.

Mr. **POSTANS** asked whether the decimal system of weights and measures was adopted in Portugal.

Mr. **LINFORD**, in the course of some humorous remarks said he thought the paper of Mr. Greenish contained a serious warning to themselves. They had now entered on the course which Portugal commenced some 400 years ago, and it might be that 400 years hence they should find English physicians prescribing Morrison's pills, because the pharmacists of England had disappeared in consequence of excessive education. It appeared to him that the legal favour bestowed upon these Portuguese pharmacists seemed to have brought them into an extremely bad condition, and he would suggest that the Council should take into its serious consideration some means to prevent the education of English pharmacists leading them into the same position as their Portuguese brethren were at present.

Mr. **GREENISH** said he believed there was only one pharmaceutical journal in Portugal at present, and that seldom had anything original in it. The pharmacists confined themselves to pharmacy, except that they sold large quantities of patent medicines.

Before adjourning the meeting the Chairman announced the following papers for the Pharmaceutical Meeting of Dec. 1st.:—

"Notes on the Preparation of Pure Chemicals." By Louis Siebold, F.C.S., Editor of the 'Year Book of Pharmacy;' and "The Action of Alcohol on Senna Leaves." Also by Mr. Siebold.

BENEVOLENT FUND.

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Watmough, A. C., Caistor, Lincs	0	5	0
Watmough, G. C., Caistor, Lincs	0	5	0
Watts, John, Dudley Hill, Bradford	0	10	6
Watson, James B., Chipping, near Preston	0	5	0
Wavell, John, Ryde, Isle of Wight	0	10	6
Welch, John J., Kinver, Staffs	0	5	0
Whitburn, A. R., 174, Regent Street, W.	0	10	6
Whittaker, E., Regent Road, Salford	0	10	6
Williams, R., 324, Coldharbour Lane, S.W.	1	1	0
Williams, Sophia, 23, Pulteney Street, Bath	1	0	0
Willsher, S. H., Tenderden	0	10	6
Winterbottom, James, High Street, Oldham	0	5	0
Yeomans, George, Desborough	0	5	0

DONATIONS.

	£	s.	d.
Bishop, Alfred, 17, Specks Fields, Mile End, E., per John Williams, Esq., Treasurer	10	10	0
"Du fort au faible"	16	16	0
Lloyd, Arthur, 98, St. Paul's Road, Camden Town, N.W.	5	5	0
Schacht, G. F., Clifton, Bristol	1	1	0
Simpson, Robert Edward, Effra Villa, Effra Road, Brixton	10	10	0

Provincial Transactions.

LEEDS CHEMISTS' ASSOCIATION.

The second general meeting of this Association for the present session was held on Wednesday evening, October the 27th, in Blackburn's Dining Rooms, Boar Lane; and, as usual of late years, was of a social character, but differing from previous similar gatherings in being confined to the members and associates of the Association only, instead of being thrown open to the trade generally. The company, numbering fifty-seven, after inspecting a small exhibition of microscopes, kindly lent for the occasion by several of the members, sat down to an excellent tea, after which the Secretary was called upon by the President, Mr. Yewdall, who occupied the chair, to read the minutes of the last meeting. These being duly confirmed, a letter was also read from Mr. Schacht, of Bristol to Mr. Brown, one of the committee, commending the Association for making an appeal to the Pharmaceutical Society for a grant of £25 for educational purposes, and wishing it God-speed in its work.

The President then delivered the Annual Address.

PRESIDENT'S ADDRESS.

As you have chosen me to occupy the position of your President for the present year, and being fully aware of my own incompetency for such an office, I shall, in endeavouring to carry out your wishes, be compelled to rely greatly upon the kind forbearance and support of the members. Our Society has now entered upon its thirteenth session, and it may be interesting to take a retrospective glance at the work already accomplished. The Association was the outcome of a small meeting held in December, 1862, for the object of considering the desirability of forming a Leeds Chemists' Association, with a view to its holding periodical meetings for the reading and discussion of papers on scientific and other subjects interesting to the members, and also of forming classes for lectures on Materia Medica, Botany and Pharmacy, chemistry being already systematically taught by Mr. Ward, at the Mechanics' Institution. After a free conversation amongst those present, it was generally agreed that it was highly desirable to form an association having these objects in view. Accordingly, a meeting of the trade was held in the Barristers' Room, Town Hall, during the same month, when resolutions approving of the formation of the Society were unanimously agreed to; the officers were elected, and a committee formed to carry on the work for one year; since which time it has steadily maintained its position. From the annual reports I gather that during the first decade the average number of members and associates were respectively 36·2 and 40·8; last year we had 40 members and 46 associates, from which we may consider it is numerically in a healthy condition. Classes for the study of Botany, Latin, and Materia Medica, have been held from time to time, when a sufficient number of students could be obtained. The monthly meetings (held during the winter) have been supplied with various papers and lectures, some of which were of a highly interesting character, but, with few exceptions, the attendance at these meeting has been very small. When we consider the many educational institutions in the town, some of which have sectional societies holding periodical meetings, and with which most of our members are associated, and also the lectures in connection with the university extension scheme, it is not very surprising that the attendance is scanty; and yet whilst I endeavour to apologize for the absentees, amongst whom I have, during the past session, frequently been numbered, I seem to be reproved by the President of the Pharmaceutical Society (Mr. T. H. Hills), who, when at Bristol last year, said: "We have had evening meetings in London for thirty-two or thirty-three years, and I do not think I have missed being present more than four times during the whole of this time." Surely this is an example worthy of imitation. It would be pleasing to see the associates take a little more interest in the materia medica cabinet. There is yet much space left for specimens, and to increase its usefulness it might be supplied with many articles which are included in the materia medica portion of the old Pharmacopœias, and also with authentic specimens of new remedies, when procurable at a moderate cost, even if their popularity should be as shortlived as that of condurango; they would form a nucleus for a museum, and by their increasing number would probably stimulate us to engage larger rooms. It will be evident to you that the intentions of the promoters of the Society have been fully realized, the numerical strength has continued to maintain a fair average, whilst the advantages to the trade of such an Association have been frequently manifested in the readiness with which its influence was brought to bear upon any question affecting the commercial prosperity of its members. It is pleasing to those who have laboured in connection with the Society to know that several associates have, through the advantages offered by the library and lectures, passed their examination,—in one case, that of the Royal College of Physicians—with most satisfactory results. During the present month we have had another institution publicly inaugurated, I refer to the Yorkshire College of Science, established to supply instruction in those sciences which are applicable to the manufactures, engineering, mining, and agriculture, of the county of York. When the proposal to form the college was brought forward at our monthly meeting in November, 1872, a resolution was passed—"That this meeting desires to record its gratification at the proposal for a Yorkshire College of Science, and believes that it would materially assist in the education of Students in Pharmacy." The college being now an established fact, it is for the members to consider how far its capabilities recommend it for the purpose indicated. Hitherto we have only been able to offer students the advantage of evening lectures, either the excellent course upon chemistry delivered at the Mechanics' Institution by Mr. Geo. Ward, F.C.S., or those on Botany delivered by Mr. Abbott, and the hour for their commencement is well adapted for the convenience of our associates or those connected with the trade residing in this town wishing to attend; but it seems to me the college might offer facilities for students from other towns in Yorkshire, or from villages where no regular courses of lectures are given, to attend classes during the day, so as to enable them to return home in the evening, as many medical students do who attend the lectures at the Medical School. If such an arrangement could be made the number of members and associates might be increased by the addition of many now residing in these districts. With the commencement of the present month the "Sale of Food and Drugs Act, 1875," became law, and although I ventured to bring its provisions before the Annual Meeting, yet as the discussion is adjourned to another evening, I offer no excuse for again laying it before you, especially as one or two of its sections are of such a character that it is of the greatest importance to avoid a first conviction. After defining the meaning of the word "food," which is to include every article used for food or drink by man, other than drugs or water, and the term "drug" to include medicine of every description for internal or external use, the Act directs that if any person shall mix colour, stain, or powder, or order or permit any other person to mix, colour, stain, or powder, any article of food with any ingredient or material, so as to render the article injurious to health with the intent that the same may be sold in that state, or shall sell any article so mixed, coloured, stained, or powdered, he shall for the first offence be liable to a penalty not exceeding £50, and every offence after a conviction for a first offence shall be a misdemeanour, for which the person on conviction shall be imprisoned for a period not exceeding six months, with hard labour. It is very important you should observe that although a magistrate has the power to mitigate the fine, he cannot prevent the second offence making the offender liable to be committed to prison with hard labour. Under this section, I presume, ground-pepper, spices, ginger, and rice may be included, though much depends upon the manner in which the information is laid. Let us suppose a case: Assume a specimen of ground white pepper is found to be adulterated with pea flour, if the information is laid under the 3rd section it will be necessary to prove that pea flour is injurious to health, an assertion which those who are fond of pea soup would scarcely support; but suppose it is called a "drug," then it comes under the 4th section, wherein it is directed that "no person shall, except for the purpose of compounding as hereinafter described, mix, colour, stain, or powder, or order or permit any other person to mix, colour, stain, or powder, any drug with any ingredient or material so as to affect injuriously the quality or potency of such drug, with intent that the same may be sold in that state," under the same penalty in each case respectively, as in the preceding section for a first and subsequent offence. Here the word "potency" might be of service inasmuch as the presence of the pea flour would certainly reduce the pungency or strength of the peppers, or if it is designated "pepper" it would then come under the 6th section, which says, "No person shall sell to the prejudice of the purchaser any article of food or drugs which is not of the nature, substance, and quality of the article demanded by such purchaser." If the purchaser asked for ground white pepper, and obtained a mixture of pepper and pea flour it cannot be said that he has been supplied with the article he asked for; the penalty under this section is a fine not exceeding £20 and does not make the offender liable to imprisonment for a second or any subsequent offence. It may be well to ask, who is meant by the word "person?" Is an employer to be considered guilty of an act committed by his servant? Suppose a man purloined a part of the goods committed to his care for powdering, and to make up the quantity added another ingredient, would the servant or employer be considered the "person" here referred to? If the employer was charged he might, by proving his absence at the time, seek exemption under the 5th section which says, "That no person shall be liable to be convicted if he shows to the satisfaction of the court that he did not know of the article sold by him being adulterated." And thus the principal offender escapes the punishment he deserves. By the 6th section certain exemptions are allowed where a drug is unavoidably mixed with some "extraneous matter" in the process of "collection" or "preparation." It may be a little difficult to understand also what is intended by "extraneous matter." In the case of gums, oleoresins, and roots, it refers to the substances with which these articles may have been mixed during their collection. How will it apply under some circumstances to manufactured goods? In the early part of the year, Dr. J. C. Brown, of Liverpool, intimated that much of the citric acid of commerce contained lead; this statement induced me to examine some then in stock which had been obtained from a highly respectable source, and it was found to contain a notable quantity. It was evidently the result of using leaden vessels or vessels lined with lead, and therefore as it had probably not been observed previously might be considered as "extraneous matter." Five samples of oxide of silver obtained from different makers have lately been examined and all contained chlorides; would the presence of the chloride be considered unavoidable? At the Annual Meeting I ventured to suggest that acetate of lime would be considered as an adulteration if found in acetic acid, but as its presence is due to process of manufacture it might be considered as "extraneous matter." These and many other questions will no doubt have presented themselves to you. It is not necessary to enter into the question further to-night, as it is so shortly to occupy our attention again, when I hope there will be a good attendance of all interested. May I suggest that if every member will examine the various articles he has in stock, and when he meets with any containing impurities, whether of manufacture, collection, or admixture, bring it to our evening meetings, or any practical hints obtained during such examinations, we shall have no cause to regret that the Adulteration Act has become law, each having thereby been stimulated to further research. The retailer may shelter himself from the penalties of the Act if he obtain a written guarantee from the wholesale dealer of whom he purchased the goods, that they are genuine. The eloquent and exhaustive address of Mr. Groves, President of the British Pharmaceutical Conference at its twelfth annual meeting, held at Bristol in August, leaves little room for any remarks from me on pharmaceutical topics. I may, however, call your attention to a Act for establishing a Pharmaceutical Society in Ireland, which became law, the object of which is to enable those persons who pass the examinations fixed by the first council of the Society (and which council is appointed under the Act) to commence business in Ireland as chemists and druggists, or pharmaceutical chemists. Hitherto no person could sell drugs in Ireland unless he had passed the examinations of the Apothecaries' Society in Ireland, and in consequence the retail shops have been kept open by a class of men whom we call "surgeons." The effect of the Act now referred to will be to allow another class of tradesmen, similar to ourselves, to carry on the business of a chemist and druggist, or pharmaceutical chemist. A new field is thus opened for retail chemists, and from time to time we may expect to see a number of English chemists and druggists going over to Ireland. It must be remembered, however, that the Act applies only to Ireland, and makes the passing of an examination by all persons compulsory, and the same result would happen to any Irish pharmaceutical chemist who wished to commence business in England, the Pharmacy Act making compulsory examination the only means of being registered under it. The growing tendency of coroners' juries to make unpleasant insinuations when a retail chemist is found to have supplied a poison by which some person, evidently intent upon committing suicide, has come to his death, suggests the necessity of our considering whether some means should not be adopted for making the coroners more thoroughly acquained with the spirit and intention of the Pharmacy Act. It is evident when its provisions have been carefully fulfilled, no blame can be attributed to the chemist, whilst unmerited censure might seriously injure his commercial prospects. At the commencement of another session it may be well to remind the associates that to become the successful pharmacist of the future, it is necessary that they should be attentive and persevering in their studies. Approach the subject which you have chosen for working up during the winter with a firm determination to become thoroughly master of it. Are there any here who for the gratification of the amusements of the town are putting off their studies a session? Let me urge them to reconsider the subject: time lost in early life is rarely recovered afterwards. During my apprenticeship there were no opportunities of attending lectures on Botany, Materia Medica, or Pharmacy; no interest was taken in the educational prosperity of a youth at the establishment to which I was affiliated, and though I did learn toward the close of the term that a class for the study of chemistry was held in the cellar of the Mechanics' Institute, yet on account of a severe domestic bereavement I had not the opportunity of attending the whole of the lectures comprised in the elementary course. I have therefore had to gain the little knowledge I possess whilst attending to a retail business, which for the first ten years was opened at 7 a.m. and closed at 10 p.m., during which I gave constant personal attendance. It is therefore from practical experience of the difficulty you will have in after-life to make good the opportunities lost in youth, that I urge you on no account to allow a session to pass without improving your position as much as you can. When you consider that for the purpose of enabling you to pass the examination with ease it is necessary that you have carefully worked through elementary and practical chemistry, botany, materia medica, and become acquainted with the use of the microscope, including the detection of adulterations, you will form some idea that it can only be by systematic and careful work that you can obtain the position you envy. And yet there is no difficulty in doing so if you will consider your business and the studies connected therewith a pleasure; for he that is well employed in his study, though he may seem to do nothing, is yet filling storehouses with knowledge to be again called forth when necessity demands. It must be remembered you are now laying the foundation for the future, and according to the care with which you make fast every grain of knowledge upon every subject which you take up, will be the character of the superstructure raised in after life. Another reason why you should give every attention to study during your apprenticeship is the fact that when you are an assistant the hours of business are disposed of by your employer, and as few chemists engage more assistants than they can fully employ, little opportunity will be afforded hereafter.

It was moved by Mr. Abbott, seconded by Mr. Ward, and carried by acclamation, that the best thanks of the Association be given to Mr. Yewdall for his address.

Mr. P. Jefferson, Vice-President, expressed the pleasure he felt at seeing such a goodly number present, but regretted the absence of the ladies, whose presence, he thought, added much to the enjoyment of such occasions. He also hoped that this social gathering would continue to be held as a tea-meeting, and not degenerate into the form of an annual supper, where fermented liquors would be drunk; such entertainments being prejudicial to the best interests of all, but specially of the young.

Mr. Smeeton then said a few words impressing upon young men the necessity of diligence in their studies.

Mr. Ward introduced the suggestions of Mr. Schacht and others that a pharmaceutical laboratory should be established at Bloomsbury. He thought the question an important one, demanding the expression of local opinion. He ridiculed the notion of the Society becoming traders by establishing a laboratory of small apparatus for the instruction of students in practical pharmacy; apparatus of large size being necessary for the manufacture of pharmaceutical preparations for trading purposes. Many processes in pharmacy might be well illustrated by *models*, and by these, questions of room and expense would be greatly reduced; the models, however, should not be too small. As a chemical lecturer, he would say there were a very many pharmaceutical operations which could not be taught in a chemical laboratory. He thought the suggestions contained a germ worth cultivating, and as practical pharmacy was largely engaging the attention of the trade at the present time, he should decidedly favour the establishment of a laboratory of good working models.

Mr. Brown complimented Mr. Yewdall on his long and ardent devotion to the interests of the Association, and was glad to see him at last in his proper position as President. He agreed with Mr. Ward as to the utility of models in imparting instruction; and as accurate standards of apparatus were the desire of the day, he thought the Pharmaceutical Society would do well in establishing a museum of the best and latest types, many of which would probably be supplied gratuitously by makers.

A few remarks from the librarian, Mr. E. O. Brown, on the condition of the library, brought the proceedings to a close.

Parliamentary and Law Proceedings.

ADULTERATION OF MILK—HEAVY FINE.

At the Thames Police Court, on Tuesday, November 2nd, William Harman, of 24, St. James's Street, St. George's, was summoned for selling adulterated milk. It was found that some milk purchased at the defendant's shop was adulterated with 15 per cent. of water, and that a portion of the cream had been abstracted. On the 8th of July, 1874, a notice was served on the person keeping the shop in St. James's Street, cautioning him that if he did not sell better milk proceedings would be taken against him. On that occasion the milk was found deficient in quality. Mr. Paget was convinced that the defendant had a personal knowledge that proceedings would be instituted against him if he did not sell better milk. The Act under which the proceedings were taken was a beneficial law, much more so in a poor neighbourhood of this kind than a rich one, and it was important that it should be fully carried out in such districts. He fined the defendant £20, or one month.—*Standard.*

Obituary.

Mr. JOHN BRADLEY.

We have to record with regret the death of Mr. John Bradley, one of the founders of the Society, and for many years a member of the firm of Bradley and Bourdas, at Pont Street, and Belgrave Road. Mr. Bradley retired from business some years ago, and has since resided at Kilburn, where he died, on the 23rd of September, of congestion of lungs, in his 66th year.

Mr. ALEXANDER WAUGH.

We regret also to notice the announcement of the death, at Leatherhead, on the 26th of October, of Mr. Alexander Waugh, pharmaceutical chemist, of Regent Street. Mr. Waugh was formerly a student in the School of Pharmacy, Bloomsbury Square, and was a Prizeman in 1860 and 1861. In 1862, he contributed a short paper to this Journal (vol. iii., p. 426), in which he described a cheap and simple apparatus for spectrum analysis. Mr. Waugh was 39 years of age.

Notice has also been received of the death of the following:—

On the 17th of October, 1875, Mr. Joshua Hardisty Wilkinson, Chemist and Druggist, of Scarborough. Aged 31 years.

On the 18th of October, 1875, Mr. John Duncan, Chemist and Druggist, of Brecon. Aged 65 years.

On the 21st of October, 1875, Mr. John Thomas Gordelier, Chemist and Druggist, of Sittingbourne, Kent. Aged 21 years. Mr. Gordelier had been an Associate of the Pharmaceutical Society since 1869.

On the 21st of October, 1875, Mr. George William Jeynes, Pharmaceutical Chemist, of Princess Street, W. Aged 54 years. Mr. Jeynes had been a Member of the Pharmaceutical Society since 1845.

On the 26th of October, 1875, Mr. William Trenfield, Chemist and Druggist, of Gloucester.

Notes and Queries.

[450] MARIAN'S SOLUTION OF INDIA RUBBER. A correspondent wishes to know whether "Marian's Solution of India Rubber" in Naphtha differs in any way from ordinary solution of india rubber.

BOOKS, PAMPHLETS, ETC., RECEIVED.

BOTANY. By Professor BENTLEY. (Manuals of Elementary Science). London: Society for Promoting Christian Knowledge. 1875.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

QUINETUM.

Sir,—Mr. Mason in his address to the Liverpool Chemists' Association, as reported in your Journal, speaking of my new preparation of the Alkaloids of East India Red Bark, Quinetum, says:—"Analysis of this shows it to be a mixture of Quinine, Cinchonine, Cinchonidine, and Amorphous Alkaloid in "*indefinite proportions.*"

Quinetum is professedly the alkaloids extracted from the East India *Cinchona succirubra*, and therefore the proportions the alkaloids bear to each other in quinetum are the same as they exist in the bark; neither in these barks, nor in any from South America, have I ever, during a long experience, found that the quantities of the alkaloids have any definite proportions to each other.

If Mr. Mason wishes to suggest that Quinetum is therefore of irregular composition, I beg to say that within a small range this is not so. Selection of the bark by previous analysis, and working in large quantities, enable me to keep the proportions of the alkaloids fairly constant.

THOS. WHIFFEN.

Lombard Road, Battersea, S.W.

THE CITRATE OF MAGNESIA PROSECUTION.

Sir,—Kindly grant me space to acknowledge with thanks the undermentioned subscriptions, received for the defence of the citrate of magnesia case tried here on the 16th ult. At the same time I must thank Messrs. Kinninmont and Davison, Glasgow, for the great interest they took in the matter and the invaluable aid they gave the defence, without fee or expense. I consider they have put not only the chemists here but the whole trade under obligations to them.

	£	s.	d.
Archibald MacNaught	2	2	0
John White	1	1	0
Greenock Apothecaries' Company	1	1	0
Samuel Duncan	1	1	0
William White	1	1	0
John A. Burge	1	1	0
Thos. Fisher	1	1	0
Robert Chalmers	1	1	0
George Wilson	1	1	0
James Kerr	1	1	0
Dr. Andrew Dougal	1	1	0
Raimes, Blanchard and Company, Edinburgh	1	1	0
J. and E. Sturge, Birmingham	1	1	0
John Smith	0	10	6
John Macdougal, M.D.	0	10	6
James Grahame	0	5	0
	£16	0	0
Expenses	15	16	0

Balance 4*s.* sent to Benevolent Fund, Pharmaceutical Society.

Greenock. ARCHIBALD MACNAUGHT.

"A Pharmacist by Examination" is thanked for his contribution.

T. Hope.—We shall be happy to name the ferns if entire fronds be sent.

"Chemicus."—The information respecting the lavender and peppermint might perhaps be obtained from one of the large growers in the neighbourhood of Mitcham, and that respecting *Cinchona Calisaya* by application to the Director of the Royal Gardens at Kew.

W. E. Miller.—*Sanguinaria Canadensis.*

A. P. S.—The coat of arms is the property of the Pharmaceutical Society as a corporate body, and cannot legally be used by any individual.

"Student."—If you read again carefully the passage referred to you will find that the construction you place upon it is not warranted. It may assist you, however, in the proper understanding of the subject if you can consult the new edition of the 'Manual,' where it is explained in greater detail.

F. H. Alcock.—Golden Sulphide of Antimony.

G. Fritz (Vienna).—*Cytisus Laburnum*, Linn.

G. R. Cheetham.—Several formulæ for such preparations have already been given. See vol. iv., pp. 319, 359, and 682.

F. F. Newth.—If you refer to the British Pharmacopœia you will find that your inferences are incorrect.

"Arthur."—There is no official journal; the nearest approach to it is the *Journal de Pharmacie et de Chimie*, which contains reports of the meetings of the Paris Society.

"Oculus."—We think a preparation bearing such a label would require a stamp.

W. R. F.—Up to the time of going to press the regulations under the Registration of Trade-Marks have not been issued. As soon as they are a full *résumé* of them will be given in this Journal.

W. B.—The examination for the Bell Memorial Scholarships takes place on the first Monday in July.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Yewdall (Leeds), Dr. Xavier Landerer (Athens), Mr. H. Groves (Florence), Dr. Steele (Rome), Dr. De Vrij (The Hague), Mr. Cheetham (Louth), P. H. S., M. B., H.W.

EAST INDIA CINCHONA BARK.

BY DR. J. E. DE VRIJ.

As I quite agree with Dr. Paul* that the increasing importation of Cinchona bark from India promises to furnish an abundant supply for pharmaceutical use, I consider it a boon for the pharmaceutical public that he increases our knowledge of these barks by publishing the results of his numerous analyses of of them. To make, however, these results better adapted for the practical use of the pharmacist, I am of opinion that they ought to be published in another form. Thus, for instance, it is of more importance for the pharmacist to be acquainted with the total amount of the alkaloids in a bark, and if possible of the amount of the different alkaloids contained in them, than to know how much sulphates of quinine, cinchonine, etc., can be obtained from a bark. The knowledge of this fact is very useful for the manufacturer of quinine, but not for the pharmacist. For as *all* the cinchona alkaloids are febrifuge, the first thing he wants to be acquainted with when he selects a bark for pharmaceutical use is the total amount of alkaloids contained in that bark. The different pharmaceutical preparations of bark do not contain the alkaloids in the form of sulphates, but in the form of quinotannates, quinates, and perhaps of quinovates.

There is still another fact which is of great interest to the pharmacist, namely, the quantity of alkaloids which can be extracted from any bark by water *only*. I have made some investigations in this direction which are not yet completed. Therefore, I am for the present only able to state that by percolating one part of finely powdered Indian red bark with cold water till eight parts of clear fluid are collected, I obtained from this liquid by precipitation with an excess of caustic soda three-eighths of the total amount (8 per cent.) of the alkaloids contained in the bark. Since I communicated this fact to the College of Physicians in this town, the pharmacists frequently receive prescriptions in this direction. An infusion thus prepared contains not only a large proportion of the alkaloids contained in the red bark, but also the chief part of its quinotannic acid in its unaltered state.

The Hague, October 27, 1875.

THE INDIA MUSEUM AT SOUTH KENSINGTON

(*Continued from page* 242.)

The Apocynaceæ are represented in the Indian Museum by the bark known as Pala, Conessi, or Tellicherry bark. It is the produce of *Holarrhena antidysenterica*, R. Br., which, as its name implies, is used as a remedy for dysentery. In this complaint, so prevalent in hot climates, this bark has been found a most valuable remedy, succeeding where even ipecacuanha has failed. The bark, as well as the singular oat-like seed, is intensely bitter. Unfortunately there exists a tree extremely similar in appearance (*Wrightia tinctoria*, R. Br.), which yields a bark resembling the above, and known by the same name, but which is almost inert. This bark appears to have been collected and substituted in many instances for Conessi bark, and thus this bark which is undoubtedly one possessed of very valuable properties, has not received the attention it merits. It is well worthy of trial in other hot countries where dysentery is prevalent. The root of *Nerium odorum*, Ait., possesses poisonous properties. It appears to act as a depressant to the nervous system, but its properties have not been thoroughly investigated.

Passing on from this order we come to the well-known clearing nut, *Strychnos potatorum*, L., used in India for clearing muddy water, regarding which it is rather singular that its mode of action is not thoroughly understood even at the present day. *Exacum bicolor* is a gentianaceous plant used in Madras as a substitute for chirata, under the name of Country Kariját (Chirata).

The root of *Ipomœa turpethum*, R. Br., a convolvulaceous plant, was formerly well known in this country under the name of Turbith root, and has left its name to the yellow sub-sulphate of mercury under the name of mineral Turbith. The fruits of *Cordia myxa*, L., are the Sebesteen, or Indian plums, of the older pharmacologists, and were formerly used in this country as a demulcent and pectoral like jujubes, and substituted for them. *Picrorrhiza kurroa*, Royle, has an intensely bitter root, confounded by Ainslie and other writers on oriental materia medica with black Hellebore, to the root of which it bears not the slightest resemblance; indeed it belongs to a very different order, the Scrophulariaceæ. Its use as a tonic and anti-febrile remedy extends to China, where it is known under the name of Hu-hwang-lien. From its great bitterness it appears to deserve chemical investigation. The singular flower-buds of *Hygrophila spinosa*, T., an acanthaceous plant, can scarcely be overlooked; furnished as they are with spines nearly an inch long, and in general appearance reminding one of the *Centaurea calcitrapa* of our own country; various parts of the plant are used as a diuretic.

The little fruits of *Vitex Negundo*, L., a verbenaceous plant, recall the fact that Dr. Fleming has spoken of the plant as having a better claim to the title of discutient than any other vegetable remedy, dispelling inflammatory swellings of the joints from acute rheumatism in a remarkable manner. True discutients are so few in number that the plant is deserving of trial in this country. The roots of *Plumbago rosea*, L., possess active vesicant properties, but are said to cause more pain than cantharides.

The dried fruits of *Withania coagulans*, Dunal, a plant belonging to the Solanaceæ, are interesting on account of being in general use in Beloochistan and Affghanistan for curdling milk in the preparation of cheese. They are also used by the natives in dyspepsia, and are known in the Scinde bazaars under the name of Puneer ja fota (Puneer cardamoms).

The common Indian weed *Achyranthes aspera*, L., an amarantaceous plant, has the singular reputation of being a safeguard against scorpions, which it is said to paralyse; it has been used by Europeans in India as a local application for the stings of that crustacean, and also as a remedy for snake bites.

Among the products of the Euphorbiaceæ may be noticed the seeds of *Jatropha Curcas*, L., known as English physic nuts, the oil of which was believed by Pereira to be used as an adulterant of East Indian croton oil. The oil of another plant of the same family, *Aleurites triloba*, Forst., seems worthy of trial in this country, since it possesses the purgative property of castor oil, and has the advantage of being free from taste or smell. The fruit yielded by this plant is known as the Belgaum or Indian walnut. The Emblic Myrobalans (*Phyllanthus Emblica*, L.), possess astringent properties, but must not be confounded with the true myrabolans, which belong to the Combretaceæ. The rhizomes of various species of sarsaparilla are used in rheumatism as a substitute for China root, or Chob China (*Smilax China*, L.), which they closely resemble in appearance, and a quantity of which is imported into India from China. China root is still to be found occasionally in the London markets. It is remarkable for its singular resemblance to a fungoid growth known as *Pachyma cocos*, with which it is confounded by the Chinese, but from which it may be distinguished by the presence of starch.

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* *Pharmaceutical Journal*, October 23rd, 1875, p. 321.

The Zingiberaceæ are represented by Ceylon and xanthioid cardamoms, Zerumbet, Zedoary, Galangal, and Mango ginger rhizomes. Both kinds of cardamoms are occasionally to be met with in the London drug market; the xanthioid kind has been figured and described in former pages of this Journal, and the other in Pereira's 'Materia Medica.'*

Much confusion has, until lately existed about the plants which yield Zedoary, Zerumbet, and Galangal rhizomes, formerly used in this country, but [now, except the Galangal, rarely met with.

The rhizome of *Asparagus sarmentosa*, L., known in India under the name of Utees, is worthy of notice on account of being sold for and sometimes mixed with the root of Atees (*Aconitum heterophyllum*, Wall.), from which it is distinguished by its want of bitterness. We must not omit to notice the root known in this country as Vittie vayr or Vetiver (*Andropogon muricatus*, Retz.), but which is commonly known in India under the name of Khus-khus, and the essential oil of which forms one of the principal ingredients in the perfume known as *Frangipanni*. Scented baskets, window screens, and other ornamental and useful articles formed of this root will be found in other parts of the museum. The singular concretion of silica found in the cavities of the bamboo and known under the name of Tabasheer, is esteemed in India as an aphrodisaic, but is only remarkable on account of its mineral-like appearance and its curious optical and physical properties, a most interesting account of which has been given by Sir David Brewster.†

Among the Cryptogams the most remarkable product is the *Polyporus anthelminticus*, Berk., which is used by the natives as a remedy for round worm. It appears to exercise a specific action upon these parasites, since the worms are expelled in a lifeless state. It has the great advantage of not producing any disagreeable effect upon the system and of being tasteless and odourless, and hence readily taken by children.

ACQUA DI CAPODIECI.

BY HENRY GROVES.

In a recent number of the *Pharmaceutical Journal*, a "Puzzled Pharmacist" imagines that he has discovered in this preparation a new case of medical hieroglyphics, but happily such is not the case, as the pseudo hieroglyphics are speedily deciphered. The liquid in question is the discovery of Dr. Simon Capodieci, of Naples, who calls it "Emostatico balsamico," a title which sufficiently explains its use. Such was the renown acquired by this liquid that the Italian Government ordered a commission to report thereon, and Professor Schiff, of the physiological section of the Museum, conducted a series of experiments before a commission consisting of the army sanitary body together with other competent authorities, and after making ten experiments on animals, a very favourable report was made of its efficacy. Professor Schiff describes the liquid as one having no action on litmus, and as giving no precipitate with potassium ferrocyanide; as being clear and without colour, but with a slight aromatic smell and taste. It appears from the report of the commission that the coagulation which is caused by the Capodieci resembles that which follows after blood has been left to natural coagulation, in contradistinction to that produced by other hæmostatics, which cause either a darkening or other change in the coagulum; that the coagulum formed by the Capodieci has the same consistence throughout, and that it acts more rapidly than iron perchloride or Robell's liquid (sulphuric acid with S.V.R.), even entering the mouth of the arteries after forming a coagulum, and that it is eminently useful in surgical operations, as the wound is left in its natural colour, and is not irritated by the presence of foreign matter, nor does it require repeated application of the liquid after a coagulum is once formed; moreover, the effect of the liquid is not retarded by etherization, nor does it contract the vessels. Another quality which recommends this liquid is that it can be taken internally and does not irritate the nervous centres. The report ends by recommending its use in preference to all other hæmostatics. Such, then, are the effects of the liquid which puzzles more chemists than one, where its composition is concerned. There is a formula for a Neapolitan hæmostatic water; no less than twenty-five herbs, most of which are supplied by the Labiatæ or Compositæ, enter into its composition; the same may be said of the celebrated Eau de Leschelles, besides others containing alcohol. The buds and branches of the pine (*Pinus sylvestris*) have likewise been used in the preparation of a hæmostatic water, but that under present notice appears to be the most active. The odour and taste of the Capodieci is that of sage or matico, and, as there seems to be a doubt as to whether the efficiency of matico is produced by mechanical or by specific means, it would be interesting to make some experiments with a water distilled from the plant, whose virtues may possibly be due to a volatile principle to be obtained in a distillate. Plantain is another plant which has enjoyed a reputation as a hæmostatic during several centuries; but with these hints I must leave the subject in the hands of some brother pharmacist who may be able to find time for experimenting on this interesting subject.

Florence, October 28, 1875.

THE PHARMACY OF SALICYLIC ACID.

BY M. MAURY.

The author, who is a pharmacien residing at Lyons, has made a compilation of different formulæ for the administration of salicylic acid, which he read before the Pharmaceutical Association of that city at its October meeting. The paper is published in the *Répertoire de Pharmacie* (Oct. 25, p. 609), and we are indebted to it for the following extracts :—

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* *Pharm. Journ.*, [1] xiv. p. 417; Pereira's 'Materia Medica,' 3rd ed., vol. ii., pt. I., p. 1146.

† 'Philosophical Transactions,' 1819, p. 283.

External use.—Dr. Wagner recommends that a thin layer of finely powdered salicylic acid should be spread upon calico and applied by means of a bandage to wounds.

Pommade.—Dr. Wagner gives the following formula :—

Salicylic Acid	15 parts.
Alcohol	30 „
Lard	150 „

It is important to use the alcohol as a solvent, the direct mixture of the acid with the lard does not give the same good effects.

Dentifrices.—M. Paulcke, a pharmacien at Leipzig, prepares as a dentifrice a powder in which salicylic acid is incorporated ; also an "*élixir dentifrice,*" from a solution of the acid aromatized with oil of wintergreen.

Foot Powder.—It is stated that salicylic acid removes the odour of sweat from feet, without preventing the sweating, its action being to prevent the formation of butyric, valerianic and other acids of the same family, which injure the feet. M. Paulcke therefore prepared with salicylic acid, soap, talc, and starch, a powder for the feet, which whilst rendering them firm, is said to induce an agreeable softness and to remove all unpleasant smell.

Mixture.—The following formula is attributed to Professor Wunderlich :—

Salicylic Acid	1 gram.
Oil of Sweet Almonds	20 „
Gum Arabic	10 „
Syrup of Almonds	25 „
Orange Flower Water	45 „

A teaspoonful to be taken every hour when children are sufficiently old to use a gargle. Dr. Fontheim says it may be so administered every hour.

Solution in Glycerine and Water.—M. Muller, a pharmacist at Breslau, gives the following :—

Salicylic Acid	1 gram.
Glycerine	20 „
Distilled Water	80 „

First treat the acid with the glycerine, and then add the water.

In Switzerland, salicylic acid has been used in typhoid and paludian fevers, etc. It has been noticed that it has a very remarkable cumulative action ; for after having obtained the desired remission by a first dose of 4 to 8 grams, it has been found that a dose of one half, or one fourth that quantity on the following days is sufficient to keep the temperature within good limits. Dr. De Cerenville recommends that these doses should be administered in water, flavoured with liquorice juice.

The following formulæ are due to M. Maury :—

Antiseptic Mouth Paste.

Rectified Salicylic Acid .	2 grams.
Honey	34 „

Compound Powder for Extemporaneous Antiseptic Mouth Paste.

Rectified Salicylic Acid	2 grams.
Powdered Sugar, or some other inert powder	20 „

Mix. To be applied to the sore parts of the mouth by means of a brush previously moistened with water.

Lozenges.—Salicylic acid, with sufficient gum and sugar for each lozenge to contain 25 milligrams of the acid.

Salicylic Syrup.—Pure salicylic acid, with sufficient syrup of orange-flowers for 20 grams to contain 5 centigrams of the acid.

Mixture.

Pure Salicylic Acid	1·50 grams.
Powdered Gum Arabic . . .	10·00 „
Sugar	10·00 „
Orange Flower Water . . .	20·00 „
Distilled Water	100·00 „

F. s. a.—Shake the bottle before each dose. A teaspoonful every two hours for children.

Salicylic Wine.

Pure Salicylic Acid . . .	2 grams.	
Muscat Wine	100 „	F. s. a.

Wine of Cinchona and Salicylate of Quinine.

Calisaya Bark	30 grams.	
Salicylate of Quinine . . .	1 „	
Madeira Wine	1000 „	F. s. a.

Injection.—A solution of 1 part of salicylic acid in 300 parts of water has been used as an injection in fluor albus.

THE PREPARATION OF IODIDE OF ARSENIC.*

BY JAMES F. BABCOCK.

The process for the preparation of the iodide of arsenic as given in the U.S. Pharmacopœia, consists in heating together the so-called metallic arsenic with iodine, in the proportions of one part of the former to five of the latter, and after the combination has taken place, pouring the fused iodide upon a porcelain slab to cool.

The product is described as an orange-red, crystalline solid, wholly soluble in water.

The product obtained by this process, however, does not correspond to the description given ; because, not only are the proportions such as will leave some metallic arsenic unacted on—that is to say, there is too little iodine or too much arsenic, according to the formula—but iodide of arsenic, even when pure, undergoes a slight decomposition when dissolved in water ; a small quantity of a yellowish-white *insoluble* powder being produced, which is described in the books as an oxyiodide of arsenic. Moreover, metallic arsenic is somewhat difficult to obtain in the market, and when procured is impure ; so that the amount of iodide of arsenic produced from it is uncertain, while the product itself is either very dark coloured or brownish ; fails to dissolve perfectly, independent of the decomposition above noted, and if used for the preparation of the solution of iodide of arsenic and mercury, produces an unreliable article. Indeed, Donovan's solution has fallen into disrepute with many physicians, because the amounts of arsenic, iodine and mercury which it contains are so variable.

The writer proposes a process which avoids the use of metallic arsenic, and produces an iodide of a much purer character, and of a more definite composition.

It consists in the solution of arsenious acid in hydriodic acid, and the subsequent evaporation of the solution to dryness.

Hydriodic acid for this purpose is readily prepared by passing sulphuretted hydrogen into water holding iodine in suspension.

A troy ounce of iodine is placed in a small vessel, with eight or ten fluid ounces of water ; and the washed gas passed into it, until it loses all colour except that due to the precipitated sulphur.

$$H_2S + I_2 = 2HI + S_2.$$

The solution is filtered and boiled until its odour of sulphuretted hydrogen has ceased. The acid is poured into an evaporating dish, and there is added one-fourth of an ounce of arsenious acid ; the liquid is heated until the arsenious acid is dissolved, filtered if necessary, and evaporated to dryness. The reaction takes place between two molecules of arsenious acid, and six molecules of hydriodic acid.

$$As_2O_3 + 6HI = 2AsI_3 + 3H_2O.$$

The product is in orange-red crystalline scales of definite composition, and capable of combining with its full equivalent of iodide of mercury.

Donovan's solution, prepared with this product, is of uniform and definite composition, of a very pale yellow colour, and free from excess of iodine.

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* Abstract of a paper read before the American Pharmaceutical Association, from the *Laboratory*.

ANALYSES OF BISMUTH AND PHARMACEUTICAL PREPARATIONS OF BISMUTH.

BY N. G. O. COAD, P.C.

In some contributions from the Laboratory of the University of Michigan, reported by Professor Prescott to the *American Chemist* for August, the author publishes the following results of analyses of the bismuth subnitrate and subcarbonate of pharmacy, both as prepared and as found in the market, and of current metallic bismuth:—

1st. *Metallic Bismuth.*

No. 1.	Bismuth	90·9
	Arsenic	8·24
	Sulphur	0·82
	Loss	·04
		100·00

No. 2. Chemically pure.

No. 3. Contains arsenic and sulphur, each in minute quantities.

In the analysis of No. 1, the bismuth was reduced from oxide, by cyanide, in a crucible over Bunsen's burner, according to H. Rose,[*] and weighed as metal. The arsenic was weighed as ammonio-magnesium arseniate, and the sulphur as barium sulphate.

2nd. *Bismuth Nitrate.*

In the preparation of the basic nitrate of bismuth of pharmacy, the U. S. Pharmacopœia directs that the solution obtained from 2 tr. oz. of commercial bismuth (after the operations for eliminating arsenic) shall be precipitated by 4 pints of water and 6 f. oz. of ammonia (of sp. gr. 0·96), and the precipitate washed by 2 pints of water. It is well known that this washing leaves some ammonium salt in the preparation, and that increased washing causes the salt to be more basic, *i.e.*, to contain a larger proportion of combined bismuthic oxide. The *specimen "No.* 1" was prepared (from chemically pure bismuth) with use of the quantities of nitric acid and precipitating water and ammonia directed by the Pharmacopœia, but the final washing on the filter was prolonged until the washings gave no reaction for ammonia by Nessler's test. From 7 grammes of metal, 8·979 grammes of the preparation were obtained.

Specimens No. 2 to No. 7, inclusive, were obtained from the drug trade. Nos. 2, 3, and 4 were from well-known manufacturers of good reputation. Nos. 5, 6, 7, and 8 were from unknown manufacturers—No. 8 purporting to be from a French maker.

	Impurities.	Metal.	Loss by ignition.
No. 1	....	74·00 per cent.	14·85 per cent.
,, 2	None	69·43 ,, ,,	20·20 ,, ,,
,, 3	NH_4 and Cl	69·23 ,, ,,	19·75 ,, ,,
,, 4	Arsenic,[†] NH_4 and Cl	68·99 ,, ,,	21·00 ,, ,,
,, 5	NH_4 and Cl	69·40 ,, ,,	19·70 ,, ,,
,, 6	NH_4 and Cl	69·65 ,, ,,	19·30 ,, ,,
,, 7	NH_4 and Cl	69·35 ,, ,,	19·70 ,, ,,
,, 8	Cl..........................	69·75 ,, ,,	20·00 ,, ,,

It will be seen that, of the samples from the market, the loss by ignition does not vary widely from the 20 per cent. ascribed by the U. S. Pharmacopœia, and the proportion of metal varies at most but 0·85 per cent.

On the contrary, the sample of fully washed basic nitrate No. 1 contains a much larger proportion of metal and loses much less by ignition than the others. This corresponds, of course, to the replacement of the nitric acid radical by the lighter hydroxyl or oxygen effected by washing. Ruge[‡] has given as the chief constituent of basic bismuth nitrate (*a*) $BiNO_4H_2O$, or $BiNO_3(OH)_2$, the lesser constituent, which increases by washing, being (*b*) $Bi_2O_3, 2BiNO_4, H_2O$, or $Bi_2O_3, BiNO_3(OH)_2, BiONO_3$. Of these compounds, *a* has 68·62 per cent. of bismuth, and must lose 23·53 per cent. by ignition to bismuthic oxide, while *b* has 79·09 per cent. of metal and loses 11·86 per cent. by ignition. Now, the per cent. of metal in No. 1 of above list corresponds to that of a mixture of 49 per cent. of Ruge's *a* and 51 per cent. of his *b* compound, but the ignition loss (Bi_2O_3 being left) of No. 1 corresponds to 26 per cent. of *a* and 74 per cent. of *b*. Therefore if no mistake is made, No. 1 does not consist solely of Ruge's compounds, but probably contains greater proportions of bismuthic oxide and hydrate. The pharmacopœial preparations, represented by Nos. 2 to 8, correspond, in their percentages of metal and of loss by ignition, nearly, but not precisely, to mixtures of 75 to 80 per cent. of Ruge's *a* compound, with 25 to 20 per cent. of his *b* compound.

3rd. *Bismuth Subcarbonate.*

In the preparation of this compound, the U.S. Pharmacopœia directs that the solution of nitrate, made from the commercial metal and purified from arsenic by two operations for that purpose, be precipitated by sodium carbonate solution, and the precipitate washed until the washings are tasteless. The specimen "No. 1" was obtained by dissolving pure metal with the nitric acid, precipitating with sodium carbonate, and washing the precipitate until the washings left no film on platinum foil. It was dried at 100° C.

Five specimens were obtained from the drug trade and examined by the same methods used for the subnitrate, with the following results. Specimen No. 2 was from the manufacturer of No. 3 of the subnitrate; Nos. 3, 4, and 5 were from unknown makers.

	Impurities.	Bismuth.	Loss by ignition.
No. 1	....	81·02 per cent.	9·37 per cent.
,, 2	Na and nitric acid	75·00 ,, ,,	10·55 ,, ,,
,, 3	None	76·10 ,, ,,	9·90 ,, ,,
,, 4	Na and Cl	75·40 ,, ,,	11·70 ,, ,,
,, 5	Na and Cl	75·70 ,, ,,	12·60 ,, ,,
,, 6	Na and Cl	75·23 ,, ,,	11·80 ,, ,,

The compound $Bi_2O_2CO_3$ gives 82·03 per cent. of metal and 8·59 per cent. of loss by change to bismuthic oxide. Lefort has given $Bi_2O_2\,CO_3\frac{1}{2}H_2O$ as the composition of the precipitate by alkaline carbonates, the water escaping at 100° C. No. 1 (dried at 100° C.) corresponds in composition very nearly with $Bi_2O_2CO_3\frac{1}{3}(H_2O)$. (The atomic weight of bismuth is taken at 210.)

The chloride, found in six specimens of the subnitrate and in three specimens of the subcarbonate, may have resulted from the use of nitric acid containing hydrochloric acid in the manufacture. The persistence of the oxychloride is such that all the chlorine brought in contact with the bismuth in solution will be retained in the preparation.

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NOTES ON CITRIC ACID.[*]

BY R. WARINGTON, F.C.S.

In a paper read before the Chemical Society, the author has published some of the results of his experience acquired in the Citric and Tartaric Acid Factory of Mr. J. B. Lawes. The paper is a very long one, and contains many points of interest which it may be useful to reproduce here in a somewhat condensed form.

Standard Alkali and Acid.—The standard alkali made use of in many of the analytical operations described was a dilute solution of caustic soda, containing in 100 c.c about half a gram of pure hydrate of sodium. Alkali made with soda prepared from sodium, gives a much sharper reaction than alkali made with other soda.

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[*] Fresenius' 'Quant. Anal.,' sec. 120, 4 (p. 234).

[†] The arsenic in No. 4 was quantitatively determined, and found to be 0·33 per cent. of elemental arsenic, equivalent to 0·43 per cent. of arsenious anhydride.

[‡] Watt's 'Dictionary,' iv. 90.

[*] Abstract of a paper read before the Chemical Society (*Journ. Chem. Soc.*, vol. xiii. p. 926).

The standard acids employed were a dilute sulphuric and a dilute hydrochloric acid; 20 c.c. of each being equivalent to about 100 c.c. of the alkali. The sulphuric acid was preferred as non-volatile, but when much carbonate of calcium had to be acted on, the hydrochloric acid was employed. Hydrochloric acid of the strength described (about 1 volume of strong acid to 12 volumes of water) may be gently boiled in a covered beaker without loss of acid.

The dilute sulphuric acid was prepared from distilled oil of vitriol, and its strength accurately determined by precipitation with chloride of barium. From the relation of the sulphuric acid to the alkali all the required values of the alkali were calculated, except its value in free citric acid. As the point of neutralization has to be determined in most cases with litmus paper, this should also be used for the final reaction in the experiments made to determine the value of the alkali.

Litmus Paper.—The exactness attained in alkalimetrical work depends very much on the quality of the litmus paper used. Being unable to procure litmus paper of sufficient delicacy, or of constant tint, the author prepared it by treating a strong solution of litmus in cold water, rendered pretty clear by subsidence and filtration, with nitric acid in slight excess, and boiling it to destroy carbonates. The solution was then filtered through Swedish paper, and pure caustic soda added till the desired tint of violet was reached. Sheets of thin demy paper were then painted on one side with the litmus solution, afterwards flooded with the liquor, and kept in motion between the hands for a few minutes so as to pass the flood frequently to and fro over their surface, and then hung up to dry. If tincture of litmus be employed, the paper changes its tint when moistened. If the long-continued flooding be omitted, the colour washes out when the paper is used; this also happens if the solution of litmus has been too strong. The tendency of the colour to wash out may be entirely prevented by adding a little gelatin to the litmus solution; but the author finds that paper thus made, turns reddish when moistened. The author employs paper of three tints of violet. Extreme delicacy is attained when the paper is not too deeply coloured, and when its tint approaches neutrality; pale or neutral paper is worthless. The limit of distinct reaction of his most delicate paper with various acids was about as follows, the paper being held half a minute in the solution:—

1 part of dry hydrochloric acid in 220,000 of water.
1 part of oil of vitrol in 190,000 of water.
1 part of crystallized tartaric acid in 90,000 of water.
1 part of crystallized citric acid in 70,000 of water.

Citric Acid.—The amount of water in crystallized citric acid is a point on which there has been a good deal of difference of opinion. Manuals of chemistry now generally state that the commercial acid contains one molecule of water of crystallization, and that the acid has this composition whenever crystallized from cold solutions; but that when citric acid is crystallized from hot saturated solutions it contains only half a molecule of water. In the citric acid trade, however, the crystallized acid is reckoned as containing only half a molecule of water, and all analyses of lemon-juice and citrate of calcium are reckoned on this assumption. In determinations of the amount of water in the citric acid, extending over several years, and made on wholly different bulks of acid, it was found that the water expelled at 100° varied from 8·46 to 9·35 per cent. as its extreme ranges, the mean of 17 determinations being 8·72 per cent. Theory requires for one molecule of water 8·57 per cent. There can be doubt, therefore, that the commercial acid contains one molecule of water of crystallization, corresponding with the formula $C_6H_8O_7,H_2O$.

The best way of determining water in citric acid is to heat the powdered acid for some hours at 50°—60°, and gradually raise the temperature to 100°. If this precaution be neglected, the acid partially melts, and has to be kept many days in the water-bath before it ceases to lose weight; the acid in this case darkens a little, and high results for water are obtained.

In making the determinations of water just mentioned the author observed a difference in the facility with which citric acid parts with water, which he is unable to explain.

According to Berzelius, the ordinary crystals of citric acid remain unchanged in the air, but lose 9 per cent. of water in dry air at from 28°—35°. According to Marchand, the crystals lose the whole of their water in a vacuum over oil of vitriol at 16°. In the first determination made, in December, 1868, the powdered acid lost the whole of its water by standing a few days over oil of vitriol. In September, 1871, powdered citric acid placed over oil of vitriol in a vacuum lost in several days only ·10 per cent. and in a duplicate experiment nothing was lost. This acid heated to 100° lost the normal amount of water. In February, 1873, the citric acid operated on lost, in four experiments, from nothing to ·20 per cent. in 5 days over oil of vitriol, but at 100° parted with the normal amount of water. In May, 1875, in complete contradiction to the latter results, samples of acid of different makers, lost the whole of their water (8·57 per cent.) by standing 4—6 days over oil of vitriol at 17°—18°. The difference in the results can hardly be owing to the difference of temperature, as the citric acid lost water in December, and did not lose in September.

A strong solution of citric acid suffers considerable contraction when mixed with water. 500 volumes of a solution of 1·2709 sp. gr. (bright liquor of the factory), required the addition of 503·61 vols. of water to produce 1000 vols. after mixing. 250 volumes of the same solution required 753·24 volumes of water to produce 1000 volumes. No rise in temperature was observed in either of the mixings; the rise, if any, could not have exceeded ½° C.

Free citric acid cannot be very exactly determined by neutralization with standard alkali, as it gives no sharp reaction with litmus, cochineal, or logwood. When litmus solution is mixed with citric acid, and standard alkali is slowly added, the colour, towards the conclusion of the reaction, changes in a perfectly gradual manner, comparatively large additions of alkali being required to produce small changes in colour. When the point is reached at which litmus paper is no longer affected, the amount of alkali used is a little less than that required by theory to form trisodic citrate. The more delicate the litmus paper, the nearer does experiment approach theory, but the author has never found the theoretical quantity of alkali to be quite reached even with the most delicate paper. For the above reason, the value of the alkali in citric acid should always be determined by experiment with the litmus paper that is to be subsequently used. For this purpose, the crystallized acid is to be powdered, water determined in one portion, and an experiment made with alkali and litmus in another portion.

Lemon, Bergamot, and Lime Juice.—Nearly the whole of the citric acid manufactured in this country is made from concentrated lemon-juice exported from Sicily and South Italy. Concentrated bergamot-juice from South Italy is also exported for this purpose. The lime-juice of the West Indies is chiefly used as a beverage; small quantities of concentrated lime-juice are exported from Montserrat and Dominica for the manufacture of citric acid.

All the fine and perfect fruit of the Italian lemon orchards is exported as lemons; the windfalls, and the damaged fruit are used for the production of essence and juice. About 13,000 lemons are required to make one pipe (108 gallons) of raw juice. The lemons are most acid at the beginning of the season. Sicilian lemon-juice pressed in November will contain about 9 ozs. of free citric acid per gallon;[*] this amount will gradually diminish as the pressings proceed, so that the juice obtained at the end of the following April will contain only about 6 ozs. per gallon. Three samples of Sicilian juice gave 9·33, 8·82, and 8·21 ozs., and a sample of Naples juice 8·75 ozs. of free acid per gallon. The quantity of free acid in lemon-juice pressed in England is much higher. Various samples of English pressed juice gave 13·03, 12·77, 11·84, and 10·91 ozs. of free acid per gallon; the last-mentioned sample was pressed at the end of May. The greater acidity of the English pressed juice is probably due to its being obtained from fine fruit. The specific gravities of the first and third samples of English juice were 1·040, and 1·033 respectively.

Lemon-juice is imported for citric acid manufacturers in a concentrated state. It is boiled down in copper vessels over an open fire till it is supposed to mark when cold 60° on the citrometer; it is then a syrupy liquor of a dark brown colour, and is imported in this condition. The concentrated juice will occupy about one-ninth or one-tenth the bulk of the raw juice.

In the early days of the citric acid manufacture, concentrated lemon-juice was purchased on the basis of its specific gravity as indicated by the citrometer. As to the origin of this instrument, or the values originally given to its scale, little is known. On the citrometer used by the author—

60° correspond with 1·2394 sp. gr.
50° „ 1·2003 „
40° „ 1·1598 „

He concludes, therefore, that 1° on the citrometer scale is intended to correspond with ·004 sp. gr., and consequently 60° are equivalent to a gravity of 1·240.

The purchase by specific gravity was open to many frauds; bergamot-juice, which has a high gravity but low acidity, was mixed with lemon-juice; sea-water was also added to the juice during the process of concentration. Lemon-juice is now generally purchased on the basis of its acidity. In the case of concentrated juice the acidity is conveniently determined by diluting 50 c.c. of the juice to 500 c.c., and then taking for experiment 30 c.c. of the solution. Standard alkali is added in quantity about five-sixths of that which will be required, the whole is then boiled for a few minutes, and when quite cold the titration is completed. With unconcentrated juice 10—20 c.c. of the original juice may be taken. Owing to the want of sharpness of the reaction of citric acid with litmus paper, the determination does not admit of very great nicety; experiments with concentrated juice cannot be expected to agree nearer than one-quarter oz. of citric acid per gallon.

Concentrated lemon-juice is considered to be of standard quality when it contains free acid equal to 64 ozs. of nominal citric acid per gallon (66·87 ozs. crystallized). In bygone years the acidity was usually as high as 71 or 72 ozs. of the crystallized acid, it is now often under 62 ozs., the juice being probably less boiled than formerly.

Concentrated bergamot-juice is far less acid than lemon-juice; it usually contains about 51 ozs. of free acid per gallon.

The acidity of raw lime-juice is about equal to that of English pressed lemon-juice. Two samples from Montserrat gave 12·46 and 11·91 ozs. of free acid per gallon. Another sample, representing 11,000 gallons from the Sandwich Islands, gave 12·24 ozs. Concentrated lime-juice is a thick viscid fluid, exceeding concentrated lemon-juice both in density and acidity.

Besides the acids in a free state, lemon-juice contains organic acids as salts of the alkalies and alkaline earths. The quantity of combined acid which a sample of juice contains may be ascertained very simply by evaporating in a platinum basin the portion of juice which has been used for the determination of the free acid, and which is consequently exactly neutralized with caustic soda. The residue is heated gradually, and finally carbonized at a low red heat. The ignited mass is treated with water and removed to a beaker, a known quantity of standard sulphuric acid added from a pipette with the proper precautions, the whole boiled and filtered, and the unneutralized sulphuric acid in the filtrate determined by standard alkali. We have now the neutralizing power of the ash in terms of alkali; by deducting from this the amount of alkali used in neutralizing the free acid of the juice, we obtain the alkali corresponding with those bases of the juice which during ignition became carbonates; the equivalence of this alkali in citric acid can then be calculated. In making this calculation the theoretical value of the alkali in citric acid must be used, and not the value obtained by experiment with the free acid.

Two samples of English pressed lemon-juice gave in each case ·30 oz. of combined acid per gallon, amounting respectively to 2·31 and 2·70 per cent. of the total organic acids present. In a sample of concentrated juice, prepared in the laboratory from English pressed lemons, the combined acid was 2·25 ozs., or 3·17 per cent. of the total acids. The amount of combined acid in the less acid lemon-juices pressed in Italy is however much greater. The sample of raw Naples juice already mentioned contained ·85 oz., or 8·95 per cent. of combined acid, and a sample of raw Sicilian juice ·60 oz., or 6·73 per cent., and the quantity found in the latter case must have been below the truth, as the juice had been heavily sulphured in order to preserve it. The concentrated lemon-juice exported from Sicily, agrees in character with the two analyses last quoted, and not with English pressed juice. The quantity of combined organic acid in concentrated lemon-juice is very uniformly 7—8 ozs. per gallon. It is puzzling to find that the English and Italian pressings of lemons, coming as is believed from the same districts, should exhibit so great a difference in character; the evidence seems to show that the juice obtained in Italy by pressing inferior fruit is both considerably poorer in free acid, and richer in combined acid, than the juice obtained in England from fine lemons.

During the process of concentrating juice, the proportion of combined acid must somewhat increase as there is some loss of free acid, but no loss of bases. If ordinary concentrated juice be long kept, a white deposit, sometimes considerable, of citrate of calcium is produced; such juice will be found to have decreased considerably in specific gravity, and in the amount of combined acids present, while the free acid remains unchanged. Differences in the composition of juice may arise through the deposition of citrate of calcium in pipes of juice stored for the exigencies of the market.

Concentrated bergamot-juice contains about the same quantity of combined acid per gallon as lemon-juice; three samples gave 7·77, 7·62, and 7·54 ozs. respectively; the proportion of combined to total acid is, however, higher, owing to the low acidity of bergamot juice; the proportion in these cases was 13·01, 12·90, and 12·12 per cent.

Raw lime-juice appears to contain about the same quantity of combined acid as lemon-juice, the quantity being variable, as in lemon-juice. The sample from the Sandwich Islands, already referred to, gave ·41 oz., and the two samples from Montserrat, ·63 and ·66 oz. per gallon, or, respectively, 3·21, 5·01, and 5·04 per cent. of the total organic acids present. Three samples of concentrated juice from Montserrat gave a mean of 8·60 ozs. per gallon of combined acid, or 7·36 per cent. of the total acids. A sample of very acid concentrated juice from Dominica contained only 4·61 ozs. of combined acid, or 3·93 per cent. There is evidence in these figures that, as in the case of lemon-juice, a distinct increase in the proportion of combined acid results from concentration.

(*To be continued.*)

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[*] In all places in which quantities of citric acid are mentioned, the acid is expressed as the crystallized acid, containing one molecule of water.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 13, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed* "*Pharm. Journ.*"

PHARMACY IN IRELAND.

WE heartily congratulate our pharmaceutical brethren in Ireland that the proposition to establish two classes, viz. pharmaceutical chemists and chemists and druggists, has not been carried, and that the counter proposition that there should be only one qualification for those compounding medicines, viz. that of pharmaceutical chemists, has been carried by the Council of the Pharmaceutical Society of Ireland with only three dissenting voices.

It appears from this that the information we published last week on the authority of a medical contemporary was incorrect, and that whatever desire there may have been in some quarters for the establishment of a lower grade of pharmacists in Ireland, there was no real ground for the opinion that the Council of the Irish Society was at variance in this respect with the Irish Government. It may be, however, that Sir MICHAEL HICKS-BEACH'S letter on this subject has strengthened the hands of those who were in favour of the single qualification, or even that it has influenced some who were undecided in their views.

In any case the result arrived at is one eminently satisfactory, and having regard to the advance of pharmacy in Great Britain, it furnishes reason to anticipate the possible attainment of reciprocity between the two countries at some future time.

The arrangements that have been made in regard to the mode and extent of the examination of pharmaceutical chemists in Ireland have not yet been made public, as they have not at present received the requisite approval of the Privy Council. But we notice that a statement has been published purporting to describe the nature of the examination, and if that be a correct description there is no question that the contemplated examination is greatly inferior to that required by the Pharmaceutical Society of Great Britain for the qualification of pharmaceutical chemist. According to this statement there appears to be a total absence of any tests of practical knowledge of chemistry, than which nothing is more essential. The introduction of such tests of practical knowledge into the British examinations is indeed regarded by those best able to pronounce an opinion as being the first decided step towards an improvement of the pharmacist's position. In this respect, therefore, the examination of the Irish Society does not come up even to the standard of the minor qualification of the chemist and druggist.

We trust that our contemporary's information on this point may prove to be incomplete, and rather a reflection of what is desired by some than a representation of what is to be really done.

So far as we can understand the position of affairs, the motive of those who advocate the establishment of an inferior grade of legally qualified pharmacists is to provide for small towns and country districts in Ireland a class of persons carrying on the sale of drugs, etc., who will not be averse to supplementing the small business that can be done in that way by other occupations, such as the trade of the grocer, provision store, oilman, tobacconist, etc. It is argued that the wants of these country places are very limited, and that there is no room for the fully qualified pharmacist to make a living in them by the exercise of his legitimate functions. This kind of argument is calculated to excite some feeling of pity for the places referred to, but we fail to perceive that it constitutes any ground for regulating the standard of pharmaceutical qualification. Certainly its application in that manner would not be in the interest of pharmacy, nor can we believe that it would conduce to the protection of the public.

It will be seen from the report at page 389, that the Irish Council has fixed the fee for the diploma of pharmaceutical chemist at five guineas. This is exactly the amount of the fee to be paid for registration as a pharmaceutical chemist in Great Britain, and in so far it would seem that the Council in Ireland has acted up to that provision of the Pharmacy Bill (Ireland) which declared that the fees or charges for every examination, licence, and registration should at all times be equal as nearly as might be to the fees fixed and determined for like purposes by the byelaws of the Pharmaceutical Society of Great Britain. This clause, however, was struck out of the Bill before it was passed, and it may be intended that this sum of five guineas is to be the only payment upon obtaining the qualification of pharmaceutical chemist for Ireland.

If that be the case the fee will really be only one half what it is in Great Britain; for while the Irish Act provides only for one examination, the fees for the Preliminary and Minor examinations must be paid in this country, and they make the payment for the qualification of pharmaceutical chemist ten guineas in all. According to this view of the case there is either a serious obstacle to future reciprocity or the difficulty of changing the fee will have to be encountered whenever the establishment of reciprocity is attempted.

It is, however, possible that the Council of the Irish Society intends to make a charge for examination and for registration, as well as the fee of five guineas for the diploma, and thus to equalize the payment in both countries for the qualification of pharmaceutical chemist; but in regard to this point we must await the receipt of further information.

THE WHIMS OF PUBLIC ANALYSTS.

The case reported at page 398, shows that there is still some need of tempering with discretion the zeal of public analysts, and of providing some protection for traders who are unreasonably charged under the provisions of the Act with selling adulterated articles. Milk, which, before the passing of the Act, was never the cause of so much squabbling, is again the source of contention, and fortunately for the defendant in the case, the evidence of Professor Redwood showed that the amount of butter fat, 2·28 per cent., in the milk alleged to be wilfully deteriorated was a quantity that might readily be consistent with the perfect purity of the milk. Everyone knows that as soon as milk is drawn from the cow, a process of spontaneous separation takes place—the fatty globules rising to the surface in consequence of their lesser density, and forming a layer of cream. This is a fact more familiar, perhaps, in the dairy or the kitchen than in the laboratory; but it does seem that public analysts should extend their considerations somewhat beyond their customarily limited range as mere chemists, and take into account some of the common-place influences that may affect quite naturally the composition of various articles of food, such as milk, and that they should hesitate to infer adulteration until due allowance has been made for circumstances of this kind.

While mentioning this subject we may also refer to a similar instance of superfluous if not altogether unfounded action on the part of another public analyst. In the report made by Dr. Stevenson of the results of his analysis of a sample of bread (see *Pharm. Journ.*, p. 359), he states that the bread contained a small quantity of aluminum, and that genuine unadulterated wheaten bread often contains a small quantity of aluminum. He also fixes the amount of alum corresponding to this aluminum as three and a-half grains per 2 lb. loaf.

This appears to be not only an extremely novel statement, but also one that is diametrically opposed to all recorded fact and received opinion on the subject. Notwithstanding the vast amount of attention that has been given to the analysis of ashes of plants, we are not aware of any instance in which alumina has been found in the ash of any plant. As regards wheat, flour, and bread also, very careful analyses of the ash constituents have been made by Messrs. Lawes and Gilbert, with a similar result.

If the statement in Dr. Stevenson's report be correct, however, the fact must have been ascertained only recently. In any case we are not aware that it has been made public, and reference to it seems, therefore, to be somewhat out of place in such a document as that now referred to.

MEDICAL ADVERTISING IN ALSACE LORRAINE.

The *Répertoire de Pharmacie* reports a recent decision of a German tribunal sitting at Strasburg which has at least the charm of novelty, and illustrates what may be done by a paternal government towards the suppression of secret remedies. In virtue of a French law which is still allowed to remain in force in Alsace-Lorraine, the conductor of a journal in the city of Strassburg has been fined 20 marks for publishing an advertisement of a universal panacea called the "*Breslau Universum*," which was held to be a secret remedy. The law referred to provides that all advertisements and printed bills which refer to secret remedies, under whatever name they may be prepared, shall be strictly prohibited, and that all persons who commit the offence of breaking this regulation shall be prosecuted by the police and punished. There is a certain amount of vagueness as to who is to be considered the offender, the advertiser or the printer, and in giving the preference to the latter the authorities have, perhaps, dealt with him rather hardly; but they have probably adopted the surest method of attaining the object in view. Our French contemporary, however, is not satisfied with this German reading of a French law, and maintains that to be logical it would be necessary to convict the proprietor of a wall upon which a bill advertising the secret remedy had been posted.

We are glad to learn that the educational arrangements for the present session in connection with the Bristol Pharmaceutical Association have met with a satisfactory response from the students for whose benefit they were made. The arrangements include courses of lectures on Inorganic and Organic Chemistry, by Mr. Coomber; a course on Botany by Mr. Leipner; and, at the urgent request of the Council, Mr. Stoddart has kindly consented to give a course of lessons on the Materia Medica of the Pharmacopœia, similar to those which he has so successfully conducted on former occasions. The fee for the course of either Chemistry or Botany is five shillings, provided that the student complies with the condition of presenting himself at the examination in connection with the Science and Art Department, and shall have attended at least twenty-five lectures in the course, otherwise the fee is ten shillings. Students taking a first-class certificate are eligible to compete for prizes, similar to those referred to in another part of this Journal. Provision is also made for a course of practical laboratory instruction.

The necessary arrangements having now been made by the Council of the Liverpool Chemists' Association, the chemistry classes in connection with the School of Pharmacy will be held by Mr. Thomas Williams, F.C.S., at his laboratory, 21, Lord Street, Liverpool. The course will commence on Friday evening, November 12, and will be continued on successive Friday evenings until the end of April. Fee for the course, One Guinea.

The newly-elected Mayor of Wolverhampton, Mr. J. C. Major, was formerly an Associate of the Pharmaceutical Society. He was a student in the School of Pharmacy in the year 1846, and besides other honours, gained the first prize for organic chemistry

Provincial Transactions.

PHARMACEUTICAL SOCIETY OF IRELAND.

A meeting of the Council of the Pharmaceutical Society of Ireland was held on Wednesday, November 3, at the College of Physicians, Kildare Street, Dublin, Sir Dominic Corrigan, Bart., in the chair. There was a full attendance.

After the disposal of some ordinary business, Dr. Whitaker (Belfast), in pursuance of notice, moved—

> "That there should be one qualification for those compounding medicines in this country, and that it should be that of Pharmaceutical chemistry."

Dr. Ryan seconded the motion.

Dr. Rawdon Macnamara moved and Mr. Hodgson seconded an amendment—

> "That there should be two classes, viz. Pharmaceutical chemists, and chemists and druggists."

A lengthened discussion ensued, which was taken part in by Dr. Frazer, Surgeon Collins, Mr. Tichborne, Mr. Pring (Belfast), Dr. Reynolds, Mr. Hayes, and Dr. Aquilla Smith, after which the amendment was put and lost, and the original motion declared carried by a large majority, there being only three dissenting voices.

The meeting shortly afterwards adjourned.

The meeting was resumed on the following day, when the report upon the mode and extent of examination, as drawn up by Sir Dominic Corrigan, Drs. Leet, Aquilla Smith, Messrs. Collins, Hayes, and Tichborne, was adopted with a few slight alterations. The regulations will be published after they have received the approval of the Privy Council.

Professor Tichborne gave the following notice of motion:—

> "That women be admitted to the examinations for Pharmaceutical Chemist, providing they produce satisfactory evidence of having studied during a term of not less than three years the subjects mentioned in the 21st clause of 38 and 39 Vict. c. 57."

The fee for the diploma of pharmaceutical chemist has been fixed at five guineas.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Second General Meeting of the twenty-seventh session was held at the Royal Institution, on Thursday evening, November 4th, the President, Mr. A. H. Mason, F.C.S., in the chair.

The Minutes of the previous meeting were read and confirmed.

Dr. J. Campbell Brown, F.C.S., and Mr. Edward Forbes Morton were unanimously elected members.

The following donations were announced, and thanks accorded to the donors:—Current numbers of the *Pharmaceutical Journal*, the *American Chemist*, 'Proceedings of the Liverpool Philomathic Society,' 'Proceedings of the Birkenhead Literary and Scientific Society'.

Several inquries were found in the question box, the replies to which elicited much valuable information from the members.

Dr. J. Campbell Brown, F.C.S., exhibited M. Gramme's new electro-magnectic machine, and read the following paper:—

Gramme's Machine.

This machine, like all other advances in practical electricity, is founded upon principles worked out by Faraday.

When a wire through which a current of electricity is passing approaches a second wire which is in connection with a galvanometer, an electrical current is induced in the second wire in an opposite direction to the current in the first. The existence of this current is shown by the deflection of the galvanometer needle. When the wires recede from each other, another secondary current is induced which is in the same direction as the current in the primary wire; these induced currents are of momentary duration only. Similar effects will be produced if the secondary wire, insulated by being coated with gutta-percha or shellac, is coiled round a soft iron bar or bundle of soft iron wires, called the core, and made to approach and recede from the poles of a magnet. When the end of the coil and its core approach one pole, a momentary current is induced in one direction, and when they recede from that pole, a similar current will be induced in the opposite direction. If the other pole of the magnet be used, the direction of each of the induced currents will be reversed.

In all magneto-electric machines hitherto made, two or more coils with their cores have been made to revolve rapidly opposite the poles of a magnet, the effect of which was to induce a rapid succession of momentary currents in alternate directions in the wires; these currents were drawn off for use into a single wire, but in drawing them off, each alternate current was reversed by a mechanical device, so that the manipulator had at his disposal an interrupted current flowing in one direction only.

The great merit of the Gramme machine arises from the fact that it gives a continuous and not an interrupted current. The device by which this desirable result is obtained, may be thus described:—

The core of soft iron, instead of being a bar with two ends, or a series of bars, is a ring (as if the bar had been bent round and had its two ends joined). This ring rotates between the poles of an upright magnet. Although every point of the ring becomes alternately magnetized and not magnetized as it becomes near to or distant from the poles, some part of it is always under the influence of each pole. The ring, like the cores of the old machines, is surrounded by a coil of insulated wire, but this wire is continuous, and has no free ends.

If any one loop of the coil be considered, it will be seen that a succession of induced currents is generated in it, just as in the coils of the old machines; but since there is an uninterrupted succession of loops, the sum of the whole is a continuous current in one direction in one half of the coil, and a continuous current in the opposite direction in the other half of the coil for the time being.

The two currents would neutralize each other if they were allowed to flow together; but they are drawn off before they can do this, and are only allowed to flow together in the circuit of wire which is in the hands of the operator outside the machine. The device by which this is managed is clever. At frequent and regular intervals the wire is laid bare, and just at the two points where the revolving ring passes into its neutral phases, that is at the upper and lower points where it is most distant from the magnet, each of these uncovered parts of the wire comes into metallic connection with the brushes of copper wire, the upper one of which conducts off the one current, while the lower one conducts off the other current to two binding screws which connect them with the operator's wires. In fact, the uncovered parts of the coil which are at the upper and lower position for the time being, are equivalent to the two ends of the coil in the old machines. The current is quite continuous, because one part of the copper brush does not leave one uncovered point, until another part of the brush is in connection with the next uncovered part.

The current thus obtained is available for any purpose to which electricity is applicable.

In all magneto machines, loss of strength arises from the necessary distance between the core and the magnet: the effect of the magnet on the core being inversely as the square of its distance from it. Now in this machine there necessarily is some distance between the end of the magnet and the iron ring, and this appears to me to be the only point in which the Gramme machine is at a disadvantage when compared with the older magneto-electric machines, which in other respects it greatly excels. The advantage of Gramme's current is that it is continuous, and hence available for many purposes for which an interrupted current is unsuitable.

Regarding the relative cost of a current obtained by this and other machines, I am not able to state any opinion of my own, because I have not yet had an opportunity of estimating the cost; but I may, perhaps, mention some of the opinions of others.

When used for the production of the electric light, we learn from a report made by the engineer of the Trinity House to the First Commissioner of Works, that the cost of light from a machine yielding as much as the strongest light obtainable from gas, namely three sets of 108 jets each, was about two-thirds of the cost of the gas ; but owing to its greater compactness the electric light can be better concentrated over the required area by a dioptric apparatus, and hence at the distance of three miles the light from the Gramme apparatus cost for each candle power one half as much as that from gas.

Mr. Douglas remarks also that while the light from gas cannot be increased, another electric machine can be worked at an additional cost of fourpence per hour. Compared with electricity from zinc batteries, the cost of the current is said to be as 1 to 400. The current being continuous is available for performing chemical work ; and so great is its superiority over a battery for this purpose that in one of the largest electrotyping works in Paris—that of MM. Christofle and Co., this machine is used for electro-plating with silver ; it deposits 74 ounces of silver per hour. A small machine decomposes water as well as several Bunsen cells.

The current is of course available for telegraphic purposes, and for doing other kinds of mechanical work; and its application to locomotive engines for the purpose of increasing their tractive power, by augmenting the friction or perpendicular pressure between the wheel and the rail without increasing the resistance was alluded to by Mr. Bramwell in his admirable lecture before the British Association at Bristol.

One of the most important applications of this machine the utilization of the tidal power and the power of the wind for the production of other forms of force, especially light. It has been suggested that the tidal current in the Mersey might be made to rotate two of the larger Gramme machines for the purpose of lighting the landing stage and river. Such an undertaking is quite feasible, and the work would cost little after the original outlay. There would, of course, be a short time at the turn of the tide when the tidal powers would not be directly available ; but this could be provided for by pumping water into accumulators when the tide is ebbing and flowing.

One of the great advantages of electricity as a source of energy is its capability of being transmitted to a distance by means of stationary insulated wires. This machine might be usefully employed in converting mechanical motion obtained at a point where it can be got most cheaply, as at our estuaries, tidal basins, rivers, windmills, etc., with electricity for transmission to other places, to be again converted into light, heat, or mechanical motion, or whatever form of force is most wanted.

But besides these industrial appliances, the machine is most interesting to us from the facility with which it illustrates the great law of conservation of energy. If we start with energy in the form of mechanical motion, that motion does not act upon the machine so as to convert something in the machine into electricity ; but the machine so acts upon the motion as to convert the motion itself into an electrical current. By passing the current through an electrotype cell or a soltameter, we get the same energy in the form of chemical force. By passing it through carbon points or a platinum wire, we get the same energy in the forms of heat and light. By passing it round the coil of an electro-magnet we get magnetic attraction. And reversing the first order of things, if we send an electrical current through the wires of the machine when it is at rest, the handle revolves, and we have electricity converted into mechanical motion. This is the most perfect arrangement for the purpose yet constructed.

M. Breguet revolved the wheel of one machine with a certain known force ; he passed the electricity so obtained through the wires of a second machine and thus re-obtained his original motion with a loss of only 30 per cent.

The construction and capabilities of the instrument were fully explained and demonstrated by many very successful experiments.

In the discussion which followed Messrs. Davies, Parnell, Symes, Armstrong, Murphy, Hallawell, Redford, Abraham, and the President took part. A cordial vote of thanks to Dr. Brown was carried by acclamation, and the meeting closed, the President announcing that at the next meeting an original paper would be read by Mr. Thomas Garside, F.C.S., public analyst of Southport, "On the Organic Constituents of Sewage."

LIVERPOOL.—FORMATION OF A REGISTERED CHEMISTS' ASSOCIATION.

At a numerously attended meeting of the registered Chemists and Druggists of Liverpool, held at the Royal Institution, on the 9th March last, called to consider the desirability of forming a price list, and also the subject of early closing, Mr. Abraham in the chair, it was unanimously resolved that such a list should be formed ; that the hours of business should be shortened ; and that a " Registered Chemists' Association " should be constituted.

A resolution was passed that the hour of closing should not be later than 9 p.m., except on Saturdays.

At a subsequent meeting, on November the 4th, Mr. Wharrie, hon. sec. *pro tem.*, reported that the price list was completed and would shortly be published (post free 1s. 1d.) ; that a considerable number of members had paid their subscriptions, and a large number of chemists and druggists had concurred in the proposed hour of closing. He said that the objects of the Society were, the protection of the general trade interests of its members, co-operation with the Pharmaceutical Society in movements relating to legislation, the prevention of illegal trading, and the exemption of registered chemists and druggists from serving on juries.

A Committee of management was chosen, and rules were adopted. (Subscriptions 5s. the first year, 2s. 6d. in succeeding years.) Mr. Abraham was unanimously elected President, and the following gentlemen, with the President, form the Committee :—Messrs. Dickins, Fingland, Hocken, Parkinson, Agnew, Alpass, Redford, John Shaw, Symes, Tanner, Turner, Warhurst, Woodcock, Elliot, Edisbury, Foulkes T. Davies, Blackbourn, Wharrie and Fletcher.

BRISTOL PHARMACEUTICAL ASSOCIATION.

The seventh session of this Association was inaugurated on Friday, October 29, at the Bristol Museum and Library, with an address by the newly-elected President, Mr. Charles Boorne, and the distribution of the prizes earned by the students during the past session.

The President, having been duly inducted into the chair, cordially acknowledged the distinction of being selected to preside over the Association during the ensuing year, and expressed a hope that the prosperity which had attended it under his predecessors would suffer no diminution during his term of office. Before proceeding further with the business of the evening, he would ask Mr.

Schacht to read the report of Dr. Tilden and Mr. Ekin, the examiners for the—

HILLS PRIZES.

Mr. Schacht said that it would perhaps be as well in the first place to read the examination questions. These would show that the ordeal was not nearly of so exacting a character as had evidently been supposed, for otherwise it could not have happened that, out of all their associates, only three should have presented themselves for rewards of such substantial value. He trusted that such a result would not happen again, but that the students would in future better show their appreciation of the kind feeling which had prompted Mr. Hill's generous gift to them.

The questions were as follows:—

Chemistry.

Time allowed: Two hours.

1. What do chemists understand by the terms *acid, base, salt?* Give examples of each from the B. P.
2. Why are the elements chlorine, bromine, iodine classed together? Describe very briefly the uses to which they are applied in pharmacy.
3. Describe the preparation of *acidum sulphurosum* (B. P.), giving tests by which it may be recognized and distinguished from sulphuric acid.
4. Complete the following equation:—

$$HgCl_2 + NH_4HO =$$

and calculate from it the weight of corrosive sublimate required to make 10 pounds of white precipitate.

5. Give the formula of hydrocyanic acid, and the strength and dose of the official preparation. The strength of Ac. Hydrocy. Dil. is very liable to vary in different samples: what suggestions have been made with the view of avoiding this inconvenience?
6. What are the constituents of virgin scammony, and how would you detect adulteration?
7. Name substances which give, with perchloride of iron:—
   (*a*) black,
   (*b*) red,
   (*c*) purple coloration.
8. How is aqua laurocerasi prepared, and what chemical compounds does it contain?

Botany and Materia Medica.

Botany.

1. Explain the terms:—Tetradynamous, petiole, glabrous, whorl, apocarpous, achene, corm, dicotyledon, syngenesious.
2. Plants are almost entirely made up of carbon, oxygen, hydrogen, and nitrogen. Explain from what sources and in what way each of these four elements is supplied to the plant.
3. What is the difference between an exogenous and endogenous stem?
4. From what do vessels originate, and in what way do they differ from cells? Describe the different kinds of vessels, where they are usually found in a plant, and what their functions are.
5. Give the chief characteristics of the following orders, and mention some of the genera, indigenous to England, belonging to each order:—Papaveraceæ, Caryophyllaceæ, Cucurbitaceæ, Umbelliferæ.
6. In what way do the fruits of the strawberry, blackberry, and mulberry differ?
7. What is a carpel? Give two or three examples of flowers having more than one carpel.

Materia Medica.

1. From what is citric acid prepared, and by what process?
2. What is the botanical name and the natural order of the plant yielding the alkaloid atropia?
3. Give the botanical names and natural order of the three officinal cinchona barks, and say which is used in preparation of Tinct. Cinchon. Co.
4. How much quinia per cent. does citrate of iron and quinia contain, and what is the B. P. process for estimating it?
5. Give the proportions of opium in the following preparations of it:—Liquid Extract. Pil. Plumbi. c. Opio. Pulv. Ipecac. co. Pulv. Kino. co. Tincture. Tinct. Camph. co. Wine.
6. Give the ingredients in Ext. Coloc. Co. and Pil. Coloc. co.
7. Give the botanical name, natural order, medicinal properties, and preparations of uva ursi.
8. How are scammony and the resin of scammony prepared, and into what preparations do they respectively enter?

REPORT OF THE EXAMINERS FOR THE HILLS PRIZES.

"To the Secretaries of the Bristol Pharmaceutical Association:

"Gentlemen,—The examination for the prizes offered to students connected with the Bristol Pharmaceutical Association by the President of the Pharmaceutical Society was held on the evening of Friday, the 24th instant, between the hours of 6 and 10 p.m. Three candidates only presented themselves.

"Questions on Chemistry, Botany, and Materia Medica,—copies of which are enclosed,—were submitted to them, and they were allowed to select as many as could be conveniently answered in the time (one hour) allotted to each paper. Each candidate was afterwards required to read a few prescriptions, and to recognize some commercial samples of drugs, besides a few common Bristol plants in the fresh state.

"As the result of these separate tests we have to report that Mr. Cuthbert Powell acquitted himself the best, gaining an aggregate of 350 marks; Mr. C. M. Luxmoore came next, with 305 marks. To the former of these gentlemen we recommend the award of the first prize, and to Mr. Luxmoore the second.

"We cannot conclude without expressing disappointment that the number of candidates was not greater. At the same time, we wish it to be understood that the two gentlemen whom we have nominated for the first and second prizes respectively, have acquitted themselves creditably, and amply deserve the distinction they have gained.

"We have the honour to be, Gentlemen,
"Your obedient servants,
"CHARLES EKIN.
"WILLIAM A. TILDEN.

"*28th September*, 1875."

The President said he agreed with Mr. Schacht in thinking that the smallness of the number of candidates was due to a notion that the questions would be much more difficult than they actually were, but he hoped and believed that another year a larger number of students would be found to compete. He would take that opportunity to acknowledge the great obligation they were under to their friends Mr. Ekin and Dr. Tilden, for the very efficient and willing service they had rendered in carrying out the examination. The various prizes were then distributed in accordance with the following list, the President addressing to each recipient friendly words of congratulation. The great practical value of periodical examinations, as revealing to the student his real condition with respect to the subjects of his study, was referred to, and those who had tried and failed were urged to be of good cheer, inasmuch as their time and labour had been well spent, and success would assuredly attend upon persevering effort.

First—Mr. Cuthbert Powell—Pereira's 'Materia Medica,' Attfield's 'Chemistry,' Bentley's 'Botany,' Squire's 'Companion to the Pharmacopœia.'

Second—Mr. C. M. Luxmoore—Fresenius' 'Quantitative Analysis,' Frankland's 'Notes [Inorganic],' Pereira's 'Selecta è Præscriptis,' Todhunter's 'Plane Trigonometry,' Todhunter's 'Spherical Trigonometry.'

THE ASSOCIATION PRIZES.

Chemistry—Inorganic.

Advanced—Mr. C. M. Luxmoore—Oliver's 'Illustrations of the Principal Natural Orders of the Vegetable Kingdom.')

Elementary—Mr. G. H. Morris—Bloxam's 'Chemistry,' Frankland's 'Notes [Inorganic],' Oliver's 'Elementary Botany,' Thorpe's 'Chemical Problems.')

Chemistry—Organic.

Advanced—Mr. T. W. Hall and Mr. C. M. Luxmoore, equal—(Squire's 'Companion to the Pharmacopœia' [Hall], Fresenius' 'Qualitative Analysis' [Luxmoore].

Elementary—Mr. E. J. Greatorex—Attfield's 'Chemistry,' Bentley's 'Botany.'

Botany.

Advanced — Mr. C. J. Miles—Pereira's 'Materia Medica.'

Elementary—Mr. T. W. Hall—Fresenius' 'Quantitative Analysis,' Oliver's 'Elementary Botany,' Pereira's 'Selecta è Præscriptis.'

The President then delivered the following address:—

PRESIDENT'S ADDRESS.

Self-examination must at all times be a beneficial exercise, and I shall ask you, my brother pharmacists, to accompany me to-night for a short time, while I endeavour to investigate our position, in its relation to the past, the present, and the future. What have we done in days gone by? what are we now striving to do? and what have we to look for as future results? These are questions which well become us to ask ourselves, and which, I trust, we shall seek faithfully to answer. Let us first of all look backward and review the origin from whence we have sprung, and, in doing so, I invite you to contemplate two pictures which I will endeavour to exhibit to your imagination. In the one we shall find the alchemist of a byegone age, long since departed, yet even now so familiar to our minds, that he needs no description from me here; we recognize him at once as he sits over his glowing caldron, peering into the seething pot, into which he casts—now a metal, then an earth, and, again, one of the many compounds which he has already succeeded in producing, but of which he has but an imperfect knowledge. Too often does he find his labour, like that of the Witches in 'Macbeth,' to be but—

> "Toil and trouble;
> Fire burn, and caldron bubble;"

yet he works patiently on, actuated it may be by the desire of gaining knowledge, and seeking to unravel hidden mysteries, fascinated by their own attractions, or else, as we are more accustomed to believe, vainly spending his strength and exhausting his resources in seeking to satisfy the cry of mankind in its greed for gold. Let us turn to the companion picture, where we find a subject still less attractive, —the apothecary of the olden times. Our Immortal Bard has so admirably drawn his portrait, that I will not attempt to give any other illustration, though so often repeated. I ask you to bear with me while I use his words—

> "An apothecary,—
> . . . . which late I noted
> In tatter'd weeds . . . . . .
> . . . . meagre were his looks,
> Sharp misery had worn him to the bones."

Let us also take a peep into his shop, and examine the wares in which he deals and the remedies with which he essays to mitigate the ills "that flesh is heir to." Here, again, the same author comes to our assistance, and the shop, with its contents, is placed as vividly before us as the personal appearance of the proprietor—

> "In his needy shop a tortoise hung,
> An alligator stuff'd, and other skins
> Of ill-shap'd fishes; and about his shelves
> A beggarly account of empty boxes,
> Green earthen pots, bladders, and mustard seeds,
> Remnants of packthread, and old cakes of roses,
> Were thinly scatter'd to make up a show."

Here then we have depicted before us, the early inquirer into chemical science, and the antiquated retailer and compounder of medicines. Let us not judge too harshly in reviewing these workers of the past; if they were ignorant, they were for the most part earnest, and though blindly groping in the dark, they stumbled upon many a valuable truth and sowed much good seed, from which we are even now reaping an abundant harvest. It is true they found not the "philosopher's stone," but they discovered many a rich gem of fact, which glitters in unsullied brilliancy to the present day. It is not at all my intention, at this time, to trace the various gradations through which these embryo chemists and embryo druggists have passed; that has already been ably done on two former occasions before this Association. We have had described to us, in a graphic manner, the apothecary with his nauseous and oft-times repulsive compounds, the drug-grocer selling his physic and spices in conjunction with mops, brooms and such like wares, the barber-surgeon, equally ready to use either the razor or the lancet, the quack doctor who has turned up at all times, and in all places, and whose purpose it has ever been to trade upon the superstition of his dupes. These, and others beside, have been graphically portrayed to us, and we are not without the representatives of some of them at the present day. We have perhaps lost the surgical operations of the barber, whose pole only remains to remind us that he once considered phlebotomy an essential part of his business but we have still amongst us; the travelling quack, attending fairs and markets, himself a compound of the conjuror and the merry-andrew, exhibiting an array of bottles filled with joints of tape-worms and a few innocent reptiles, in combination with a display of worm-eaten colombo root, English rhubarb, and the eccentric grown root of a mandrake. His customers, the country clowns, are as much deceived in believing that he can rid his patients of those noxious worms, as in supposing that the pills and mixtures he vends are compounded even of the worthless drugs he displays. But my more especial object this evening is to direct your attention to our own position, as pharmacists, in its present aspect, and its relation to the future. We have asked the questions, what are we now endeavouring to do? what have we to show as actually accomplished? Let us seek to answer it truthfully and faithfully; we would "nothing extenuate, nor set down aught in malice." We are happily not without some results to show; our very gathering together here to-night is a proof that we are seeking mutual instruction and progress, and let us first of all consider what we are now doing as regards education. There are, perhaps, few subjects that have of late years engrossed so much of the public attention as that of education. Very much thought and a large amount of legislative discussion have been given to it, and great diversity of opinion as to the best methods of its promotion, has naturally arisen among almost all classes. These remarks apply, of course, to education in its widest sense, but it is in its application to pharmaceutical study that I wish more especially now to invite your attention. The primary object of this Association is, I take it, to gain and impart scientific knowledge. I believe it to be the sincere desire of pharmacists of the present day to educate themselves and to make progress in the unlimited sphere of scientific research that is open to them. There is no wish, on their part, to stand still; they feel that much as has been gained, there is much more still to be acquired; the acquisition of knowledge is inexhaustible; the wealth of its mines can never be wholly reached; the heights of its sublimity will never be fully attained; we may toil upwards on the mountain, but its summit is ever above our heads. It was, perhaps, almost alone this ardent desire to advance in science and to become something better than a mere trading community that caused the formation of the Pharmaceutical Society of Great Britain, the success of which has been beyond the highest expectations of its founders. It is not possible, at this moment, to enumerate all the advantages we have derived from that Society; but I would remark, in passing, that its students have dispersed over almost all parts of the world, and carried with them a leaven of scientific information that has not only promoted further research, but has advanced the whole body of pharmaceutists in their professional knowledge. We cannot compare the present position of the pharmacist with what it was before the formation of the Pharmaceutical Society, without realizing a great cause of congratulation in it, as a legally recognized and at least a more systematically educated body. It was, too, this object of self-advancement, that brought together lately in this city that most delightful gathering of our fellow-members of the Pharmaceutical Conference. Not one of us could have attended those meetings and have listened to the interesting and highly instructive papers then read, at the same time enjoying a large amount of mutual and social intercourse, without feeling that the lines were now, indeed, falling to us in pleasant places, and that we are, at the present day, enjoying advantages which perhaps scarcely ever entered into the wildest dreams of our professional forefathers. The good that was to be derived by all who were present at the Conference can scarcely ever be lost. We learned much from the well-studied address of the excellent President; much also from the many exhaustive papers and discussions, and above all, from the many bright and cheering faces surrounding us, teaching us forcibly the truth of that word—"Iron sharpeneth iron; so a man sharpeneth the countenance of his friend." And in a more limited degree the Bristol Pharmaceutical Association, over which I feel it to be no small honour to preside, is seeking—and earnestly seeking—the mutual instruction of its members and associates. We have happily amongst us many gentlemen of great scientific attainments, and who not only possess the ability, but have also the disposition to impart to others their knowledge. We shall, I am glad to know, during this session, as we have done in former years, have opportunities of gleaning some few grains from their stores of science. I have said that pharmacists are seeking self-education; they are not less desirous of advancing the knowledge of their students. It is to these latter that the future of pharmacy is to be committed, and it will become hereafter, just what the learners of today, may themselves become, in their individual characters, as its exponents. With this object in view, associations are formed, laboratories are opened, and lectures delivered. Much too has been gained on behalf of our students, by the shortening of the hours of business; the improvement in this respect is very marked, if compared with that of even a score of years ago. It is true we have not yet attained all that is to be desired in this respect, but we are moving on in the right direction, and the public are, perhaps slowly, but not less certainly, learning, that purchases of drugs ought not, except in cases of absolute necessity, to be made at unreasonably late hours, and that the prescription, written in the morning, should not be left till the evening, before being sent to the dispenser. The pharmaceutical student must ever be prepared to practise some amount of self-denial; diseases and accidents wait no man's convenience, they come at all hours, in season and out of season, and we must at any moment be ready to grapple with them. Great encouragement is now offered to students by the gifts of prizes; these are great incentives to their achieving excellence in the various departments of their study. It has afforded me much pleasure this evening to distribute some well-earned rewards to many of our own associates, and I embrace this opportunity of acknowledging our high sense of the obligation we are under to our esteemed friend, Mr. Hills, the president of the Pharmaceutical Society of Great Britain, through whose generosity we have been enabled to make some valuable additions to the prizes offered by this Association. But I believe also, I am right in stating that to a large and still increasing extent, it is the wish of pharmacists to facilitate the information of the public; whatever may have been the case in the past, it is certainly not their desire, at the present day, to make profit out of the ignorance or superstition of their customers. The field of chemical research is one in which all are invited to labour; we claim not to possess, and wish not to have, an exclusive right to its secrets; there are many problems that need solving, many a mystery yet to be unravelled, and we hail with satisfaction all who will enter the lists, as honest seekers, to dispel the many clouds that yet hover in the horizon of chemical science. We have ceased too, to a large extent, to deal in occult and complex remedies. Our predecessors were much in favour of mysterious compounds, and were not less fond of using mystic signs; they drew largely upon the animal kingdom for the supply of many of their remedies. Reptiles and insects, of so repulsive a nature as are scarcely now ever mentioned before ears polite were much used in the composition of medicines, and even the human family was not exempted from the "materia medica" of some of the more ancient pharmacopœias. Several of the old formulæ were chiefly remarkable for the number of ingredients they contained, the object of some of which it is now difficult to discover. "Mithridate," that "many-headed, monster thing," the very mention of which, at the present day, almost provokes a smile; "Venice Treacle," another somewhat similar compound electuary containing some fifty or more simples; with many others of a like nature, are now things of the past; they were composed of so many remedies that their ultimate effect must, of necessity, have been a haphazard affair. Our forefathers must, however, have placed considerable faith in them, as we find "mithridate" lauded as "an antidote to every known poison," and "Venice treacle" believed to be a specific against most of the diseases. These, however, are no longer relied upon; the medical practitioner of the present day, prefers a less complicated remedy, and one which he can look to for a specific effect; he makes no attempt to mystify his patient, he seeks rather to take him into his confidence and teach him how to cure himself. The Latin prescription is not necessarily a sealed book; it is so written for convenience and brevity's sake, but it has no secrets; all may learn, if they so choose, the particular effect of every tincture, and the specific action of each alkaloid and chemical salt. We may too, I think, in reviewing our present position, fairly congratulate ourselves upon the progress made in chemical science as applied to pharmacy. This has brought about within the last few years a material alteration in the use of many of the remedial agents. Those, derived from the animal kingdom are now resorted to with comparative rarity. I make an exception of the well-known cod-liver oil, but this is to be regarded rather as a source of nourishment than as a medicine. There has recently been introduced a remarkable addition to our "materia medica," and one which appears to be here worthy of mention as an exception to the fact I have just stated, that remedies having an animal origin are not at the present day greatly in favour with medical practitioners. I refer to trimethylamine, or propylamine. It was originally extracted from herring-brine by Wertheim, and, like the well-known Caliban, hath "a very ancient and fish-like smell." It has been used with much success, in cases of acute rheumatism, and many patients suffering from this painful affliction have been most successfully treated with this remedy by Dr. Spencer, of Clifton, in our Bristol Royal Infirmary. This peculiar compound may also be obtained from ergot of rye, and some other vegetable sources; it appears to be a product of the putrefaction of nitrogenous substances. When combined with hydrochloric acid, it forms a crystalline salt, which is almost inodorous. I have placed upon the table specimens of this substance in solution, and in the form of the hydrochlorate salt, for the inspection of any of my non-pharmaceutical friends, who may be interested in examining them. The vegetable kingdom abounds in remedial agents, and has ever been a favourite source from which mankind has extracted its real or supposed medicaments. In a literal, as well as in a scriptural sense, it has often proved that "the leaves of the tree were for the healing of the nations." At all ages, and in all lands we find humanity resorting to the herb or flower, or it may be, to the bark, root, or leaf of a tree, or again to a seed or fruit, to find a cure or alleviation of its diseases and pains. The search has, in very many cases, been rewarded by success; the remedies derived from a vegetable source are almost innumerable, "their name is legion." Many of them have been known and used for thousands of years; we find them mentioned in the earlier books of Scripture. Of such I may instance balm, myrrh, frankincense, aloes, and others. Again, we find some known only as medicines within the last century or two; of these may be mentioned, colchicum, sarsaparilla, peruvian bark, etc. Then we have others of much later discovery, and are still making new additions; for nature's pharmacy is, by no means, yet exhausted. Among those of quite recent introduction, I may refer to Guarana, a fruit obtained from Brazil, used with much success in cases of sick-headache; Eucalyptus, imported originally from Australia, and found of great benefit in many cases of a febrile nature, especially so in intermittent fever and ague; Jaborandi, also procured from the Brazils, a plant, the infusion of the leaves of which produces abundant perspiration, accompanied with remarkable salivation; its use in bronchitis, pneumonia, and some cases of fever, has been found most beneficial. As these three latter drugs may be novelties to some of my audience, I have placed specimens of them on the table for examination. I make no reference here to the products of nature's own laboratory, the gums, gum-resins, and other vegetable productions which have been in use almost from time immemorial as medicinal agents; and it would be quite impracticable to mention all the various methods of preparation that are now in use for the administration of drugs having a vegetable origin. The tincture is, at the present day, one of the most favourite modes of using these remedies; it is a form of comparatively recent introduction, as it is not found mentioned in some of the more ancient pharmacopœias. It is not, however, free from objection, on account of the large proportion of alcohol contained in it, which in some cases renders it an undesirable mode of exhibition. To obviate this difficulty, the liquors, or fluid-extracts, have lately come much into use, as they are found to contain the active principles of the drugs in a concentrated and convenient form. There have recently been introduced into this country with much success many of the fluid-extracts prepared according to formulæ of the Pharmacopœia of the United States; these possess the advantage of being stronger than ordinary tinctures, each fluid-ounce containing the active principles of one troy ounce of the ingredients. They are prepared by percolation with various proportions of alcohol, water, and glycerine, and afterwards evaporated to the requisite strength. These fluid-extracts have been in use for some years in the United States, but being comparatively new to English pharmacists, I have on the table small quantities of those most generally in use for the inspection of any present who may not have met with them before. But perhaps one of the most striking features of modern pharmacy is the introduction of a great number of new therapeutic agents obtained from the mineral kingdom; this has arisen, as I have already observed, from the progress made of late years in chemical science, and the increased facilities that are open to pharmacists for research. The difficulty of investigation and analysis in the case of these inorganic compounds is less than that usually attending the examination of organic bodies. It is true there are many of these medicinal agents that partake of the nature of both these divisions of chemistry; for example, those metallic salts, which consist of an inorganic oxide, in combination with an organic acid; and again the salts, containing mineral—which are inorganic—acids combined with alkaloids or other organic bases. But in referring to drugs having a mineral source, it is almost impossible to exclude many, at least, of the former character, that I have just mentioned. There has ever existed and no doubt, to some extent, there still prevails, a popular prejudice against remedies derived from the mineral kingdom. This antipathy to them can scarcely be founded on scientific principles, and it will probably be the case, that those very objectors to drugs of this class are daily in the habit of taking, in the form of our most natural condiment, the common salt, a mineral remedy, without the aid of which, good health can rarely be maintained. The physician prescribes these mineral therapeutic compounds upon principles based on a scientific knowledge of their chemical action, and with a confidence in their unvarying potency, which cannot always be placed in remedies derived from animal or vegetable sources. But I must pass on to notice, and that in a very few words, the future of pharmacy; and when looking at what may be looming in the distance, we naturally turn to the younger members of the audience. I have already observed,—and will my young friends allow me emphatically to repeat?—that pharmacy will become just that which the students of to day become hereafter in their individual capacity. That there are great things yet in store for it, we cannot but believe; the success of some present to-night in gaining the coveted prize is an earnest that they will yet achieve greater things in the future. The opportunities of gaining knowledge are greatly increasing; colleges of science are being founded in many of our larger towns, and we are confidently expecting that our own city will not, in this respect, be found wanting, but that the "Bristol College of Science and Literature" will shortly become an established fact. Of no science, can it be more truly said, than of chemistry, that the knowledge of it is yet in its infancy, and as the hand-maiden of pharmacy, there is yet an unlimited field of research. To the Bristol pharmaceutical students let me say, she stands before you as a coy maiden, waiting only to be wooed; success is only to be gained by steady, persevering study; she will give no favours to those who offer her only the superficial cram. Be earnest then in your work, and in her pursuit,

"Be not like dumb, driven cattle;
Be a hero in the strife."

We delight, at this day to do honour to the names of such workers in pharmacy, and pharmaceutical education, as William Allen, Jacob Bell, Henry Deane, and Daniel Hanbury; and there is not one among you, but may become all that they were, and much more, and whose name may be handed down with reverence to generations of pharmacists yet to come.

At the conclusion of his address the President was heartily applauded, and, on the motion of Mr. Stoddart, a vote of thanks to him was carried by acclamation. Mr. Stoddart, in the course of his remarks, warmly eulogized the excellent conduct and diligence of the British pharmaceutical students, and this opinion was based, he said, upon a considerable personal experience of them.

Proceedings of Scientific Societies.

PARIS SOCIÉTÉ DE PHARMACIE.

A meeting of this Society was held on Wednesday, October 6th, under the presidency of M. Planchon.

After the usual preliminary business, M. Petit gave an account of his recent experiments as to the action of diastase upon starch. In presence of an excess of diastase, and after some hours' contact at the temperature of 50°C., starch is transformed into three distinct bodies. The quantity of dextrine precipitable by alcohol is inconsiderable (about 5 per cent.); the remainder would consist of about three-fifths of fermentable maltose, reducing Fehling's solution, and two-fifths of a new fermentable saccharine substance that has no action on Fehling's solution. The ulterior action of the diastase was opposed by a prolonged boiling of the liquid before submitting it to fermentation.

M. Petit also described to the Society fresh experiments which he had made in respect to the melon, the results of which confirmed an opinion previously expressed by him, that in a melon collected before its maturity, and having no further communication with the leaves, there is a transformation of inverted sugars into cane sugar; after an interval of two days the polarimetric deviation passes from the left to the right.

M. Méhu presented a perfectly crystallized specimen of sulphide of mercury, obtained by exposing to the air sulphide of mercury dissolved in monosulphide of sodium with the aid of caustic alkali.

CHEMICAL SOCIETY.

Nov. 4, 1875. Professor Abel, F.R.S., President, in the chair. The usual business of the Society being completed, the first paper "On the Decomposition of Stearic Acid by Distillation under Pressure," by Mr. G. Johnston was read. Dr. C. R. A. Wright then read a paper by himself and Mr. G. H. Beckett on "Isomeric Terpenes and their Derivatives," being Part V. of their researches on this subject; also one "On the Alkaloids contained in the Aconites, Part I." After which Mr. F. J. M. Page gave an account of a simple form of gas regulator for maintaining a constant temperature in air-baths, water-baths, incubators, etc. Communications from Mr. R. W. E. M'Iver were also read "On the Fluorides of Arsenic, Phosphorus, and Iodine," and "On the Iodides of Antimony." The last paper "On Tolylphenyl, a new Hydrocarbon," was by Mr. T. Carnelly. The meeting finally adjourned until Thursday, 18th November, when the following communications will be read; "Ethyl Phenyl Acetylene," by T. M. Morgan; "On the presence of Liquid Carbon Dioxide in Quartz Cavities," by W. N. Hartley; "Addendum to the paper entitled Monthly Analytical Examination of the Harrogate Spas, 1872," by R. H. Davies; "On Certain Bismuth Compounds" by M. M. P. Muir; "On the Formation of Coumarine, Coumaric, and other similar Acids," by W. H. Perkin; Communications from the Laboratory of the London Institution, (*a*) "On the Action of Potassic Sulphite on the Haloid Derivatives of Phenol; (*b*) "Note on the Action of Nitric Acid on Tribromo-Phenol," by E. Armstrong; "On Narcotine, Cotarnine, and Hydrocotarnine," by G. A. Beckett, and Dr. Wright; "On the Decomposition of Alcohol and its Homologues by the joint Action of Aluminium and its Halogen Compounds," by Dr. Gladstone and Mr. Tribe.

SOCIAL SCIENCE CONGRESS.

ADDRESS ON HEALTH.

BY BENJAMIN W. RICHARDSON, M.D., F.R.S.

(*Continued from page* 357.)

It will be seen, from what has been already told, that in this our model city there are no underground cellars, kitchens, or other caves, which, worse than those ancient British caves that Nottingham can still show the antiquarian as once the fastnesses of her savage children, are even now the loathsome residences of many millions of our domestic and industrial classes. There is not permitted to be one room underground. The living part of every house begins on the level of the street. The houses are built of a brick which has the following sanitary advantages:—It is glazed, and quite impermeable to water, so that during wet seasons the walls of the houses are not saturated with tons of water, as is the case with so many of our present residences. The bricks are perforated transversely, and at the end of each there is a wedge opening, into which no mortar is inserted, and by which all the openings are allowed to communicate with each other. The walls are in this manner honeycombed, so that there is in them a constant body of common air let in by side openings in the outer wall, which air can be changed at pleasure, and, if required, can be heated from the fire-grates of the house. The bricks intended for the inside wall of the house, those which form the walls of the rooms, are glazed in different colours, according to the taste of the owner, and are laid so neatly that the after-adornment of the walls is considered unnecessary, and, indeed, objectionable. By this means those most unhealthy parts of household accommodation, layers of mouldy paste and size, layers of poisonous paper, or layers of absorbing colour stuff or distemper, are entirely done away with. The walls of the rooms can be made clean at any time by the simple use of water, and the ceilings, which are turned in light arches of thinner brick, or tile, coloured to match the wall, are open to the same cleansing process. The colour selected for the inner brickwork is grey, as a rule, that being most agreeable to the sense of sight; but various tastes prevail, and art so soon ministers to taste, that, in the houses of the wealthy, delightful patterns of work of Pompeian elegance are soon introduced.

As with the bricks, so with the mortar and the wood employed in building: they are rendered, as far as possible, free of moisture. Sea-sand containing salt, and wood that has been saturated with sea-water—two common commodities in badly built houses—find no place in our modern city.

The most radical changes in the houses of our city are in the chimneys, the roofs, the kitchens, and their adjoining offices. The chimneys, arranged after the manner proposed by Mr. Spencer Wells, are all connected with central shafts, into which the smoke is drawn, and, after being passed through a gas-furnace to destroy the free carbon, is discharged colourless into the open air. The city, therefore, at the expense of a small smoke-rate, is free of raised chimneys and of the intolerable nuisance of smoke. The roofs of the houses are but slightly arched, and are, indeed, all but flat. They are covered either with asphalte, which experience, out of our supposed city, has proved to last long and to be easily repaired, or with flat tile. The roofs, barricaded round with iron palisade, tastefully painted, make excellent outdoor grounds for every house. In some instances flowers are cultivated on them.

The housewife must not be shocked when she hears that the kitchens of our model city, and all the kitchen offices, are immediately beneath these garden roofs—are, in fact, in the upper floor of the house instead of the lower. In every point of view, sanitary and economical, this arrangement succeeds admirably. The kitchen is lighted to perfection, so that all uncleanliness is at once detected. The smell which arises from cooking is never disseminated through the rooms of the house. In conveying the cooked food from the kitchen, in houses where there is no lift, the heavy-weighted dishes have to be conveyed down, the emptied and lighter dishes upstairs. The hot water from the kitchen boiler is distributed easily by conducting pipes into the lower rooms, so that in every room and bedroom hot and cold water can at all times be obtained for washing or cleaning purposes; and as on every floor there is a sink for receiving waste water, the carrying of heavy pails from floor to floor is not required. The scullery, which is by the side of the kitchen, is provided with a copper and all the appliances for laundry work; and when that is done at home the open places on the roof above make an excellent drying ground.

In the wall of the scullery is the upper opening to the shaft of the dust bin shaft. This shaft, open to the air from the roof, extends to the bin under the basement of the house. A sliding door in the wall opens into the shaft to receive the dust, and this plan is carried out on every floor. The coal-bin is off the scullery, and is ventilated into the air through a shaft, also passing through the roof.

On the landing, in the second or middle stories of the three-storied houses, there is a bath-room supplied with hot and cold water from the kitchen above. The floor of the kitchen and of all the upper stories is slightly raised in the centre, and is of smooth grey tile ; the floor of the bath-room is the same. In the living-rooms, where the floors are of wood, a true oak margin of floor extends two feet around each room. Over this no carpet is ever laid. It is kept bright and clean by the old-fashioned beeswax and turpentine, and the air is made fresh and ozonic by the process.

Considering that a third part of the life of man is, or should be, spent in sleep, great care is taken with the bed-rooms, so that they shall be thoroughly lighted, roomy, and ventilated. Twelve hundred cubic feet of space is allowed for each sleeper, and from the sleeping apartments all unnecessary articles of furniture and of dress are rigorously excluded. Old clothes, old shoes, and other offensive articles of the same order, are never permitted to have residence there. In most instances the rooms on the first floor are made the bed-rooms, and the lower the living-rooms. In the larger houses bedrooms are carried out in the upper floor for the use of the domestics.

To facilitate communication between the kitchen and the entrance-hall, so that articles of food, fuel, and the like may be carried up, a shaft runs in the partition between two houses, and carries a basket-lift in all houses that are above two stories high. Every heavy thing to and from the kitchen is thus carried up and down from floor to floor and from the top to the basement, and much unnecessary labour is thereby saved. In the two-storied houses the lift is unnecessary ; a flight of outer steps leads to the upper or kitchen floor.

The warming and ventilating of the houses is carried out by a common and simple plan. The cheerfulness of the fireside is not sacrificed ; there is still the open grate in every room, but at the back of the fire stove there is an air-box or case, which, distinct from the chimney, communicates by an opening with the outer air, and by another opening with the room. When the fire in the room heats the iron receptacle, fresh air is brought in from without, and is diffused into the room at the upper part on a plan similar to that devised by Captain Galton.

As each house is complete within itself in all its arrangements, those disfigurements called back premises are not required. There is a wide space consequently between the back fronts of all houses, which space is, in every instance, turned into a garden square, kept in neat order, ornamented with flowers and trees, and furnished with playgrounds for children, young and old.

The houses being built on arched subways, great convenience exists for conveying sewage from, and for conducting water and gas into, the different domiciles. All pipes are conveyed along the subways, and enter each house from beneath. Thus the mains of the water-pipe and the mains of the gas are within instant control on the first floor of the building, and a leakage from either can be immediatly prevented. The officers who supply the commodities of gas and water have admission to the subways, and find it most easy and economical to keep all that is under their charge in perfect repair. The sewers of the houses run along the floors of the subways, and are built in brick. They empty into three cross main sewers. They are trapped for each house, and as the water supply is continuous, they are kept well flushed. In addition to the house-flushings there are special openings into the sewers, by which, at any time, under the direction of the sanitary officer, an independent flushing can be carried out. The sewers are ventilated into tall shafts from the mains by means of a pneumatic engine.

The water-closets in the houses are situated on the middle and basement floors. The continuous water-supply flushes them without danger of charging the drinking water with gases emanating from the closet—a danger so imminent in the present method of cisterns, which supply drinking as well as flushing water.

As we walk the streets of our model city, we notice first an absence of places for the public sale of spirituous liquors. Whether this be a voluntary purgation in goodly imitation of the National Temperance League, the effect of Sir Wilfrid Lawson's Permissive Bill and most permissive wit and wisdom, or the work of the Good Templars, we need not stay to inquire. We look at the fact only.

To this city, as to the town of St. Johnsbury, in Vermont, which Mr. Hepworth Dixon has so graphically described, we may apply the description Mr. Dixon has written :—"No bar, no dram-shop, no saloon, defiles the place ; nor is there a single gaming-hell or house of ill-repute." Through all the workshops into which we pass, in whatever labour the men or women may be occupied—and the place is noted for its manufacturing industry—at whatever degree of heat or cold, strong drink is unknown. Practically, we are in a total abstainers' town, and a man seen intoxicated would be so avoided by the whole community, he would have no peace to remain.

And, as smoking and drinking go largely together—as the two practices were, indeed, original exchanges of social degradations between the civilized man and the savage, the savage getting very much the worst of the bargain—so the practices largely disappear together. Pipe and glass, cigar and sherry cobbler, like the Siamese twins, who could only live connected, have both died in our model city. Tobacco, by far the more innocent partner of the firm, lived, as it perhaps deserved to do, a little the longest ; but it passed away, and the tobacconist's counter, like the dram counter, has disappeared.

The streets of our city, though sufficiently filled with busy people, are comparatively silent. The subways relieve the heavy traffic, and the factories are all at short distances from the town, except those in which the work that is carried on is silent and free from nuisance. This brings me to speak of some of the public buildings which have relation to our present studies.

It has been found in our towns, generally, that men and women who are engaged in industrial callings, such as tailoring, shoe-making, dress-making, lace-work, and the like, work at their own homes amongst their children. That this is a common cause of disease is well understood. I have myself seen the half-made riding-habit, that was ultimately to clothe some wealthy damsel rejoicing in her morning ride, act as the coverlet of a poor tailor's child stricken with malignant scarlet fever. These things must be, in the ordinary course of events under our present bad ordinary system. In the model city we have in our mind's eye, these dangers are met by the simple provision of workmen's offices or work-rooms. In convenient parts of the town there are blocks of buildings, designed mainly after the manner of the houses, in which each workman can have a work-room on payment of a moderate sum per week. Here he may work as many hours as he pleases, but he may not transform the room into a home. Each block is under the charge of a superintendent, and also under the observation of the sanitary authorities. The family is thus separated from the work, and the working man is secured the same advantages as the lawyer, the merchant, the banker, now posesss ; or, to make the parallel more correct, he has the same advantage as the man or woman who works in a factory and goes home to eat and to sleep.

In most towns throughout the kingdom the laundry system is dangerous in the extreme. For anything the healthy householder knows, the clothes he and his children wear have been mixed before, during, and after the process of washing, with the clothes that have come from the bed or the body of some sufferer from a contagious malady. Some of the most fatal outbreaks of disease I have met with have been communicated in this manner.

In our model community this danger is entirely avoided by the establishment of public laundries, under municipal direction. No person is obliged to send any article of clothing to be washed at the public laundry; but if he does not send there he must have the washing done at home. Private laundries that do not come under the inspection of the sanitary officer are absolutely forbidden. It is incumbent on all who send clothes to the public laundry from an infected house to state the fact. The clothes thus received are passed for special cleansing into the disinfecting rooms. They are specially washed, dried, and prepared for future wear. The laundries are placed in convenient positions, a little outside the town; they have extensive drying grounds, and practically they are worked so economically, that home washing-days, those invaders of domestic comfort, are abolished.

Passing along the main streets of the city, we see in twenty places, equally distant, a separate building surrounded by its own grounds—a model hospital for the sick. To make these institutions the best of their kind, no expense is spared. Several elements contribute to their success. They are small, and are readily removable. The old idea of warehousing diseases on the largest possible scale, and of making it the boast of an institution that it contains so many hundred beds, is abandoned here. The old idea of building an institution so that it shall stand for centuries, like a Norman castle, but, unlike the castle, still retain its original character as a shelter for the afflicted, is abandoned. The still more absurd idea of building hospitals for the treatment of special organs of the body, as if the different organs could walk out of the body and present themselves for treatment, is also abandoned.

(*To be continued.*)

Parliamentary and Law Proceedings.

Poisoning by an Anodyne.

An inquest was held at the Talbot Inn, Duke Street, Park, Sheffield, on Saturday last, by the Coroner (D. Wightman, Esq), on the body of a child named Harry Scholey, two years of age, son of Charles Scholey, a sawyer.

Mr. George Atkin, surgeon, said he had not attended the child during life. He had made a *post mortem* examination, and was of opinion that the child had died from poisoning by opium. The child was one which appeared to have been in moderate health. There were no marks of violence upon the body, nor any symptoms of disease, and the organs of the body were healthy, with the exception of the brain—that was affected by the poisoning. He had seen and had tasted the mixture called "anodyne," which the mother of the child showed to him. It tasted chiefly of Spanish juice, but he had no doubt but that it contained opium. He could not tell the "dose" for a child, because he had not taken the means to test its strength.—The Coroner: What would be a proper dose, for a child, of tincture of opium?—From half a drop to a drop. Witness added that he thought the sale of the mixture ought to be restricted.

The mother of the deceased deposed that the child had on the whole been a healthy child. It had suffered from a cough a week before it died. Had not given it any other medicine but anodyne, which was fetched from a Mrs. Bancroft's, in Duke Street, by the child's grandmother, on Wednesday night. A pennyworth was fetched. The first dose was given to the child about ten minutes to six on Wednesday evening by the witness's husband. He gave it about two teaspoonfuls. Ten minutes later the child was taken to bed, and on witness going upstairs about eight o'clock it seemed to be breathing heavily, and its tongue was projecting between its teeth. Witness thinking all was not right, went and fetched a neighbour, and Mr. Packman, surgeon, was afterwards sent for, who ordered remedies, but the child died about three o'clock the following morning. The grandmother of the child, said she fetched a pennyworth of anodyne on Wednesday for the child's cough. She got it from Mrs. Bancroft, who did not keep a shop. The mixture was fetched in a bottle. No label was put upon the bottle when the anodyne was sold. Mrs. Bancroft did not tell her how much to give for a dose, Remembered fetching some three or four months ago. The stuff was "commonly" sold by Mrs. Bancroft, who lived in a private house.

The mother of the child was called into the room again, and in answer to the Coroner said the child had nothing else but the anodyne.

Mary Ann Bancroft was then called. She said she was the widow of John Bancroft. She did not remember Mrs. Scholey coming to her house, but said there was a woman came. She had a card in the window, which stated that anodyne cordial was sold there. She had not any doubt but that it was Mrs. Scholey who came to her house. She thought it was either a cup or a bottle which she fetched it in. She had never put a label on a bottle in her life. She remembered Scholey saying that the child had been very "teethy." Witness told her to give it a teaspoonful, and if she gave it two it would not hurt it. She had sold the mixture in the neighbourhood for about forty years. Made the mixture herself, which was composed as follows:—Coriander seeds, 2 oz.; aniseed, 2 oz.; juniper berries, 2 oz.; Spanish juice, 1 oz.; opium, 18 grains; and treacle, half-a-pound, which were boiled with three pints of water, and evaporated to a quart. Generally sold about a quart a week. The ingredients were purchased of Mr. Walter Owen, and were weighed separately.

Charles Scholey, father of the deceased, said he gave the child the anodyne on Wednesday night. He did not measure the stuff, but poured it out of the bottle into a cup. He was not told how much to give the child. When the child became ill he went for Mr. Packman. It appeared when he saw it as if it was gasping for breath. Mr. Packman said he was of opinion that they had given it "too much stuff" (anodyne). The bottle containing the mixture was here produced, and shown to the jurymen. It appeared as if it had contained tincture of opium before the mixture was put into it. There were three labels on the bottle pasted over each other. The foreman of the jury (Mr. Walter Owen, chemist), said the tincture of opium of the Pharmacopœia strength was, he thought, about a grain of opium to every 19 minims. The child would get about one-third of a grain of opium. He thought about eight teaspoonfuls of the mixture had been given the child by the evidence of the father.

The Coroner, addressing the father, said he thought he was a foolish man to pour the medicine out of the bottle into a teacup and give it a child two years old without knowing what it was. He had recklessly and indiscriminately given the medicine without knowing the dose. The Coroner then proceeded to sum up the evidence. He said it was a very difficult question for the jury. The number of children that had been poisoned by these mixtures was very great. If there were any means to stop the sale he was sure it was the duty of the Legislature to stop it. He should do all he could to put a stop to it. He was sure they would all be satisfied, from the evidence of Mr. Atkin, that the child had been poisoned. There was not sufficient evidence, he thought, for them to send Mrs. Bancroft for trial. Mrs. Bancroft sold the stuff which contained opium indiscriminately to men and women, boys and girls, in any kind of a vessel, and put no label on it. She only told them how much to give, which seemed to him to be a most dangerous proceeding. But she was not the only person to blame, the father was to blame for pouring the stuff into the teacup. He appeared to be a respectable man, and in all probability he intended to do the best for the child. It was just one of those cases where they had to come to an unsatisfactory conclusion. He was anxious to get a case that would justify him in sending it for trial.

It completely puzzled him what was the best to do to prevent these practices. He was satisfied that there was no chance of a conviction if he sent the woman to trial for manslaughter.

After further remarks a verdict was returned "That the deceased died on the 4th instant from being poisoned by an overdose of anodyne containing opium, sold by Mary Ann Bancroft, without any direction as to its use, and carelessly administered by the father, Charles Scholey, and the said jury further say that the sale of the anodyne indiscriminately by Mary Ann Bancroft is highly dangerous and ought to be prevented."

Mrs. Bancroft was then called in and severely censured by the coroner. She said she would not sell any more.—*Sheffield Daily Telegraph.*

PROSECUTION UNDER THE SALE OF FOOD AND DRUGS ACT. ALLEGED ABSTRACTION OF CREAM FROM MILK.

An important case under one of the new provisions of the Sale of Food and Drugs Act, was decided, after an adjourned hearing, at the Westminster Police Court, on Monday the 8th inst., before Mr. Ingham. Mr. Morgan, a cowkeeper and dairyman, of Marsham Street, Westminster, had been summoned by the Inspector for selling milk from which, according to the analyst's certificate, cream had been abstracted.

Dr. Dupré, the analyst, stated that the butter in the milk, according to his analysis, amounted to 2·28 per cent., and he inferred from this that from one-third to one-half of the cream had been abstracted. Since his appointment he had analysed about ninety samples of milk, and in only a small proportion of those samples had he found the quantity of butter fat to be less than it was in the milk in question.

The Inspector stated that he purchased the milk at 10·30 A.M., and the pail containing it was then about half full.

For the defence, the defendant gave evidence to the effect that the milk in question was taken by himself and assistant from his own cows, which are kept within a few feet of the dairy, where the milk was sold; that he was present during the milking of the cows and the selling of the milk, and that the milk sold was perfectly genuine and unaltered from the state in which it was obtained from the cows, with the exception of a slight diminution in the proportion of cream which must necessarily occur during the process of dipping out of the pail in serving customers.

Professor Redwood was called by the defendant, and stated that he had analysed the duplicate sample left by the Inspector, and found the proportion of butter to be 2·4 per cent. He considered this, or even the proportion of fat found by Dr. Dupré, to be consistent with the milk being genuine, especially if allowance be made for the diminution in the proportion of fat necessarily occurring in the last portions sold by dipping out of a pail. To satisfy himself on this point and with reference to the quality of the defendant's milk, he had four of the cows milked in his presence, the milk put into a pail, similar to that in which the defendant kept the milk for retail sale, and this was allowed to stand in his laboratory for two hours and a-half (the time the milk in question had stood in the pail when the inspector bought his sample), during which time he dipped some out every five or ten minutes, so as to reduce the quantity to about one-half. Three samples were taken, as follows: A, the milk as drawn from the cow; B, the part that was dipped out from the top; and C, the part that was left in the pail. These were analysed, and the fat determined as follows:—A, 2·4 per cent.; B, 2·52 per cent.; C, 1·88 per cent. He thought that if milk contained more than 2 per cent. of fat, it would be unsafe to conclude on that evidence alone that cream had been abstracted from it.

Mr. Ingham said he was clearly of opinion that it had not been proved in this case that there had been any abstraction of cream from the milk, he therefore dismissed the summons, and ordered the Local Board to pay the expenses that had been incurred.

Review.

FREE PHOSPHORUS IN MEDICINE: with Special Reference to its Use in Neuralgia. A Contribution to Materia Medica and Therapeutics. By J. ASHBURTON THOMPSON. London: H. K. Lewis. 1874.

Until within the last few years free phosphorus had fallen into complete desuetude as a medicine in this country. But the medical faculty of late has begun to appreciate its properties as a nervous stimulant in the treatment of neuralgia, exhaustion from overwork, and certain skin diseases. In the recently published Additions to the British Pharmacopœia two formulæ for its internal administration were inserted, both containing that element in a free state; but neither appears to have met with much favour from prescribers; the nauseousness of the one and the inefficacy of the other have precluded their general adoption. Altogether the pharmacy of phosphorus has been deficient. Its effects have been viewed as uncertain. Its proneness to change, either by oxidation or entering into an allotropic and inert condition, different from its normal one, and the difficulty of dividing it into equal doses, and of getting it either into a solution at all palatable, or in such a minute state of division that it could be assimilated when swallowed by the patient, have all been obstacles in the way of its use with any amount of precision. These are serious hindrances to the employment of such an active remedy.

Mr. Thompson in his plea for the more general employment of phosphorus in medicine lays claim to having made "an attempt to render its employment safe," and "make those results determinate and uniform which have hitherto been uncertain and variable." Considerable space is devoted to its pharmaceutical preparation, as he thinks this is a matter of the first importance; "for the efficacy, stability, uniformity of effect, and above all, the safety of the preparation depend entirely upon the integrity of the agent contained in it."

In judging how far Mr. Thompson advances the pharmacy of phosphorus, we preface our remarks by stating that the phosphorus pills which meet with his approval most, are those of two makers, with neither of whose formulæ or process of preparing them, he seems to be acquainted. In other respects we are told both "how not to do it, as well as how to do it." His main object it appears is to discourage the use of phosphorated oil, at least phosphorated vegetable oils, as being dangerous, as "never producing *less* than the expected effect" and producing unexpected poisoning owing to their containing "*altered* (?) phosphorus." In the first case in which he tried the remedy (p. 218), he gave a patient suffering from sciatica doses of phosphorated oil, each containing $\frac{1}{24}$ grain every four hours. This he considers a moderate and reasonable dose. It produced violent vomiting and purging, and flatulent dyspepsia from which the patient continued to suffer for several months. We are not told whether in this case phosphorated olive oil or phosphorated almond oil was used, but Mr. Thompson's strictures are principally against the use of olive oil. He notices that M. Beaumetz states phosphorated olive oil deposits a white insoluble matter which is formed at the expense of the element, and infers that phosphorated almond oil, like phosphorated olive oil, will deposit, especially if it has not been superheated before adding the phosphorus to it. At first the author seems to be very hazy about the preparation of oleum phosphoratum, B.P., as (p. 16) he states "I have felt compelled at last to reject the use of solutions of phosphorus in olive oil"—almond oil is ordered in the Pharmacopœia,—"at least if they are prepared with oil in its normal condition; and it is to be regretted that this solution should have been introduced to the British Pharmacopœia without proper directions for *super*-heating the solvent before using it. The necessity for this preliminary manipulation, in order to prevent the formation of the white material alluded to above, has long been recognized."

However, further on, Mr. Thompson, acknowledges that the Pharmacopœia does recommend superheating the oil first. On the authority of M. Gubler he states that M. Méhu uses *olive* oil, whereas M. Méhu has always recommended *almond* oil as being the best solvent for phosphorus.

Mr. Thompson's great objection to the use of olive oil is, that it possesses the property of absorbing 600 to 800 times its volume of oxygen (p. 14) or "air" (pp. 22 and 77). That in fact it is aërated, something like a bottle of soda water we imagine, and the result of superheating is "that whereas, in its normal or virgin state olive oil is possessed of the power of dissolving from six to eight hundred times its own volume of air, it is now in a great measure deprived of it." If he thinks that rancid olive oil, which it undoubtedly is if it has absorbed so much "air," can be freed from most of its oxygen, or rancidity, and made palatable, it is a valuable discovery and worthy the attention of oil merchants.

Mr. Thompson further attempts to show that this oxygen contained in the oil converts the phosphorus into hypophosphorous acid, and that this acid and oils containing it possess poisonous properties "entirely out of proportion to the free element contained in them," as stated by Devergie. We think he has far from proved his case. Free hypophosphorous acid has long been employed medicinally in the form of syrup of the hypophosphite of iron, an excess of the acid generally being used to hold the hypophosphite in solution, as in the formula published by Mr. Squire in his 'Companion to the Pharmacopœia'; We are of opinion that the oily solution (almond oil—olive oil we are aware does deposit some white insoluble matter when kept) is the most definite, stable, and certain preparation of phosphorus that has been used, (unfortunately it is very nauseous); whereas the preparations Mr. Thompson recommends—the alcoholic as well as the ethereal solutions—are probably nothing like the strength he supposes they are. He approaches near the truth when he states the results yielded by alcoholic or ethereal and oily solutions differ more "in degree than in kind; the toxic symptoms yielded by small doses of phosphorized oil and by poisonous doses of the solid element being the same, it may be suggested that oil, after all, only affords a *better* means of exhibiting free phosphorus; a means, which, by protecting it from premature oxidation in the stomach, ensures the utilization of all the element administered. I am inclined to admit in part that this may be so. But this point granted, the unexpectedly poisonous effect of medicinal doses of phosphorus thus exhibited is not explained by it; because the same dose may be given in solution with cod-liver oil as in the ethereal tincture, with the same benign result, and without the occurrence of the least gastric derangement, even when continued for considerable periods," and in doses of $\frac{1}{12}$ of a grain 3 or 4 times a day.

Mr. Thompson's formula for phosphorated cod-liver oil, is—

Take of Phosphorus, 1 grain.
Cod-Liver Oil, $1\frac{1}{2}$ ounces.
Oil of Peppermint, 1 minim.

The oil of peppermint may probably, to some extent, lead to the discrepancies in the results obtained from this preparation and the phosphorated vegetable oils, as many volatile oils form almost inert combinations with phosphorus. There is no accounting for taste, but Mr. Thompson recommends this solution as being "reasonably palatable."

A formula is given from Bouchardat for éther phosphoré: "phosphorus 4 grammes, pure sulphuric ether 200 grammes, macerate," etc., for a month. On the authority of Beaumetz, Mr. Thompson believes the phosphorus is all dissolved, overlooking the following note in Bouchardat, "la proportion de phosphore dissoute est de 2 décigr. environ par 30 gram. d'éther;" *i.e.* absolute ether will only hold in solution at the ordinary temperature one part of phosphorus in 150 parts by weight of ether. The statement of Mr. Thompson therefore that Von Lobel took "as large a quantity as twenty drops of a solution in ether, of eight grams to the ounce (the equivalent of five-twelfths of a grain), every two hours for many days" is simply impossible as regards the dose of phosphorus. This will also account for Mr. Thompson's estimating phosphorated oil to be so poisonous when compared with the mild action of phosphorated ether, and will cast a light on Mr. Reedale's case of poisoning, quoted from the *Lancet* at p. 70. A boy of 10 years takes for 5 days, of a saturated solution of phosphorus in ether, 10 to 15 drops three times a day; this quantity Mr. Thompson says "may have been equal to $\frac{1}{5}$ to $\frac{3}{10}$ of a grain." It could not really have been equal to more than $\frac{1}{20}$ to $\frac{3}{40}$ of a grain, allowing for the low specific gravity of ether, and supposing the drops even to be equal to minims. The medicine is then changed for phosphorated oil equal to $\frac{5}{6}$ of a grain of phosphorus for a dose, of which very few doses in the hands of a quack sufficed to cause death. At this we are not surprised, but Mr. Thompson observes "that although this child received daily from $\frac{3}{4}$ to possibly $\frac{9}{10}$ of a grain of phosphorus *per diem* in the solid form or in the ethereal solution, he did not suffer from it, at all events, in any marked manner." The fact is, in the ethereal solution he had not taken more than one-fourth of these quantities. No wonder the phosphorated oil in such doses has caused "*unexpected* symptoms of poisoning." The same source of error occurs in the case quoted from M. Martin Solon. A patient suffering from saturnine paralysis takes for six days, and improves under the treatment, what is supposed to be half a grain of phosphorus in solution in ether (gr. i in ʒj.) daily (it could only have been about one-fourth that quantity); the medicine is changed and the patient is killed in 36 hours by taking gradually phosphorated oil, containing less than one grain of phosphorus. Solon remarks, "that this then is one of those medicines of which we must be most jealous, and the use of which when once it has been decided to employ it, must be attended by the greatest possible caution." Although Soubeiran, Mr. Thompson states, prepared the medicines for this case, we are inclined to think there must have been a grave error somewhere.

The most approved preparation of phosphorus, according to Mr. Thompson, is its solution in absolute alcohol. He gives the following as the best mode of preparing it:—

"Take of absolute alcohol, a sufficiency; of phosphorus, an excess. Heat the alcohol to ebullition in a Florence flask; add the phosphorus, and keep the mixture at boiling point for a few minutes. Close the flask accurately, and set the solution aside to stand for twenty-four hours. Agitate until cool, and afterwards occasionally. Decant the solution from the excess of phosphorus with as little exposure to air as possible into small coloured glass bottles. Let each be quite filled, accurately stopped, and stored in the dark.

"This is a saturated tincture of phosphorus; and it therefore contains one grain in three hundred and twenty grains, or six drachms and twenty minims by measure. In preparing it great care should be taken to ascertain that the spirit is absolutely dehydrated. and that perfectly dry vessels are used during the process; the presence of a single drop of water is sufficient to throw down some of the element in its hydrated form, and thus to cast doubt on the actual strength of the solution."

That phosphorus is soluble to this extent in absolute alcohol is, we suppose, made on the authority of Buchner,* who states that it is "soluble in 320 parts of cold alcohol of 0·799 sp. gr., and in 240 parts of the same alcohol when it is warm; from this hot solution $\frac{1}{4}$ of the phosphorus is deposited on cooling." Mr. Thompson does not appear to have corroborated this statement. We are very much inclined to doubt it, especially when we read Mr. Thompson has "frequently exhibited one-eighth of a grain in this solution every four hours for many days together, while one patient took as much as the equivalent of one sixth of a grain every four hours for three days without any but a beneficial result."

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* Storer's Dictionary of Solubilities, p. 507.

We now come to Phosphorated Chloroform, for which we have the following formula given :—

Take of Phosphorus, 1 gramme ;
Chloroform, 4 grammes.

Four or five drops for a dose. According to M. Beaumetz, Mr. Thompson says, about 1 in 100 is dissolved.

Castor oil, it is stated, does not dissolve phosphorus. M. Méhu,* who has also worked at the subject, finds that 1 part is soluble in 105 of castor oil at the ordinary temperature. We are told that phosphorus is soluble in both phosphorous and hypophosphorous acids (?) (pp. 56 and 57) ; but the following misquotation from Taylor and Brande is the most surprising : "Under conditions of molecular change, whereby *on exposure to light its outermost layer becomes white*, it melts at a temperature of less than 70°, and inflames on being touched." The italics are ours.

In conclusion, we have said more than we otherwise would have done, had not the work which is written with such presumptuous confidence obtained some medical reputation. Some of our readers may have had to dispense some of the formulæ contained in it and can give us their experience. We think it necessary to caution them about dispensing such a dose of phosphorus as Mr. Thompson says he gives—one-sixth of a grain—if they know the preparation to be a really reliable one.

Notes and Queries.

[451]. EAU DE BOTOT.—A. S. would be greatly obliged by being furnished with a good form for Eau de Botot.

[*_** The following is a translation of a recipe given by Dr. Jeannel in his 'Formulaire' :—

Star Anise	2 parts
Cloves	2 ,,
Cinnamon	2 ,,
Cochineal	1 ,,
Cream of Tartar	1 ,,
Oil of Peppermint	1 ,,
Alcohol (60°)	320 ,,

Powder the dry substances, make a tincture by displacement, and add the essential oil. A mouth wash; to be mixed with sufficient water.—ED. P. J.]

[452]. SIZING OF SATIN.—I wish to know the best method to size white satin before painting on it in water colour.—C. H. SNELL.

ACQUA CAPODIECI.—Mr. W. H. Langbeck writes—"The Acqua Capodieci, mentioned in No. 278, page 340, might be 'Aqua Cappadocea,' an old remedy now replaced by Eau de Mélisse des Larmes.

The prescription is the following :—

℞. Olei absinthii
,, fœniculi
,, lavendulæ
,, melissæ
,, menthæ viridis
,, rosmarini
,, rutæ
,, salviæ
,, serpylli
,, thymi āā ♏ ij.
Spir. rectificati ℥i.
Aquæ distillatæ ad. ℥ xx.

Misce et filtra.

Obituary.

Notice has been received of the death of the following :—

At Bristol, on the 2nd of October, 1875, Mr. John Wine, Pharmaceutical Chemist. Aged 87 years. Mr. Wine was a Member of the Pharmaceutical Society from 1841 to 1872.

On the 15th of October, 1875, Mr. John Jones, Chemist and Druggist, of Worksop. Aged 72 years.

On the 6th of November, 1875, Mr. Joseph Coghlan Green, Chemist and Druggist, of Northampton. Aged 65 years.

Correspondence.

*_** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

ADULTERATED CANARY SEED.

Sir,—Those readers of the Journal who are buyers of canary seed, may be interested by the following :—

Having noticed, in a sample of the above that came to hand a few days ago, a considerable number of millet seeds, I took the trouble to weigh out several small quantities, taken at random from the bulk, and pick therefrom these foreign seeds. The following are the results :—

(*a*)	100	grains	of sample	contained	3	grains millet.
(*b*)	100	,,	,,	,,	3	,, ,,
(*c*)	150	,,	,,	,,	3	,, ,,
(*d*)	150	,,	,,	,,	4½	,, ,,
(*e*)	200	,,	,,	,,	7	,, ,,
(*f*)	200	,,	,,	,,	5½	,, ,,

Being an average of nearly 3 per cent. by weight or rather more than 3 per cent. by measure.

I have no means of knowing whether this admixture of millet seed is of frequent occurrence or not. The present high price of canary seed may however induce dealers to resort to such "tricks of trade," purchasers should therefore be on the alert.

J. WALTERS.

Belgrave Road, Dresden, Staffs.

H. W.—You will find a recipe for the preparation of Glycerine Jelly in Mr. Pocklington's article, "The Microscopical Use of Glycerine Jelly," on p. 401 of the last volume of this Journal (3rd series, vol. v.). Your failure to prepare a transparent article has arisen from your omission of the clarifying process with albumen.

H. J.—So far as we can comprehend the inquiry you make we are of opinion that the practice contemplated would be irregular, if not illegal.

A. P. Balkwill.—You will find a formula in the article on "Boldo," vol. v. of present series, p. 406.

J. G.—We have noticed a precipitate, but not crystalline, and would suggest that you make a closer investigation of its nature. No doubt a little excess of hydrochloric acid in the tincture would prevent its formation.

"*Quietus.*"—There is really but little essential difference between lime-juice and lemon-juice, nor are we aware that there is any difficulty in obtaining either, or that one is more difficult to keep than the other.

"*Stephanis.*"—The rights of a pharmaceutical chemist with regard to patent medicines are in no way affected by his having retired from business.

"*Spes.*"—The 14th section of the Pharmacy Act, 1868 provides that any person wilfully procuring himself by false representation to be registered under the Act, and any person aiding and abetting him therein, shall be deemed guilty of misdemeanour, and be liable n conviction to imprisonment for twelve months.

E. J. H. Thring.—*Senecio Jacobæa.*

"*A Young Apprentice*" is referred to the rule respecting anonymous communications.

G. Gubbins.—(1) Yes. (2) The regulations of the Board of Examiners give a detailed description of the practical knowledge of analysis required of candidates for the Minor examination.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Snell, Mr. Tichborne, Mr. Brevitt. Mr. Mackay, Mr Wigner, Professor Flückiger.

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* *Répertoire de Pharmacie*, 25 Juin, 1875, p. 338.

NOTE ON HING OF THE BOMBAY MARKET, THE SO-CALLED NAUSEOUS ASAFŒTIDA.

BY PROFESSOR FLÜCKIGER.

Professor Dymock, of Bombay, in describing the Asafœtidas of the Bombay market,* called attention to *Ferula alliacea*, Boissier, the gum-resin of which is the Abushaheree Hing of the Bombay market. I am sorry to state that the seeds of that plant sent to Europe by the Professor, as far as I know, have nowhere succeeded, but I have been enabled, by the kindness of Professor Dymock, to ascertain that Hing of Abushaher, as described by him, is exactly the third form of asafœtida mentioned by my late friend Hanbury and myself in our 'Pharmacographia,' pp. 281 and 284. Its extremely strong odour reminds one of garlic, not exactly of the common asafœtida.

It seemed to me well worthy of examination whether the essential oil, to which the odour is due, contains sulphur like that of common asafœtida. The drug, as obligingly presented to me by Professor Dymock, is so rich in essential oil that a few ounces of it proved sufficient to yield, by distillation with water from a glass still, a gram or two of yellow essential oil. The bad smell given off in this process was certainly one of the most repulsive I ever met with, and would probably be altogether intolerable if the distillation were carried on on a somewhat larger scale. Vigier† was fully entitled to call this drug asafœtida "*nauséeux*."

The oil was energetically attacked by an alcoholic solution of potash; after the evaporation of the alcohol I added a few drops of water to the residual mass and then diluted the clear dark liquid with more water until I got a faintly brownish solution. On addition of a little nitro-prussiate of sodium it turned beautifully violet, showing thus the presence of sulphide of potassium. Another portion of the oil was oxidized by means of pure nitric acid and was then found to contain a considerable amount of sulphuric acid. It is, therefore, proved that the oil of *Ferula alliacea* is a sulphuretted one, probably closely allied to that of common asafœtida. The odour of Hing being decidedly different from the latter, I am inclined to think that their essential oils are not identical.

TAYUYA.

In a recent note‡ upon some Brazilian drugs presented to the Museum of the Pharmaceutical Society, Mr. Holmes referred to a long slender root received under the name of "tayuya." Some experiments with a drug bearing the same name are now being made in the treatment of syphilis in the French hospitals, by M. Beaumetz and others. Meanwhile, the following information is published by M. Stanislas Martin in *L'Union Pharmaceutique*, for October.

The plant appears to have been met with by a naturalist named Ubicini, during some journeyings in Central Brazil, where he found it to be used against syphilis by a tribe of natives. "Tayuya" is a vernacular word, and botanists are uncertain at present to what cucurbitaceous plant it properly belongs. In the herbarium of the Paris natural history museum there is a specimen labelled "*Bryonia tayuia* de Velloso;" but whether this should be considered as identical with the *dermatophylla* of Manso, or referred to the genus *Trianosperma* of Martius is undecided. Some seeds, however, have been received from Mr. Ubicini, and these are now being cultivated in the Jardin des Plantes, Paris.

M. Martin describes the tayuya as a shrub, with elongated and tuberous roots, sarmentose stems, and rugose dentate obtuse leaves, which are 5 to 7 lobed and cordate at the base; the fruit is 3½ to 4 centimetres long, nearly trilobed, and contains sometimes less, rarely more, than a dozen seeds. The plant is found only in the wild state in the forests, where it prefers stony places.

The root as received in Paris is cut into rounds 2 to 3 millimetres thick, and varying in circumference, that of the largest being 12 centimetres. The colour both of the exterior and interior is analogous to that of fennel root. The rounds resemble in the interior a star with rays converging to and becoming narrower towards a common centre. Each division has the appearance of projecting, and in the larger roots ten rays have been counted. Ten grams of the root displaced 12 grams of water and absorbed 19. In a longitudinal section of the green root the cells would probably be seen full of the water of vegetation; for in a dried specimen under the microscope the cavities seem to be deep and ranged like those in a honeycomb.

Eight experiments made by M. Martin to ascertain whether the root contained an alkaloid gave negative results. The substances found were a green resin, a citron yellow coloured fatty matter, a very bitter and strongly aromatic brown extractive matter, tannin, mucilage, glucose (traces), starch, a volatile oil, magnesia, lime, iron, potash, and lignin.

The mineral substances are so abundant in this plant that they appear as a white powder when an aqueous decoction slightly acidulated with acetic acid is concentrated. The distilled water of tayuya, as well as the alcoholate and the ethereal and alcoholic tinctures, are aromatic.

In the notes forwarded by Mr. Ubicini from Brazil together with the drug, he states that the tayuya has effects that ought to class it among the most energetic agents of the materia medica. All the parts are bitter, purgative and resolutive, and they exercise a special action upon the lymphatic system. The root principally is used against syphilis. An aqueous solution or alcoholic tincture is prescribed, the latter being prepared as follows:—

Tayuya root, reduced to powder .	337 grams.
Alcohol 80°	1000 „

Macerate during a fortnight, stirring from time to time, and filter through paper.

This tincture is called the "mother tincture." If required for internal administration four times its volume of rectified spirit is added. The dose is one to fourteen drops per day, taken progressively in three times mixed with a little water. Fourteen drops per day is the maximum dose for a man. If administered by hypodermic injection the tincture is not dilute, and the dose is varied according to the intensity of the disease.

Tayuya root reduced to powder and mixed with water is used for making resolutive cataplasms. It requires to be collected at a particular season, and dried with care, or its activity is impaired.

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* *Pharm. Journ.*, v. (1875, May 29), 945.

† See 'Pharmacographia,' 284, foot-note 4.

‡ *Pharm. Journ.* [3], vol. v., p. 986.

ON TEA.

BY G. W. WIGNER.

(Concluded from page 282.)

The following table shows the amount of extract yielded by twenty-four genuine teas.

They are divided into three classes and arranged in each class according to the percentage of extract yielded.

ORDINARY TEAS.—GENUINE.

No.	Description.	Extract.	Ash of Extract.
49	Gunpowder.	39·20	5·75
51	Hyson.	36·80	5·00
52	Congou.	33·00	4·75
41	do.	29·80	——
48	do.	29·80	4·45
43	do.	26·20	4·60
47	do.	26·15	——
	SPECIAL TEAS.—GENUINE.		
2	Moyune Young Hyson.	44·85	7·00
1	Indian Young Hyson.	43·85	5·80
11	Broken Indian.	43·43	6·13
4	Moyune Gunpowder.	40·75	5·45
54	Oolong.	40·75	——
57	Moyune Gunpowder.	39·30	4·80
6	do.	38·50	4·90
5	do.	37·95	5·25
10	Mannuna Fine.	37·00	6·00
17	Scented Orange Pekoe.	34·20	5·40
7	Moyune Gunpowder.	33·35	4·05
55	Assam.	33·30	6·60
21	Indian Souchong.	32·50	5·50
	CAPERS.—GENUINE.		
78	Caper.	37·90	4·70
80	do.	37·75	5·15
81	do.	32·40	5·25
79	do.	30·05	4·70

The average of all these results is, extract 35·79 per cent., ash of extract 4·63 per cent., while the maximum and minimum extract are 44·85 per cent. and 26·15 per cent. respectively, or a variation of 52 per cent. calculated on the average, and the maximum and minimum ash are 7·0 per cent. and 4·05 per cent. respectively or a variation of nearly 64 per cent. calculated on the average.

In ordinary cases of tea analysis I think these determinations of extract are of little value, but they appear to be of use in two special cases.

When teas are adulterated with exhausted leaves, the extract will certainly be reduced. Thus I found one sample of tea recovered from a sunken vessel which yielded only 20·40 per cent. of extract, of which 3·08 per cent. was chloride of sodium, leaving only 17·32 per cent. of net extract, and another sample of a similar character yielded only 23·29 per cent. of extract, of which 1·11 was chloride of sodium, leaving only 22·18 per cent. of net extract. In both these cases, however, the examination of the ash had already clearly revealed the fact of the tea being partly exhausted.

In some other cases it may be desirable to estimate chemically the value of a sample of tea, and the determination of extractive matter is certainly of service in this case.

By careful consideration of the soluble ash—alkali in ash—and extractive matter, a tea may be valued almost as closely as by an experienced tea-taster. The tables which I have given will illustrate this fact.

The weight of the ash of exhausted leaves is very variable. It averages about 2·50 per cent. when the extract has been made on the one per cent. system which I recommend, but it is not at all uncommon to find as much as 3·5 per cent. or as little as 2·0 per cent.

As a means of judging of the purity of tea this determination is almost valueless.

The total weight of the ash of tea extract and the ash of exhausted leaves is almost invariably in excess, and sometimes very greatly so, of the ash of the tea itself, the increased weight being in some cases as much as 1·5 per cent.

It is not easy to find any definite reason for this increase, which, however, appears to be mainly due to the fact that the ash of exhausted leaves and of tea extract contain together a larger proportion of carbonic acid than does the ash of tea.

Pulverized tea appears, however, to show a larger increase than whole leaf, and those samples which have been repeatedly boiled a larger increase than those which have been only boiled once in a one per cent. solution.

The percentage of tannin in tea is very variable, and there is little doubt that this is in a great degree the cause of the erroneous estimate which English tea drinkers frequently make of the dietetic value of tea. They prefer tea which gives a dark-coloured infusion, and has some sensible astringency, to those varieties which give a paler and a less bitter liquor. This probably accounts, to some extent, for the high estimation in which some kinds of Assam are held for mixing purposes.

The acetate of lead process seems more reliable for determining the percentage of tannin than the old gelatine process, and it is certainly easier; I have therefore adopted it.

I find that a sample taken from a mixture of six samples of Assam tea gave 45·5 per cent. of tannin, while some of the highest results were

No. 82	Moyune Young Hyson	39·0 per cent.
„ 83	Very Choice Assam	33·0 „
„ 1	Indian Young Hyson	39·0 „
„ 97	Assam Tea, from Dr. McNamara's Garden	27·7 „
„ 75	Caper (Mixed)	42·3 „

It is clear, therefore, that some teas exceed the average so greatly that, as regards adulteration or impurity, the tannin determinations can give only negative results.

Sometimes, however, useful confirmatory evidence may be obtained from them; for instance, a sample of tea originally of good quality which had been sunk in a vessel for sixteen days gave only 3·74 per cent. of tannin, a figure closely approaching that which is yielded by ordinary exhausted tea leaves, 3·80 per cent. The high percentage of nitrogen present in tea leaves has been pointed out by Peligot and Wanklyn.

This is of course partly due to the proportion of theine present (theine itself containing 28·87 per cent of nitrogen). The real commercial value of tea appears to depend to a considerable extent on its proportion of theine, and if the quantity were capable of more speedy and accurate determination it would be of much value. By the present processes it is, however, difficult or even impossible to get a trustworthy result.

Zöllers' figures, for instance, are about ten times as high as Mulder's.

I have made some few determinations of the total nitrogen in tea, with the following results:—

	Per cent.
Sample taken from 60 Green Teas slightly faced	3·76
„ „ 60 Black „ „	3·26
„ „ 6 Assam „ „	3·64
„ „ 6 Caper „ „	3·32
„ „ Assam, Dr. McNamara's Garden.	3·88
„ „ Sample, Exhausted Leaves	3·80

I now proceed to consider the question of adulterated tea, premising that as the result of the examination of hundreds of samples obtained in various ways, some from original chests, and some from retailers, I do not believe that any adulteration of tea is practised in this country. Years ago, no doubt, tea was occasionally faced here and from samples which I have seen, I should think, very badly faced, *i.e.* a large quantity of colouring matter was put on in such a clumsy way as to completely spoil the appearance of the leaf.

It is not uncommon for tea to be de-faced in this country, *i.e.* to have the colouring matter either removed or so altered in appearance as to be rendered almost invisible.

As regards exhausted leaves, foreign leaves, and siliceous matter, I do not think that any Englishman could introduce them into tea, so as to deceive the eye of a tea buyer, except at a cost which would render the operation unremunerative.

The Chinese have, however, special facilities for such operations during the process of "tea making," and years ago the introduction of exhausted leaves and sandy matter into low grade Canton Capers and Ping Suey Gunpowders was by no means uncommon.

As far as I can judge, the high-class teas have always been kept scrupulously free from such admixture, and this renders it even more certain that the presence of 4, 8, 9, and even 37 per cent. of sandy matter (and I have found all these percentages in low-class teas) must have been due to design, not accident.

Such tea seems, however, to have almost entirely disappeared from the English market during the last few years, and the inferior teas which are to be met with now are either the remainders of some old stock or some chests which have been recovered from wrecked vessels and re-dried. In the latter case, the fact is generally evident from the tea containing a heavy percentage of common salt. Such teas are seldom offered here except for export, but the five following are illustrations:—

No.	Description.	Total Ash.	Ash soluble in Aqua.	Ash soluble in Acid.	Silica.	Alkali calculated as Potash.	Extract.	Chlorine calculated as Na Cl.
84	Congou.	8·00	4·09	3·02	·89	·24	20·40	3·08
85	Gunpowder.	13·16	4·32	7·20	1·64	1·62	23·29	1·11
86	Congou.	5·35	2·44	2·17	·74	·61	26·48	1·14
87	Pekoe.	8·64	2·28	3·66	2·70	·75	41·20	·23
88	Caper.	8·23	2·42	3·53	2·28	·80	36·45	·17

The first of these had been more than a fortnight under water, and was completely soaked, and then re-dried. The two latter ones had merely been slightly moistened. Sometimes samples have evidently been wetted, and some of the value extracted, even when salt is present in minute traces only. Thus, I have found—

89	Hyson.	8·53	1·13	4·76	2·64	·70		Traces.
90	Congou.	7·27	1·35	3·54	2·38	·70		Traces.

while, again, the following are samples of Tea which are obviously impure, though in the same state as when imported:—

91	Gunpowder.	19·73	1·00	6·15	12·58	·14	37·78	
92	Caper.	14·44	1·95	2·47	10·02	1·03	35·45	
93	do.	15·20	1·69	5·35	8·16	·61	31·60	
94	do.	15·08	1·96	5·65	7·47	·73	35·60	
95	do.	12·74	2·68	3·44	6·62	1·04		
96	do.	14·60	2·67	5·87	6·06	1·04		

It is clear from these figures that each of these samples is adulterated with from 6 to 12 per cent. of sandy and other foreign matter. I do not, however, think they would be likely to be met with in this country now, although very probably some of the foreign markets could furnish corresponding samples.

If the Customs' examination of tea, which we are now promised, is properly conducted, such teas as the above would of course be condemned, and the injustice of taking the duty on an article which it is illegal to sell would be obviated.

It is to be hoped in the interest of the tea trade that the Customs' authorities will take care that the analysts they appoint are not only sufficiently numerous, but that their individual experience will ensure the examination of tea being satisfactorily performed.

When I commenced this paper I purposed giving the complete analysis of a number of the ashes of tea, but the work has grown upon my hands, and it may be thought that the paper is already too long. I, however, append a few partial analyses, and I may probably some day, as opportunity serves, complete them, when I shall have pleasure in laying the results before the Society of Public Analysts.

In the ash of a mixed sample of twenty-four genuine black teas, and in another of a number of medium quality (faced) green teas, I find—

	Ash of Black Teas. Per Cent.	Ash of Green Teas. Per Cent.
Potash	30·92 . . .	28·42
Soda	1·68 . . .	2·08
Sulphuric Acid . .	4·88 . . .	5·66
Carbonic Acid . . .	11·60 . . .	6·43
Silica	1·70 . . .	7·50
Percentage of total Ash Soluble in Aqua	57·00 . . .	52·85

In another case, a sample of genuine black tea was ignited to ash, and another part of the same sample exhausted by boiling, the leaves and extract being also brought to ash, and the carbonic acid and percentage of soluble ash in each determined. The results were:—

	Carbonic Acid. Per Cent.	Soluble in Aqua. Per Cent.
Original Tea Ash . . .	12·52 . .	57·55
Ash of Exhausted Leaves	5·71 . .	21·20
Ash of Extract	16·72 . .	84·15

I desire, in conclusion, to acknowledge the valuable assistance which I have received, in the experiments necessary to the compilation of this paper, from Mr. R. H. Harland, one of my assistants and an associate of this Society.

ACETUM SCILLÆ, B.P.*

BY E. GREGORY.

About a year since, taking up in an idle moment an old copy of the London *Pharmaceutical Journal*, I read in answer to an inquiring correspondent, a recommendation to prepare Acetum Scillæ according to the formula of the British Pharmacopœia, "carefully avoiding, however, the directions to add one and a half fluid ounces of proof spirit at the end of the process." On theoretical grounds I had long omitted the spirit, but the strangeness of this advice, proceeding from such a source, determined me to open the whole question, and endeavour to satisfy myself by experiment that I had taken a correct view. Accordingly on the 4th of November, 1874, four samples of Acet. Scillæ were put into separate four ounce vials, and tightly corked.

No. 1 same as B. P., but no spirit.
" 2 " " but contained spirit.
" 3 " " no spirit.
" 4 " " contained spirit.

Nos. 1 and 2 were placed on the inside sill of a window with a western aspect. These were exposed during the winter to a temperature of from about 28° to 65°, and in summer, the direct rays of an afternoon sun would sometimes raise the atmosphere around them to about 90° or possibly 95° Fahrenheit, Nos 3 and 4 were placed on a shelf, near a stove; and here the temperature was pretty equable, ranging about 70°, and sometimes in summer going a little over 80°.

When put in their respective positions the four samples had the following appearance. All had been filtered through paper, and had the taste and odour peculiar to Acetum Scillæ.

No. 1 was perfectly clear.
" 2 " a little cloudy.
" 3 " perfectly clear.
" 4 " a little cloudy.

It is quite certain that spirit does not improve the appearance of this preparation when freshly made, since Nos. 1 and 3, containing no spirit, were clear and bright, whilst Nos. 2 and 4, containing spirit, were cloudy.

On November 16th the samples were again examined, and presented the following appearance:—

No. 1 clear, no sediment.
" 2 cloudy, slight sediment.
" 3 clear, no sediment.
" 4 very cloudy, heavy sediment.

Another examination was made December 3rd, with the following result:—

No. 1 clear, no sediment.
" 2 clear, slight sediment.
" 3 clear, no sediment.
" 4 clear, heavy sediment.

The taste at this period showed No. 4 to be slightly "musty," whilst No. 3 seemed deficient in acidity, but I think this last must have been fancy.

From this date the samples were occasionally examined in a superficial manner, but through extreme press of business, results were not particularly noted. It is enough to say that there was a gradual deterioration in all the samples.

On the 20th August, 1875, all were finally examined. Nos. 1, 2, and 4 were unmistakably spoiled, whilst No. 3 was scarcely fit to use, but would pass muster if not examined too critically. It was decidedly less decomposed than the other three. There was a distinct sediment in all, but much the heaviest in No. 4; the rest seemed about equal.

All the samples were then examined volumetrically, for the purpose of determining their relative acidity. Two drachms of No. 1, diluted with six drachms of distilled water, required fifty-three minims of the volumetric solution of soda, B.P., to neutralize it. No. 2 and No. 4 were equally strong in acid, whilst the same quantity of No. 3, diluted with a like quantity of water, required sixty-eight minims of soda solution to neutralize it. I cannot be quite certain as to the exactness of my acidimetry, since my burette and measuring flasks are of my own construction, from glass tubing and common vials; but as the same solution and apparatus were used throughout, the comparative results will be correct. The volumetric estimates were duplicated to insure accuracy, and gave very nearly the same results each time.

I would draw the conclusion, from these experiments, that the Proof Spirit ordered to be added to Acetum Scillæ, by the British Pharmacopœia is worse than useless, since it impairs the beauty of the sample, and renders it less able to resist the inroads of decomposition; and also, that the preparation is best kept in situations having an equable temperature, and not exposed to very strong light. Those samples have suffered most in my hands that have been exposed to the greatest extremes of temperature.

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* From the *Canadian Pharmaceutical Journal*, vol. ix., *October*, 1875, p. 77.

COMPARATIVE DETERMINATIONS OF THE SOLUBILITIES OF ALKALOIDS IN CRYSTALLINE, AMORPHOUS AND NASCENT CONDITIONS.*

BY ALBERT B. PRESCOTT.

The few determinations here reported were made with the desire to obtain further data as to the power of solvents when used to extract alkaloids from water solutions or moist residues. The separations of alkaloids, by treating their salts, in water solution or in moist residue, at once with alkali and with solvents, are already found of great service in proximate analysis. The use of ether after alkali, as proposed by Stas in 1851, with the previous ether washing of the acid material, as proposed by Otto in 1856; also the use of chloroform instead of ether, as proposed by Rodgers and Girdwood in 1856, and the use of amylic alcohol in the way of Otto's modification, as proposed by Uslar and Erdman in 1861,† have become familiar from their value in forensic analysis. More recently, Dragendorff has presented methods for the use of various solvents, particularly chloroform, amylic alcohol, benzol, and "petroleum ether," each being applied alternately in acid and alkaline aqueous solutions; for various analytical purposes, especially the separation of alkaloids from plant constituents and the systematic separation of alkoloids from each other.‡

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* Read at the Detroit Meeting of the American Association for the Advancement of Science.

† *Anal. d. Chem. u. Pharm*, 120, 121; *Zeitsch. f. Analyt. Chem.*, i. 267.

‡ *Pharm. Zeitsch. für Russland*, 1866, Heft 2, and 1867, Heft 10; *Zeitsch. f. Analyt. Chem.*, vi. 300, and vii. 52; *Zeitsch. f. Analyt. Chem.*, viii. 240 (1869); 'Beitrage zur Gericht. Chem. Organ. Gifte,' 1872; 'Die Chem. Werthbestimmung einiger Starkwirkender Droguen,' 1874.

In most of these operations the solvents are necessarily saturated with water; and ether, chloroform, and amylic alcohol hold quantities of water sufficient to affect their solvent power to a considerable extent. At the same time these three solvents can readily be obtained free from ethylic alcohol, and the ether and chloroform free from acids, the impurities occurring in their commercial state and largely varying their solvent power, simply by washing with water. In other words, we have in water-washed ether, chloroform, and amylic alcohol, cheap, convenient, and uniform grades of these solvents, nearly or quite free from all impurities except the water, which is unavoidably present in the analytical processes to be provided for.

It is desirable to know how much influence the amorphous condition and that of recent liberation from salt have upon the adhesive force of alkaloids for these water-washed solvents; so that we may understand the degree of supersaturation attained when dissolving in the nascent or amorphous condition.

The *washed ether* used was neutral to test paper, and of sp. gr. 0·7290, at 15° C. Before washing, it was acid and of sp. gr. 0·7477, at 15° C.

The *washed chloroform* was neutral, and of sp. gr. 1·4953, at 15° C. In washing chloroform, the last agitation was made and the water drawn off at 0° C., by which means more perfect separation is effected. It was slightly turbid when below 16° C., but clear when above that temperature. If washed at 18° to 20° C., it would be turbid below 24° C.

The *washed amylic alcohol* was of sp. gr. 0·8316, at 15° C.

The *washed benzol* was of sp. gr. 0·8766, at 15° C.; and boiled at 89° C.

The *morphia* was purified by digesting and washing with the solvents employed respectively. The *cinchonine* was washed for some time on a filter with ammonia of sp. gr. 0·96; then dried and well washed with ether and dried again.

Except as otherwise stated, the solvents were applied at their boiling points, for five minutes; when they were turned upon the filter. To dissolve in the "nascent condition" a sulphuric acid solution was warmed in a large test-tube, mixed with the solvent, and the mixture warmed to the boiling point of the solvent, then made *slightly* alkaline with ammonia and shaken, and kept warm for five minutes, then turned upon the filter. The filtered solutions were received in a tared specific gravity bottle; the bottle being stoppered as soon as possible, and the weight of bottle and contents taken. The solution was then turned into a thin tared beaker, the bottle well rinsed with portions of the solvent into the beaker, and the liquid evaporated on the water-bath, at a suitable temperature, and the weight of the residue taken. The weight of residue, deducted from that of the solution, gives the weight of the solvent. From 5 to 10 grammes of the solvent were used. For solubilities of morphia, two or more trials were made for each determination, the mean being given. For solubilities of cinchonine, but one trial was made in each determination.

Morphia: number parts of water-washed solvent required for one part of alkaloid.

	Ether.	Chloroform.	Amylic Alcohol.	Benzol.
Crystallized . . .	6148	4379	91	8930
Amorphous . . .	2112	1977	—	——
Nascent	1062	861	91	1997

Cinchonine: number parts of water-washed solvent required for one part.

	Ether.	Chloroform.	Amylic Alcohol	Benzol.
Crystallized . . .	719	828	—	——
Amorphous . . .	563	—	40	531
Nascent	526	178	22	376

Crystallized morphia, treated 15 minutes with washed chloroform at 25° C., required 9770 parts of the solvent; treated with boiling chloroform and allowed to deposit for twelve hours and then filtered, held 6209 parts of the solvent.*

Nearly all the solutions deposited alkaloid on standing a short time, though most of the filtrates remained clear for five or ten minutes.

When the acid solution of morphia was made alkaline with a large excess of potassa (a ready solvent of the alkaloid), it required 5656 parts of chloroform instead of 861. The writer has from time to time observed that alkalies which redissolve the alkaloids, in so doing, measurably prevent extraction upon Stas' plan. Doubtless, the best results in these cases would follow the use of measured quantities of standard solutions of the acid employed to salify and the alkali employed to liberate the alkaloidal material.

The residues of morphia, from ether, chloroform, and benzol, were amorphous; from amylic alcohol crystalline. The residues of cinchonine from ether and from amylic alcohol were crystalline, from chloroform and from benzol amorphous.

Determinations of solubilities, when the ratio of solvent to solid is very large, must necessarily be approximate rather than precise, even when the stable, saturated solutions are determined. And when the instable, *supersaturated solutions* are undertaken, it is evident that variations must be greater. The time taken in filtration for instance, and the atmospheric temperature during filtration must affect the results. The effect of temperature of the solvent, when applied to the alkaloid at the moment of its liberation, the writer has not yet investigated.

NOTE ON DILUTE PHOSPHORIC ACID.

At the recent meeting of the American Pharmaceutical Association no less than three excellent papers on this subject were read. One of the papers, that by Professor G. F. H. Markoe, gave a process for its manufacture direct from phosphorus, and it was stated as being safe, economical, and expeditious. In his paper Professor Markoe gave full details as to the mode of manipulation and at the time arranged the apparatus on the table.

Professor P. W. Bedford, of New York, having learned that Dr. W. H. Pile, of Philadelphia, had met with an accident in attempting to use the process, and, as it had been stated to be dangerous, made inquiry as to the cause of the accident, and also made some experiments with the process himself. The result of his experiments he has communicated to the *Druggists' Circular* in a note, incorporating some information by Professor Markoe, from which the following is taken:—

"Professor Markoe's paper stated that the water, phosphorus, and nitric acid were to be put into a flask or jar, and then a small quantity of bromine or hydrobromic acid was to be added by drops, when the funnels were to be placed in position,† and the jar surrounded by water (if necessary), to moderate the action.

"In the accident alluded to, this form of apparatus was not used, and the bromine was added at once! The action was so rapid that an explosion took place, and Dr. Pile was injured.

"In the process given previously, the quantity of water used was comparatively small, but it is enough, if the phosphorus is kept under its surface. Experiments by Professor Markoe and Mr. Bedford have proved that it can be made with perfect safety with the proportions originally given. In order, however, to prevent inexperienced manipulators from accident, it is proposed to increase the quantity of water used. The glass flask should have a wide neck, but a stone jar is to be preferred and should be of double the capacity of all the materials added together.

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* Wormley gives 6550 as ratio of chloroform (not washed) to morphia in saturated solution.—'Micro-Chemistry of Poisons' 471. Hager, an authority generally exact, gives morphia as soluble in about 90 parts of chloroform.—'Untersuchungen,' ii. 159.

† See before, p. 275.

"Into the flask (or stone jar), put the following :—

Water	12 troy ounces.
Phosphorus	2 " "
Nitric acid, sp. gr. 1·42 .	12 " "
Iodine	10 grains.
Bromine	40 to 60 grains.

"The water and phosphorus are placed in the jar, then the iodine, and afterwards the bromine by drops ; when the reaction has ceased, add the nitric acid, adjust the funnels [by 'placing to the neck of the flask a close funnel, inserting a smaller funnel over the first one'], place the apparatus in a stoneware dish, and surround the flask or jar with cold water to about the same level as the acid mixture, and allow it to stand twenty-four hours ; at the end of that time it may be gently heated to dissolve the remaining phosphorus, when the heat may be increased to expel the nitric acid, and continued until, on testing, no traces of nitric acid are found. It may then be diluted with distilled water until it has the specific gravity of 1·056.

"With the above proportions and by following the manipulation given, it is impossible that any accident should occur.

"Further experiments have proved that the use of water as one of the ingredients in the formula may even be dispensed with, and yet no accident occur, if the addition of bromine be by drops only, and the vessel containing the mixture of nitric acid and phosphorus be such as will give free vent to the vapours which are formed on the addition of the bromine. The rapidity of action is moderated by the use of ice cold water in the outer vessel.

"The vapours given off in this modification of the process are the result of the decomposition of the nitric acid, and their presence in the jar or flask prevents the combustion of the phosphorus.

"Another result of the experiments has been to prove that the proportion of nitric acid is in excess, and wasteful, when conducted on a manufacturing process, as nearly double the amount of phosphorus can be dissolved by the quantity of nitric acid employed, at the expenditure of a little more bromine.

"The result of these further experiments will be given at a future time, the object of this note being simply to correct the idea that the process is dangerous when it is properly conducted.

"The unfortunate accident which befell Dr. Pile was due to the addition of about one hundred drops of bromine at one time to the phosphorus and nitric acid in a glass retort. Under such circumstances the rapid action would necessarily cause combustion, and the neck of the retort not giving free egress to the products of the combustion, an explosion was inevitable.

"In order that such an accident may not again occur, the writer has given full details which, if followed, will entirely avert any risk or danger."

To this we append the following remarks of the Editor of the *American Journal of Pharmacy* on the accident :—

"The danger appears to be in the combination of bromine and phosphorus, and Professor Markoe has failed to point out this danger, although he recommended his process because it was more expeditious and *safer* than that of the Pharmacopœia. We have prepared, and seen prepared by others, large quantities of phosphoric acid by oxidizing phosphorus with nitric acid, and have never noticed any explosion, the dilution of the nitric acid having been properly attended to. But for the new process it was claimed that, without danger of explosion, it could be prepared even with concentrated nitric acid. The directions given in the paper read at Boston, are as follows :—

"Take of—

Phosphorus	1 part.
Nitric Acid, sp. gr. 1·42 . .	6 parts.
Water	1 part.
Bromine or Hydrobromic Acid	a sufficient quantity.

"Put the phosphorus and nitric acid into a glass flask, holding at least double the amount of all the materials, place in the neck of the flask a glass funnel and invert a smaller funnel over the first one ; pour into the flask a few drops of bromine or hydrobromic acid, and when the reaction has fairly started place the flask in a pan of water, etc.

"This is the material part of the process, the remaining operations consisting of decanting the liquid from the undissolved phosphorus, and evaporating it in order to expel the bromine, iodine and excess of nitric acid. It will be observed that while on the one hand a *few drops* of bromine is a very uncertain quantity, on the other hand it is not stated that the bromine should be added drop by drop, waiting after each addition until the reaction has taken place, and that the vessel is directed to be placed in water only after the reaction has commenced.

"Dr. Pile mixed in a glass retort 6 ounces of water and 36 ounces of nitric acid of 1·42 sp. gr., and after placing the retort in the yard in a rope ring resting upon an empty barrel, added 6 ounces of phosphorus, and then poured slowly, through the neck of the retort, a fluid drachm of bromine, having a vessel with cold water handy to place the retort in as soon as the reaction should become brisk. The result was, before any brisk reaction could be observed, a most violent explosion, whereby the retort was shattered into atoms, the burning phosphorus carried in minute pieces in all directions, the rope ring thrown upon the roof of the house, the barrel blown to pieces and portions of it driven into the ground. Dr. Pile was injured upon the left side of his face by minute fragments of glass and minute particles of phosphorus, but more severely by the hot nitric acid. Fortunately, from his position in watching the reaction, he escaped meeting with any serious injury, is again about and has again tried the reaction with satisfactory results, adding the bromine *in drops*, and waiting after each addition until the reaction subsides. The force of the explosion seemed to be directed mainly downwards and upwards, not a window being broken in the adjoining buildings ; but the force was sufficiently strong to sweep chemicals from the glass plates upon which they had been left in the drying room, located in the third story, where the windows had been left open.

"What has caused this violent explosion ? Perhaps the formation of bromide of nitrogen first suggests itself as the cause, since it is stated to be as violently explosive as the corresponding chlorine compound. Balard, the discoverer of bromine (1826), noticed already that bromine and phosphorus unite with incandescence, and H. Rose states in 'Poggendorf's Annalen,' xxvii. p. 118, that small pieces of phosphorus thrown into bromine cause dangerous explosions. The violence of the reaction of the two elements upon each other was doubtless the cause of the accident above referred to, and on account of this violence the process, in the form in which it was first recommended, appears to be too dangerous for general adoption, since a slight oversight in the addition of the bromine must be considered as fraught with dangerous consequences.

"Much more promising appears to be a modification which Professor Markoe has since suggested in a letter to Dr. Pile, and according to which 12 ounces each of water and nitric acid sp. gr. 1·42 are mixed, then 4 cubic centimetres of bromine added and shaken until it is dissolved ; 10 grains of iodine are now added and afterwards 2 ounces of phosphorus ; the reaction commenced at once, and at the end of an hour was sufficiently brisk to cause the escape of bromine vapours. The flask was now placed into cool water (of 55° F.), and without further precaution the reaction proceeded until the phosphorus was dissolved, which was accomplished in twenty-four hours.

"It is possible, however, that even this process may not be without danger, since, according to the experiments of Personne, made in 1864 ('Bull. de la Soc. Chim.,' 2 ser., vol. i., p. 163), not inconsiderable quantities of ammonia are formed on dissolving phosphorus in concentrated nitric acid or in this acid previously diluted with two volumes of water. Bromine, like iodine and chlorine, when in contact with ammonia or its compounds, is apt to produce compounds with nitrogen which are dangerously explosive under various circumstances, and it seems, therefore, that further critical experiments are needed before this promising process can be recommended for general adoption."

SINGULAR PRODUCTION OF A NEW VARIETY OF ORANGE.

(*Citrus Aurantium Panormitanum.*)

In a paper read before the Palermitan Academy of Science, Literature, and Art, by Professor Giuseppe Inzegna, on the 9th of May, 1875, he published a description of the singular production of a new variety of orange, which had originated not by seminal reproduction, as ordinarily happens, but by organic transformation* of the individual itself, or rather, by complete modification of the organographic characters composing it.

On a Portugal orange-tree cultivated in the Castelnuovo Agrarian Institute, which is under the direction of the author, there was developed a shoot quite distinct in the character of its leaf from the ordinary branches of the same tree. At the first blush it seemed to be a passing transformation, one of the abortions daily observed in all gardens, or, perhaps, a certain morbid condition of the primary development, which in its ulterior growth would disappear.

The branch, however, in prolonging itself, always preserved its primitive "habit;" it divided into secondary and tertiary branches, and reached the adult stage quite unaltered in the characteristic form of its leaves, as if it were an individual branch quite different from the parent tree on whose trunk it had sprouted.

The branch was placed under careful surveillance, so as to allow it to develop and enlarge the more favourably, and to keep it apart from the normal branches of the tree.

In the third spring (1864) the transformed branch was covered with abundant flowers, differing from the normal flowers of the tree; then followed an abundance of fruit, also different from the normal fruit of the tree. In short, it presented the appearance of a distinct variety of orange, offering as will be seen from the botanical description of it, no resemblance whatever to the parent variety from which it was developed.

Still further to demonstrate the constancy of the character of this new variety, it was grafted on vigorous stems of orange-trees (*melangoli*), such as the bitter orange and the *Citrus Bigaradia*, and has developed luxuriantly, always preserving its primitive characteristics unaltered. On every ground, therefore, it may be held as a distinct variety of the species to which it belongs; it being impossible to refer it to any of the numerous varieties known as subordinate to that species, as may be seen by comparing the following botanical description with those given in the work of Risso, the best existing monograph in the botanical description of acid fruits.*

Citrus Aurantium Panormitanum; foliis lanceolatis; fructibus parvis, basi apiceque depressis, torulosis; cortice crasso epidermide papillosâ tecto, luteo-rubescente; pulpâ dulci.

The Palermitan orange not forming a very high and robust tree, must be relegated to the dwarf varieties among acid fruits; the first place being taken by the *Citrus deliciosa*, or mandarin orange of Tenore,† for its delicious edible qualities. It is without thorns, with rather small, lanceolate leaves, sustained by stems cylindrical or slightly winged (*alati*).

Its flowers are sometimes axillary, and sometimes ranged in terminal bunches; they are small, furnished with five petals, very concave, especially in bud (*bottone*) before opening, and exhale a penetrating odour.

The fruit is of a reddish-yellow colour, compressed at both ends, hollowed at its summit and its base; torulose or deeply furrowed longitudinally; the peel is very thick, and is distinguished from the other varieties by the papillous epidermis, or by the essence-glandules (*glandole essenziali*) which cover it, projecting and developed outwardly, offering to the touch the impression of an uneven and granular surface; the interior is divided into ten or twelve wedges (*lagge*), full of pulp, not very succulent, but, nevertheless, sweet and distinctly pleasant to the taste, seedless, or containing abortive seeds.

Length of axis of the fruit, 0,030·040; bulk, or transverse diameter, 0,040·050; thickness of the peel, 0,006.‡

The Palermitan orange will not be a variety of economic and commercial importance, as it is inferior in exquisiteness of taste to many other varieties of the same species; it would, however, be an elegant variety of much value for the quite characteristic form of its fruit, and may safely be recommended for such confections as are made from the *Citrus Bigaradia sinensis*, and the *Citrus Bigaradia myrtifolia.*

NOTES ON CITRIC ACID.§

BY R. WARINGTON, F.C.S.

(*Concluded from page* 386.)

The direct determination of citric acid in lemon juice is clearly a great desideratum to the manufacturer, but there appears to be no general method by which citric acid can be separated from other organic acids. There is, however, no difficulty in determining the amount of insoluble organic lime salt which can be obtained from lemon-juice; and as the lime salts of malic and aconitic acid are readily soluble, and the same is true of the lime salts of the volatile acids of the acetic series, such a determination will probably give with sufficient exactness the quantity of citric acid present. The mode of operating is very simple. 15—20 c.c. of unconcentrated lemon juice, or a quantity of concentrated juice equal to about 3 c.c., is exactly neutralized with pure caustic soda; the solution, which is about 50 c.c., or is concentrated to that bulk, is brought to boiling in a salt-bath, and so much solution of chloride of calcium added as is known to be rather more than sufficient for the total organic acids present; the whole is then boiled for half-an-hour. The precipitate is collected and washed with hot water. As citrate of calcium is rather soluble in water, the filtrate and washings are concentrated in the salt-bath to about 10—15 c.c., the solution being finally neutralized with a drop of ammonia if it has become acid. The second precipitate thus obtained is collected on a very small filter, the filtrate being used to transfer the precipitate to the paper, and the precipitate receiving only five or six washings with hot water. As a matter of precaution, the filtrate and washings may be evaporated a third time in the salt-bath. The precipitates, with their papers, are then burnt at a low red heat in a platinum basin, and the neutralizing power of the ash determined by appropriate treatment with standard hydrochloric acid and alkali. Working in this way, and calculating the precipitated calcium salt into its equivalent in citric acid, the following results were obtained:—

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* The word transformation, poetically called by Goethe "plant metamorphosis," is applied in the language of exact science to the transmutation of some organs into others of different form and name, as, *e.g.*, the different organs of the flower, which are transformed into green leaves, the stamens into petals, and so forth. In the present case, by transformation, is to be understood a change of form, not, indeed, of a single organ, but of all the organs of an entire individual, producing a new variety in the true botanical sense.

* 'Histoire naturelle des Orangers,' par A. Risso. Paris, 1818.

† 'Atti dell' Istituto d'Incoraggiamento di Napoli,' tom. viii.

‡ In this description, the identical diagnostic formulæ of Risso (*op. cit.*) is used, so that, with reference to the dimensions of the fruit, the length means the axis, the bulk its greatest diameter, and its size the thickness of the peel, taken from the epidermis to the inner wedges.

§ Abstract of a paper read before the Chemical Society (*Journ. Chem. Soc.*, vol. xiii., p. 926).

A sample of English juice, pressed in January, yielded citric acid equal to 99·60 per cent. of the total organic acids (free acid plus combined) present. Another sample, pressed in May, yielded 98·97 per cent. A sample of concentrated juice, prepared in the laboratory some years before from English pressed juice, gave 97·06 per cent. A sample of Sicilian unconcentrated juice gave only 91·71 per cent. Two samples of Sicilian concentrated juice of the season 1871-72 gave, respectively, 92·98 and 94·57 per cent. Three samples of the season 1872-73 gave 88·75, 89·36, and 91·91 per cent. It appears, then, that in English pressed juice the organic acids other than citric do not amount to more than 1 per cent. of the total organic acids present; while in concentrated juice from Sicily they amount to 5 – 11 per cent. The single specimen of unconcentrated Sicilian juice agreed with the concentrated Sicilian juices, containing 8·29 per cent. of organic acids other than citric. The Italian juice, which we have seen to be so much richer in combined acid, is thus also richer in certain organic acids yielding soluble calcium salts, than the juice pressed in England from fine lemons.

Two samples of concentrated bergamot juice contained 87·24, and 88·95 of precipitable acid, for 100 of total organic acid.

The raw lime juice from the Sandwich Islands gave 92·31, and the two Montserrat juices 91·75 and 89·64 per cent. of precipitable acid. Three concentrated juices from Montserrat, of the same season as the raw juice just mentioned, gave 86·98, 88·16, and 90·40, and the Dominica concentrated juice 89·12 of precipitable acid for 100 of total organic acid.

It appears, then, that in all these juices, there is a far greater quantity of non-precipitable acid than exists in English pressed lemon-juice. Another point brought out is that the proportion of non-precipitable acid is very similar in raw and concentrated juice, and is apparently but slightly increased by the process of concentration.

It is important to compare the citric acid found by the method of precipitation with the citric acid calculated by the ordinary method from the acidity of the juice. The following table gives the proportion of precipitable acid to that calculated from the acidity:—

Nature of Juice.	Precipitable for 100 of acidity.	Nature of Juice.	Precipitable for 100 of acidity.
Lemon juice—		*Bergamot juice—*	
Raw, English............	102·0	Concentrated Italian...	101·2
,, ,, ...	101·7	,, ,, ...	100·2
,, Sicilian............	98·3	*Lime juice—*	
Concentrated, English.	100·2	Raw, Sandwich Islands	95·4
,, Sicilian.	103·7	,, Montserrat	96·6
,, ,, ...	103·0	,, ,, ...	94·4
,, ,, ..	102·5	Concentrtd. Montserrat	97·2
,, ,, ...	99·7	,, ,,	95·5
,, ,, ...	99·2	,, ,,	93·9
		,, Dominica..	92·8

It appears from these figures that the ordinary method of determining the value of juice from its acidity gives tolerable results in the case of lemon and bergamot juice, but that with lime juice such results are too high.

It is well known that lemon juice suffers loss of acidity by concentration. Some English pressed juice concentrated in the laboratory to one-sixth its bulk over a water-bath lost 3·5 per cent. of its acidity.* It must not be concluded, however, that the whole of this loss is due to the presence of volatile organic acids, as hydrochloric acid is doubtless expelled by the action of citric acid upon chlorides.

That concentrated juice should contain any considerable amount of volatile acids seems unlikely from the mode of its preparation. Some concentrated Sicilian juice was mixed with water, and distilled in the salt-bath till the juice was reduced to about 70 per cent. of its original volume. The juice was again diluted with water, and again reduced by distillation to the same volume, and this operation was repeated four times. The last distillate contained only one-fifth the acidity of the first distillate. If we assume that the amount of acid in the distillate would have continued to diminish in the same ratio, it is easy to calculate the amount of the volatile acid present. Calculating on this assumption, the amount of volatile acid was 1·25 per cent. of the acidity of the juice, or about 1·12 per cent. of the total organic acids present.

The distillates were purified by redistillation, and then examined qualitatively. Formic acid was at once detected by the speedy reduction of nitrate of silver even in the cold. The weak acid solution was neutralized with oxide of silver, the formate destroyed by boiling, and the filtered solution concentrated and allowed to crystallize over oil of vitriol. Star-like groups of opaque white crystals were first formed; afterwards the deposit consisted merely of white crusts. These silver salts treated with sulphuric acid gave the characteristic odour of acetic acid, but not in its purest form. A little propionic acid was probably present. It is clear, therefore, that the organic acids other than citric which occur in concentrated juice are chiefly non-volatile, and have soluble calcium salts. There is no difficulty in neutralizing pure citric acid with chalk; but lemon juice, and especially commercial concentrated juice, remains unneutralized even after long boiling with chalk. The neutralization is more perfect when chalk is added in excess to cold juice than when it is added to hot juice; in the former case a part of the chalk is dissolved by the carbonic acid set free, and probably acts more energetically than solid chalk. English pressed juice can generally be perfectly neutralized by chalk in the cold, but not at a boiling heat. The neutralization in the cold is not destroyed by subsequent boiling. With commercial concentrated juice neutralization cannot be effected, even in the cold, but there is a nearer approach to neutralization under this condition.

The fact of the imperfect neutralization by chalk has been variously explained. In Richardson and Watt's 'Chemical Technology,' it is stated to be owing to the presence of alumina in the juice. The author has not, however, been able to detect alumina in lemon juice. Moreover, when alumina or ferric oxide is dissolved in citric acid, the solution can be easily neutralized with chalk. He finds, however, that if phosphoric acid, or phosphate of iron or aluminium, be dissolved in citric acid, the solution is not neutralized by chalk; and lemon juice contains a good deal of phosphoric acid and a little iron. It is probable, therefore, that a part of the unneutralized acidity may be due to their action. Several other explanations are possible. Malic acid after long boiling with excess of chalk is still strongly acid. Aconitic acid appears to have a similar property. If citric acid be slowly heated to 170°, and kept for some time at that temperature, it loses water, and aconitic acid is produced. If the resulting mass is dissolved in water and boiled with excess of chalk the solution remains strongly acid, though the original citric acid could be perfectly neutralized by chalk. Since, according to Dessaignes, some aconitic acid is formed when solution of citric acid is long boiled, it may clearly be produced during the rough concentration of the juice in Sicily; or aconitic acid may occur in lemons ready formed, as it is known to do in aconite.

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* The concentrated juice thus obtained was of excellent quality, containing 68·91 ozs. of free acid per gallon; it marked the exceedingly low gravity of 49° on the citrometer. This juice deposited nothing in five years.

Citrate of Calcium.—The formula of citrate of calcium dried at ordinary temperature is, according to Gmelin's 'Chemistry,' $C_{12}H_{10}Ca_3O_{14}$, $4\,H_2O$, and when dried at 100°, $C_{12}H_{10}Ca_3O_{14}H_2O$. On igniting some specimens of citrate of calcium dried at 100°, the author found that they always gave less lime than is required by the above formula; the lime determinations given in Gmelin are also below the amount required by theory. With the object of explaining these facts, a number of water determinations were made with citrate of calcium artificially prepared. It was found that the amount of water in different samples of citrate dried at 100° varied very considerably, apparently according to the conditions under which the specimen had been prepared. In no case did the water existing in citrate of calcium dried at 100° fall as low as one molecule, nor did it in any case reach three molecules. In the case of the citrate prepared directly with citric acid and lime-water, the percentage of water was very nearly two molecules.

The percentage of lime at 200° (33·11 to 33·80) proved the samples to be normal citrates, anhydrous tricalcic citrate containing 33·73 per cent.

Crystalline citrate of calcium, prepared by neutralizing citric acid with lime-water and boiling, gave at 14° a solubility of 1 part (dried at 100°) in 1133 of water, and at a boiling heat a solubility of 1 in 1754. Another specimen of citrate prepared by slowly adding pure carbonate of calcium to a hot solution of citric acid, gave at 14° a solubility of 1 in 1223, and at 90° a solubility of 1 in 1784. A third specimen of citrate, prepared by slowly adding citric acid to carbonate of calcium diffused in hot water, gave at 14° a solubility of 1 in 1183, and at 90° a solubility of 1 in 1652. A fourth specimen of citrate, prepared in the factory in the ordinary process of adding lemon juice to chalk, gave at 18° a solubility of 1 in 707, and at a boiling heat a solubility of 1 in 1123. The first three specimens give fairly accordant results; the mean solubility is 1 in 1180 at 14°, and 1 in 1730 at 90°—100°. The fourth specimen has a decidedly higher solubility, and illustrates Liebig's remark that amorphous citrate is more soluble than crystalline citrate.

It is stated in Gmelin's 'Chemistry,' and the remark reappears in recent manuals, that the solubility of citrate of calcium in ammonium salts is so great, that if the citrate be dissolved in hydrochloric acid and ammonia added, no precipitate takes place unless the solution is boiled. The author finds, however, that the fact is that the citrate of calcium is precipitated very perfectly in the cold, if sufficient time is allowed, and even when considerable quantities of chloride of ammonium are present. If citrate of calcium be dissolved in dilute hydrochloric acid, and ammonia added in excess, precipitation will commence in a few minutes if the solution is pretty strong, but takes many hours to complete. With large quantities of ammonium salt the precipitate may not commence for some hours, and takes several days to complete. The citrate falls under these circumstances in curious curled crusts and arborescent forms. Citrate of calcium is never precipitated immediately on the addition of ammonia, as is often the case with tartrate of calcium.

For many years citrate of calcium has from time to time come into the market as a material for the manufacture of citric acid; it is prepared by adding chalk or lime to lemon juice, the chalk or lime being usually added in excess. Besides the excess of carbonate or hydrate of calcium thus introduced, the citrate may contain carbonate due to the decomposition of the citrate; this decomposition readily takes place if more than 12 per cent. of water is present.

Commercial citrate may be conveniently analysed by an alkalimetric method. The excess of chalk or lime is first determined by adding to about 4 grams of the citrate a known quantity of standard hydrochloric acid, boiling gently in a covered beaker, and when the whole is quite cold, determining the excess of acid remaining with standard alkali. It seems safer to add the alkali till delicate-red litmus paper assumes a decided blue tint, and then to deduct the amount of alkali necessary to produce the same tint on the paper in a similar bulk of water; by this precaution it is insured that the citrates return to the tribasic state. Two grams of the citrate are next gently ignited in a covered platinum crucible, the ash obtained is boiled in a covered beaker with standard hydrochloric acid, filtered when quite cold, and the excess of acid determined with alkali. The neutralizing power of the ash in units of alkali is thus ascertained; by subtracting from this figure the alkali corresponding with the excess of chalk or lime in two grams of the citrate, the amount of alkali which corresponds with the citrate of calcium present is obtained. This method is speedy and convenient, but of course assumes that citric acid is the only organic acid present.

If it be desired, the amount of organic acid forming insoluble lime salt can be ascertained. For this purpose the citrate is dissolved in a small quantity of hydrochloric acid, filtered, the filtrate exactly neutralized with caustic soda, and boiled in the salt-bath, the further operation being conducted as already described under the head of juice. If it is uncertain what bases are present, and citrate from Sicily is sometimes prepared with lime burnt from dolomite, this is no obstacle to the alkalimetric method; but if the insoluble lime salt is to be determined, the citrate must in this case be first decomposed by boiling with carbonate of sodium, the solution filtered, neutralized with hydrochloric acid, and precipitated with chloride of calcium in the salt-bath.

The best sample of commercial citrate met with by the author contained 72 per cent. of citric acid, and this is about the highest percentage that can be reached when the citrate contains no excess of chalk, and has also been thoroughly dried. Commercial citrate that has been insufficiently dried may contain scarcely any citric acid, as citrate of calcium prepared from juice rapidly decomposes when in a moist condition.

PURIFICATION OF COMMERCIAL GUTTA-PERCHA, AND PREPARATION OF LIQUOR GUTTA-PERCHÆ.*

BY GEO. E. WILLMARTH.

The preparation of the solution from commercial gutta-percha by clarification with carbonate of lead often gives unsatisfactory results. The carbonate requires a long time to settle, and sometimes fails at last to separate completely, so that the solution, if colourless, is not clear and may be contaminated with lead.

The *methods of purification* tried in this investigation depend upon the principle that gutta-percha is precipitated white and pure, by alcohol, from solvents which mix with alcohol. These solvents may then be recovered from their alcoholic mixtures by addition of water.

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* Communicated to the *American Journal of Pharmacy* by Professor Prescott, of the University of Michigan.

The solvents tried were benzol and bisulphide of carbon, the benzol (from coal-tar) having about 0·85 sp. gr. and boiling at 176° to 178° F.

It is stated, on the authority of Kent[*] that, if any of the hydrocarbons are used to dissolve gutta-percha, the solvent cannot be fully expelled without decomposition of the gutta-percha. On the contrary, the precipitate formed by alcohol in benzol solution of gutta-percha, when dried on the water-bath, was found to lose all odour of benzol in a short time, and to possess as much tenacity as samples purified by chloroform or bisulphide of carbon. At ordinary temperature the precipitate dried very slowly.[†]

120 grains of gutta-percha of commerce were dissolved by aid of heat in 3 troyounces of *benzol* (1 to 12); the solution was poured upon a filter under a bell-jar and left 24 hours, the thermometer being 60° F. at the end of that time, when the gutta-percha was found to be deposited in a white granular mass, with a thin granular coating of pure gutta-percha on the filter. At 92° F. the deposit dissolved. (This deposition, at about 60° and more rapidly at lower temperatures, occurs with ether and essential oils, but not with bisulphide of carbon or chloroform.) The solution required 17 c.c. (4 fluiddrachms and 35 minims) of alcohol for complete precipitation. The precipitate was drained, washed with a little alcohol (which facilitates its collection), and collected into a compact mass, which was stirred for a short time in an evaporating dish over the water-bath, when it was nearly or quite free from benzol. When 42 grains of this purified gutta-percha were dissolved in 1 troyounce of chloroform (the pharmacopœial proportion), a clear solution of a light brown colour was obtained. It was of thicker consistence than the pharmacopœial solution, and this will always be observed when pure gutta-percha is taken and the lead clarification omitted. In subsequent operations with benzol, it was found that by addition of animal charcoal to the solution before filtration, a colourless preparation was obtained. The benzol used in these operations was mostly recovered from its mixture with alcohol, by adding sufficient water, setting aside in a cylindrical vessel and drawing off the upper liquid. It was then somewhat turbid, but after distilling from a water-bath, it was as pure as before use.

In purification with *bisulphide of carbon*, 120 grains of gutta-percha required 4 troyounces of this solvent (1 to 16). The solution, filtered under a bell-glass, remained clear, and was somewhat less coloured than the benzol solution. It required between four and five times its volume of alcohol for complete precipitation. The precipitate was gathered on a pill-tile and pressed with the spatula into as thin a sheet as possible. After the evaporation of all the liquids, the gutta-percha was a milk-white compact sheet, and weighed 80 grains. Of this 42 grains were dissolved in a troyounce of chloroform, giving a clear solution, very slightly coloured. By subsequent operations it was found that by adding animal charcoal to the bisulphide of carbon solution, the filtrate is obtained colourless. The bisulphide of carbon and a portion of the alcohol were recovered as follows: The mixture of bisulphide of carbon and alcohol was subjected to fractional distillation, and the distillate, containing a very little alcohol, was washed with water, drawn off and then filtered. The alcohol left by the distillation was filtered and used in another operation.

From these and other concordant experiments, it was fully decided that bisulphide of carbon is generally preferable to benzol as a *purifying agent*. The difficulty in obtaining benzol of required standard, and the trouble of rectifying it, as well as the superior purity of the gutta-percha precipitated from bisulphide of carbon, are the considerations in favour of the latter.

After many trials with varied proportions and conditions, the following *directions for preparation of the solutions of gutta-percha* from commercial gutta-percha are presented:

(1.) *For the purification of the gutta-percha:* In a strong bottle provided with a finely-ground stopper, and containing four troyounces bisulphide of carbon, place 120 grains commercial gutta-percha (or one part gutta-percha to sixteen of the solvent), and shake frequently until dissolved. After solution has taken place, add a small quantity of animal charcoal, shake thoroughly and filter under a bell-jar placed upon a ground glass plate (the rim of the jar being coated with tallow), to secure an air-tight vessel. Into a wide mouth bottle, provided with a good stopper and containing four volumes of alcohol for one of the filtrate, pour the filtrate a little at a time, shaking after each addition; then shake thoroughly until the precipitate collects into one mass and the liquid is quite clear. If the liquid does not become nearly clear after shaking, add more alcohol and shake again. Pour off the liquid into another bottle; transfer the precipitate to a pill-tile and press it with a spatula into a sheet as thin as possible, and leave the sheet for 24 hours or until all smell of bisulphide of carbon and alcohol has disappeared and a little piece from the thickest part of the sheet dissolves clear in chloroform. (To save time, the precipitate, instead of being pressed into a sheet may be stirred in an evaporating dish on the water-bath till found pure as above.)

(2.) *For recovery of solvent and precipitant:* Place the liquid from the precipitate in a retort previously set over the water-bath and connected with an ice-cooled receiver, and by gentle heat distil over all the bisulphide of carbon. When the retort is cool, remove the receiver and add to the bisulphide of carbon a large quantity of water, and shake gently; pour off as much water as possible and then, pouring into a burette, draw off the bisulphide of carbon from the remaining water through a filter into the bottle to contain it. The alcohol in the retort should be filtered, and both solvent and precipitant are ready for use again.

(3.) *For preparation of the solution:* Take of the fully purified gutta-percha, in thin slices, forty-two (42) grains; chloroform one fluidounce; add the gutta-percha to the chloroform, in a bottle provided with a finely-ground stopper and designed to contain the preparation, and shake until dissolved.

Precautions. If all the vessels are not clean and perfectly free from dust, the preparation will be cloudy; and if the alcohol be not wholly removed from the precipitate the preparation will be milky. In the latter case, heating causes the milkiness to disappear, but it returns on cooling again. If milky from presence of alcohol, the liquor can be obtained clear by evaporating off the solvent and drying in a thin sheet; then dissolving in chloroform again.

Ordinary commercial bisulphide of carbon and the purified chloroform of the trade, are *sufficiently pure*. If benzol be chosen for purification, it should be 0·85 sp. gr. and boiling at 176° or 178° F.

The only necessary *apparatus* not found in all drug stores consists of the bell-jar with ground rim and plate, the burette, the retort and receiver, and (?) the water-bath.

Thin sheets of gutta-percha may be prepared by pouring sufficient of the solution into a breaker, rolling the beaker to form a uniform coating by evaporation of the solvent, then immersing the vessel in cold water, when the film may readily be detached from the glass.

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[*] *Am. Jour. Sci.* (2), vi., 246.

[†] According to the 'U. S. Dispensatory,' p. 444, complete drying requires several weeks.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 20, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

MANUFACTURE OF CINCHONA ALKALOIDS IN INDIA.

IN pursuance of the intention expressed some weeks since, we now proceed to place before our readers so much of Mr. WOOD'S report on the manufacture of cinchona products as has reached us.

In the first place it will be desirable to mention, in reference to the fact that the red bark hitherto produced in Sikkim has been deficient in the most valuable of the alkaloids and contained chiefly cinchonidine, that on the 31st March, 1874, Dr. KING in a report upon this subject explained that the prevailing preponderance of *Succirubra* trees in the plantations at Darjeeling was not due to any preference for that species over *Calisaya*, but that it resulted from the fact that the *Cinchona succirubra* is hardier, much more easily propagated, and has a much wider range as regards conditions of growth than the *Calisaya*. Artificial propagation of *Calisaya* by cuttings was very difficult, but owing to the slow production of seed by that species, it was the only means of propagation until three years ago, while the *Succirubra* had been seeding freely for years. At the date of Dr. KING'S report, however, he had succeeded in raising a large supply of *Calisaya* seed, and he was then in hopes of being able to report more than half a million of plants in the nursery beds ready for planting out before the end of that year. At the same time Dr. KING expressed the opinion that the *Calisaya* species was likely to grow well in Sikkim, and that the Government decidedly ought to extend its cultivation since there was an opportunity of doing so. It appeared, however, from Dr. KING'S report that some uncertainty prevailed as to whether he would have at his disposal the requisite funds for the purpose.

According to the view taken by the SECRETARY of STATE for INDIA it was not, however, so much a matter of importance that the cultivation of a quinine-yielding species of cinchona should be sought after, since the species to which the climate and soil of Sikkim were favourable was especially productive of cinchonidine; and in support of this view he referred to the report of the Cinchona Commission, which assigned to cinchonidine a febrifuge value very little inferior to quinine. In consequence of that report, upwards of a hundred pounds of cinchonidine was sent out to India for trial by medical officers in various parts of the country, and it was pointed out that great importance attached to the results obtained by the administration of this alkaloid, inasmuch as they might be expected to settle the question finally.

Passing now to Mr. WOOD'S report of the 24th May last, we learn from it that while the total amount of alkaloids in the red bark was rather more than in the *Calisaya*, the *Calisaya* trees of five or six years' growth yielded from 4·53 to 6·92 per cent. of quinine and no cinchonidine, but the *Succirubra* trees seven years old yielded on examination from 0·9 to 2·2 per cent. of quinine, and from 1·73 to 2·87 per cent. of cinchonidine. Mr. WOOD was of opinion that by selecting the best varieties of *Calisaya* there was a possibility of growing bark very rich in quinine and suitable for the manufacture of quinine sulphate; and that as regards the manufacture of alkaloid in India, a great advantage would be obtained by using bark containing only quinine. At the same time he considered that in operating upon the actually available *Succirubra* bark the production of quinine could not well be attempted; but that the total alkaloids it contained must be issued for use as a mixture in no very definite proportions.

Upon the receipt of this report Dr. KING recommended that all further planting of *Succirubra* should be discontinued and this was sanctioned by the authorities in Calcutta. Since that time, however, Dr. KING has reported that the experiments with *Calisaya* seed have proved a failure, and the final decision of the question whether it is desirable to cultivate *Succirubra* depends upon the nature of the reports that have been called for, from the medical officers charged with the application of the cinchonidine that was sent out to India. No reports have yet been received on this subject; but the SURGEON-GENERAL has been asked to report specially upon it and likewise upon the results obtained in using the febrifuge preparations sent to him for trial by Mr. WOOD.

Since his arrival in India, Mr. WOOD has been carrying on some experiments and inquiries with the object of maturing a process for the manufacturer of a cheap febrifuge from the bark of *C. Succirubra*, to which it now appears that all efforts must be confined so far as Sikkim is concerned.

Mr. WOOD estimates that the yield of each tree will amount to 2½ lbs. of dry stem bark, and that if the trees were regularly cut on the completion of their seventh year of growth, there would be on the average 328,000 trees to cut, furnishing altogether 738,000 pounds of dry bark annually. To allow for contingencies, however, he takes the probable number of trees at 2,000,000 and allowing them to attain eight years' growth before cutting he calculates on obtaining 244,000 trees every year. On the assumption that they yielded only 1½ pound of bark each the available quantity of dry bark would be 366,000 pounds annually.

As regards the cost of producing this quantity of bark Mr. Wood estimates that it would amount to 80,000 rupees or 3½ annas per pound. He also estimates the yield of total alkaloids from the bark at 4 per cent. According to inquiries he has made, it appears that the requirements of Bengal for quinine amount to from twelve to sixteen thousand pounds annually, but that the existing cinchona plantations will only yield ten or twelve thousand pounds of the mixed alkaloids.

Mr. Wood has abandoned the spirit process of manufacture as being too costly, and has confined his attention to the use of acid as a means of extracting the alkaloids from the bark. Working in this way, he estimates that the cost of manufacture, including bark, chemicals, carriage, labour, salaries, and interest on capital would amount to 126,655 rupees, and that the produce, at the rate of 2¼ per cent. would amount to 8235 pounds, at a cost of rather less than 1 rupee per ounce for the mixed alkaloids. He adds that if the cultivation of cinchona and the production of alkaloid be regarded as one operation, then Government, by simply extending existing appliances, will be in a position to supply the dispensaries with large quantities of an efficient febrifuge at 1 rupee an ounce, after covering every expense and paying interest at 4 per cent. on all the capital sunk on cinchona in Sikkim from the commencement down to the present time. He therefore recommended that a factory should be fitted up in Calcutta, and that the appliances in Sikkim should be maintained in order to work up the inferior bark.

These recommendations are regarded by the Lieutenant Governor as deserving of consideration, but it is thought that their final acceptance must depend upon the reports which may be received from the Medical Department upon the value of the mixed alkaloids as a febrifuge. Under these circumstances it is deemed inadvisable to issue under the authoritative stamp of the Government, and for the treatment of the most prevalent disease of the country, a preparation of which the medical officers have as yet no experience, since medical authorities might be unwilling to consider it as an equivalent for quinine in any case involving serious responsibility, and the result would be a call upon Government for the latter remedy which would cause as great an expense as if no cinchona plantations existed in Sikkim. So far, therefore, as the manufacture of febrifuge alkaloid in India is concerned it still remains entirely a matter of experiment, and must continue so at least until efficient medical testimony has been obtained as to the efficacy of the new preparation.

IRISH PHARMACEUTICAL EXAMINATION.

We have received from a correspondent in Ireland a circular purporting to have been issued by a member of the Council of the Pharmaceutical Society of Ireland, together with a printed statement of Regulations as to examination, headed "Pharmaceutical Society of Ireland." This statement corresponds with the description we referred to last week as having been published in a medical journal. In the circular it is stated that the Council intends to adopt for the space of one year an examination which is described as "comparatively easy," and those who require to obtain the qualification of Pharmaceutical Chemist are, therefore, urged to come forward at once and avail themselves of "the year of grace." In the absence of any official information on this subject we are at a loss to comprehend what may be the true significance of a proceeding which certainly appears not only irregular but also calculated to cast discredit upon the Council of the Irish Society as a body, for we have no hesitation in expressing the opinion that even the temporary establishment of an examination such as is described in the printed paper we have received would involve an entire abandonment of that regard for the maintenance of a high standard of pharmaceutical qualification which has always been contended for as an essential feature of any legislation regulating the practice of Pharmacy in Ireland. As we are informed, the circular and the accompanying pseudo-official statement as to the nature of the examination have been made so public that we feel bound to mention the circumstance for the information of our readers, though at the same time entertaining the hope that the proceeding referred to will prove to be unauthorized by the Council.

DR. WELWITSCH'S COLLECTION.

The suit instituted in the name of the King of Portugal against Mr. Carruthers and another, as the executors of the late Dr. Welwitsch, to restrain them from disposing of the collections made in Africa according to the terms of his will came again before the Vice-Chancellor on Wednesday. After some discussion the Vice-Chancellor decreed that the King of Portugal was entitled to all the collections and notes made by Dr. Welwitsch whilst employed in Africa by the Portuguese government; but that the king being willing "of his grace and favour" to give to the British Museum the set of specimens next best after the study set, a selection should be made by Dr. Hooker, acting on behalf of the King, and Mr. W. P. Hiern on behalf of the British Museum, and that each party should pay its own share of the expense of making the selection. On the other hand the plaintiff was ordered to pay to the executors within two months the sum of £600 in full of all demands.

Mr. S. M. Webster, Pharmaceutical Chemist, the Local Secretary of the Pharmaceutical Society, has been elected Mayor of Warrington. Another Local Secretary of the Society, Mr. Charles Tucker, Pharmaceutical Chemist, has been re-elected Mayor of Bridport. We believe that this is the third year in succession Mr. Tucker has been chosen to fill the office, and that his immediate predecessor, Mr. Thomas Beach, was formerly a pharmaceutical chemist.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

November 17*th*, 1875.

Present—Messrs. Allchin, Barnes, Carteighe, Corder, Gale, Hills, Linford, Martindale, Moss, Schweitzer, Southall, Taylor and Umney.

MAJOR EXAMINATION.

Five candidates were examined. *Two* failed. The following *three* passed and were declared qualified to be registered as Pharmaceutical Chemists :—

Senier, Alfred, jun.	Finsbury Park.
Sawden, Alfred	Filey.
Slater, Thomas, jun.	Stone.

MINOR EXAMINATION.

Ten candidates were examined. *Six* failed. The following *four* passed and were declared qualified to be registered as Chemists and Druggists :—

Unsworth, John Walter	Bolton-le-Moors.
Wright, Edwin	Ipswich.
Oldham, William	Peterborough.
Woodhouse, George	Ludlow.

The above names are arranged in order of merit.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's Examination :—

Certificate of the University of Cambridge.

Brooker, Algernon................ .Exeter.

Certificate of the University of Edinburgh.

Waldron, Derwent Hutton R. ...Edinburgh.

Certificate of the University of London.

Stuart, Charles Edward ....London.

Certificate of the University of Oxford.

Price, Rees ....Shepherd's Bush.

NORTH BRITISH BRANCH—EDINBURGH.

Twenty-Second Session.

The first scientific meeting of this session was held in the Society's rooms, 119a, George Street, on Monday, 8th November, 1875, at half-past eight o'clock. Mr. Gilmour, President, in the chair. In opening the meeting he said that at present there was nothing that called for special remark, either in regard to the parent society or the branch in Scotland. Everything was in a quiet state, and it was not likely, therefore, that the Society would be called upon to consider any extraordinary question for some time to come. This he did not regret, because it was not in the midst of argument, excitement, and debate that real progress was made. Referring to the progress of the Branch, he said that they had been able to appoint a resident secretary who would undertake all the onerous duties in connection with the library and museum. From this he anticipated good results, as in a thoroughly efficient library and museum lay much of their success. Mr. Gilmour then alluded to the loss which the Society had sustained by the death of Mr. Brown (of Messrs. Macfarlan and Co.), who had contributed more to the library and museum than any other private individual connected with the Society. He then intimated that the following gentlemen had agreed to give lectures during the session :—Dr. McKendrick, Dr. Stevenson Macadam, Dr. Craig, Dr. Moinet and others, and he recommended all the young men to be constant and punctual in their attendance.

After these preliminary remarks, Mr. Gilmour proceeded to give a lecture on "Light—a Motion." He noticed that philosophers had come to the opinion that light was the vibration of an exceedingly fine and elastic medium which they called ether, and showed by demonstration how the undulatory theory received its justification from the way in which matter was transferred through that medium. He drew attention to the peculiar change that light undergoes on being reflected from a polished surface such as glass or marble, or on being transmitted through certain crystals, and showed by experiment that this change can only be accounted for by double vibrations transmitted through the ether. The lecture, which was illustrated by a series of experiments by means of the oxyhydrogen light, was frequently applauded by an attentive and appreciative audience.

Dr. Craig, in a few appropriate remarks, proposed a vote of thanks to Mr. Gilmour, which Mr. Baildon seconded, and the meeting carried with acclamation.

Chrysarobine.

Mr. Baildon then presented to the museum a specimen of Chrysarobine sent from Mr. D. T. Kemp, of Bombay, and made the following remarks—

In reference to this important drug it certainly has not yet received that attention in this country which it merits. In India, where it is largely employed, it is looked upon as a specific for several very formidable skin diseases. The paper which I read at one of our evening meetings last session, containing an exhaustive analysis made by Professor Attfield for Mr. Kemp, and a report of the favourable opinion of Dr. Fayrer of Bombay, and other medical men, which followed this analysis in the pages of the *Pharmaceutical Journal*,* should lead the profession in this country to give it a fair trial. I have myself heard of a case of obstinate eczema which had long resisted other treatment being cured by the application of an ointment prepared of the strength recommended by Dr. Fayrer, viz. :—

℞ Chrysarobine	gr. xx.
Acid. Acetic.	gtt. x.
Axung. Benz.	℥j.

So long ago as 1870, Mr. Kemp writes, "This is the only remedy which has been found invariably efficacious in the treatment of the parasitic form of that obstinate disease known as Indian ringworm and by the native as *Dadhur*, *Gutchkurran* or *Dharaj*. Until the discovery of its extraordinary properties, numerous medicines, both native and European, had long been tried by medical men with indifferent success; and patients were known to suffer for many years without obtaining any relief. One English surgeon has stated that he suffered from the disease for four years; he visited England for medical advice, and could not obtain any relief. He was at last induced to try Goa powder,† and in fourteen days his disease had entirely disappeared. Cases are constantly coming under notice in which a few days' application of the powder has cured disease of many years' duration. Indeed Goa powder is now regarded by the natives of India (who are especially liable to the disease) of all classes, as an infallible remedy for Indian ringworm."

The specimens of the wood were sent by Mr. Holmes, Curator in Bloomsbury Square, accompanied by a letter to me giving some additional information regarding the botanical origin of this drug, which was known to him as Arariba. He writes, "I first received it about three months ago from Mr. P. L. Simmonds, who informed me it was imported into London from Bahia, South America, as a very valuable drug, and requested an opinion upon it. I examined it carefully and concluded from a microscopical section of the wood that the tree yielding it was closely allied to the genus *Cæsalpinia* and that the substance was really secreted in the heart wood of the trunk. I was further confirmed in my suppositions by finding that Martius in his 'System. Mat. Med., Brasil.,' page 125, mentions Arariba as a native name for a dye-wood yielded by a species of *Cæsalpinia*. Guibourt, in 'Hist. des Drogues,' vol. iii., p. 350 (1869), speaks of two kinds of wood very similar in appearance; one from India called Diababul, which he supposes to be derived from the Babool tree (*Acacia Arabica*) and the other called Arariba rosa (which he states M. Redel attributes to a *Pterocarpus*). This latter is probably the Arariba now being discussed, and its similarity to the wood from India is explained by the fact that Arariba is exported from Bahia to India. They are therefore probably identical."

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* *Pharm. Journ.* [3], vol. v., p. 723.

† The old name for Chrysarobine.

Should the faculty here prescribe this remedy, I am sure our honorary secretary would allow any of our Edinburgh pharmacists to have a small quantity of the drug, as there is so large a jar of it, and thus ensure that it is pure Chrysarobine, which is all important, as it is specially liable to be adulterated.

The Honorary Secretary then drew the attention of the meeting to the following presentation of books to the Society's library:—Eighteen volumes of the *Lancet*, from Dr. J. R. Crease, South Shields; 'Balfour's Manual of Botany,' 5th edition, from the Author; 'Historia Plantarum," by Gerarde, 1561, from Mr. Blanshard; 'De Quincy's London Dispensatory,' 1721, from Mr. William Blain, Bolton; 'Milne's Materia Medica,' 3rd edition, 1876, from the Editor, Dr. Craig; eight numbers of the *Pharmacist*, from the Chicago College of Pharmacy; eight numbers of the *Canadian Pharmaceutical Journal*, from the Canadian College of Pharmacy; seven numbers of the *Proceedings of the Royal Society*, and ten numbers of the *Journal of the Chemical Society*, from John Mackay.

A list of volumes still missing from the library was read, and an urgent request made that any books in the hands of members or others might be returned with the view of completing the catalogue.

The usual vote of thanks awarded to the donors brought the meeting to a close.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL ASSOCIATION.

The general monthly meeting of this Association was held on the 10th inst., Mr. H. W. Maleham, President, in the chair.

After the minutes had been presented in the usual manner and adopted, the President gave a short address upon the past and present condition of the Society, congratulating the members upon its continued vitality, and concluded by placing before the meeting the business of the evening, which was the consideration of the question of "Patent Medicines, their Sale and Purchase."

It appears much dissatisfaction has been experienced lately by, in some prominent instances, patent medicines being retailed by grocers, etc., at wholesale list prices, and this has led to considerable anxiety among the members of the Association and the trade generally. A letter was read stating that in one particular instance the party underselling was supplied by a Leeds firm, and the meeting after fully discussing the matter condemned such conduct on the part of wholesale dealers and unanimously passed a resolution to the effect that—"The secretary be instructed to communicate with the wholesale houses in Leeds with the view of ascertaining whether such report be erroneous or not."

The nomination of one or two gentlemen as members and associates brought the meeting, which was well attended and of a successful character throughout, to a conclusion.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION.

The first ordinary monthly meeting of the seventh session took place on Wednesday evening, November 10th, Mr. W. Scott Brown, President, in the chair.

The minutes of the last monthly meeting having been read and confirmed, Messrs. A. N. Palmer and T. Swindells were elected associates.

Mr. J. T. Slugg, F.R.A.S., then delivered a highly interesting lecture "On the Construction of the Eye—or, What is Seeing?" aided by diagrams. Mr. Slugg explained in a very lucid manner the nature and uses of the various parts of the eye, the changes induced in these by age or disease, and the means adopted by science and surgery to assist defective vision, and even to restore sight to the blind.

Mr. Slugg's lecture was listened to with great attention, and a cordial vote of thanks was awarded to him at its close.

THE ASSOCIATION OF CHEMISTS AND DRUGGISTS FOR WOLVERHAMPTON AND DISTRICT.

The second meeting of the present session of the above Association, took place on the evening of the 11th inst., in the Committee Room of the Agricultural Hall. Besides the ordinary members there were present several medical and scientific gentlemen, evidently attracted by the fact that the *pièce de résistance* of the evening was to be a lecture on the Spectroscope by the Borough Analyst. The chair was taken by Mr. R. H. Lowe.

After the election of two assistants as associates, Mr. W. Y. Brevett, the Senior Secretary, stated that he had a most gratifying announcement to make; the President of the Pharmaceutical Society, Mr. Thos. Hyde Hills, F.C.S., had forwarded for the embellishment of their newly acquired rooms four excellent engravings of Dr. Pereira, Jacob Bell, a copy of Sir Edwin Landseer's portrait, and the Old Laboratory in Oxford Street. This gift was accompanied by a donation of five guineas to the Library and Museum fund, and a cordial letter of congratulation, from which he read the following extract. "I am glad to hear your Association has succeeded in obtaining suitable rooms to carry on its work, and it affords me much pleasure in sending you by this day's train four engravings, and I trust your Association will do me the favour to accept them. I also do myself the pleasure of enclosing a cheque for £5 5s. towards the Library fund, and wish your Association every success." The kindness and generosity of Mr. Hills appeared to know no bounds, and it was indeed most flattering to them to know that their endeavours to forward pharmaceutical education in this district should be noticed and appreciated by the President of their Parent Society.

The announcement of the donation of Mr. Hills was received with hearty applause, and a vote of thanks was unanimously and enthusiastically passed.

In continuing his report, Mr. Brevitt stated that the Council had decided to commence the classes on Materia Medica, Botany, Pharmacy and the subjects for the Preliminary examination forthwith. He was much surprised to find that the number of applicants for the chemistry class was so few as to render the commencement of that class undesirable, for with such a teacher as their county analyst (Mr. W. L. Scott, F.C.S.), it should have been the most popular ones of the whole scheme. It should be known that Mr. Scott had offered to give his valuable services gratuitously, and he was at a loss to know where a more suitable teacher could be obtained. Doubtless, the fact that the chemistry classes in connection with the science and art department were in full working order in the town, and that many of their students attended them would partially account for this; but the Council could not but feel disappointed that the kind and generous offer of Mr. Scott should have met with so poor a response.

Mr. Brevitt then briefly noticed a paragraph in the *Chemist and Druggist* of October, in which he said it was almost insinuated that their classes were intended to promote a system of "cram" by "shallow preparation." He need scarcely say that there was no foundation or cause for such an unjust insinuation. It was the ambition of the Council to gradually and thoroughly prepare the young men, during the years of their apprenticeship, either for the parent school, in London, or possibly for their examination itself. He added that the Council had that evening decided to commence issuing the books from the library at once, and had placed upon the table an inquiry box, into which students could drop any written inquiry, suggestion, or remark; these would be answered at the next meeting, or duly considered by the Council. In January they hoped to have a *soirée* of an entertaining and instructive character.

At this stage a cheque for one guinea was handed to the chairman as a donation from the county analyst, which was duly acknowledged (together with his offer of assistance in conducting the chemistry class) by a very cordial vote of thanks.

The Chairman then briefly introduced the lecturer of the evening (Mr. E. W. T. Jones, F.C.S., Public Analyst for the Borough and Southern Division of the County), who was received with great applause.

In commencing his lecture "On the Spectroscope and its Application for distinguishing various Coloured Substances," Mr. Jones said he intended his lecture that evening to be but an introductory one—one that his younger hearers would readily understand—and at some future occasion he hoped that either himself or some other one of their honorary members would give further and more complete particulars of the subject which he intended only to view in an elementary manner that evening. The paper was divided into three parts—(1) The principle involved in the formation of a "spectrum;" (2) The description of the instrument used for its examination called the "spectroscope;" (3) Its application for distinguishing various coloured substances. With regard to the first point the author explained, assisted by diagrams, the effect of a prism upon a ray of homogeneous light, then upon ordinary or compound light. He said that the reason the colours were separated was on account of their different refrangibilities, and that if a prism of equal refraction and dispersion was placed in reverse position against one forming a spectrum it produced the "recomposition of light." It was worthy of note that the prism which first called the attention of Newton to spectrum colours was purchased at a neighbouring town—Stourbridge—not many miles from Wolverhampton. In dwelling upon the second part of his paper, Mr. Jones exhibited and described various forms of spectroscope and microspectroscopes; the optical principle involved in the production of the direct vision spectroscope was fully explained, as were also Browning's bright line micrometer, Sorby's interference spectrum scale, the new microspectroscope for the binocular microscope, and other similar apparatus. In the third part the lecturer demonstrated that colour was due to a selective influence on light; he described absorption bands and their cause, and stated that with the spectroscope, colours alike to the unaided eye are often clearly distinguishable and in conjunction with reagents, acids, alkalies, reducing and oxidizing, generally most conclusively. He then briefly explained the *modus operandi* of such examinations and spoke of the value of the spectroscope for detecting blood and blood-stains in legal investigation. Some time was then devoted to the exhibition of characteristic spectra, by means of the electric light on a screen, and finally much interest was evinced in the examination of the various instruments and their revelations already adjusted and illuminated on the tables of the lecture room. The lecturer was listened to throughout with the greatest attention, and the brilliancy of many of the experiments frequently evoked hearty applause. At the conclusion, in proposing a vote of thanks, Mr. Brevitt stated that no one could fail to be highly interested in the subject of spectroscopy so fully and ably explained and demonstrated by their lecturer. It was a subject to which Mr. Jones had doubtless given much attention, and when they looked at the tables crowded by so many rare and valuable instruments he thought they ought to feel more than usually gratified at the pains and expense Mr. Jones had evidently been put to that night to entertain and instruct them. The vote of thanks was then briefly seconded by Dr. Totherick and unanimously carried. A vote of thanks to the chairman brought a highly instructive and entertaining evening to a close.

It was announced that the next general meeting would take place on the 23rd of December when a paper would be read and a discussion opened by Dr. J. Y. Totherick "On the relation of pharmacy to medical practice."

Proceedings of Scientific Societies.

SOCIAL SCIENCE CONGRESS.

Address on Health.

BY BENJAMIN W. RICHARDSON, M.D., F.R.S.

(*Concluded from page* 397.)

It will repay us a minute of time to look at one of these model hospitals. One is the *fac simile* of the other, and is devoted to the service of every five thousand of the population. Like every building in the place, it is erected on a subway. There is a wide central entrance, to which there is no ascent, and into which a carriage, cab, or ambulance can drive direct. On each side the gateway are the houses of the resident medical officer and of the matron. Passing down the centre, which is lofty and covered in with glass, we arrive at two side-wings running right and left from the centre, and forming cross corridors. These are the wards: twelve on one hand for male, twelve on the other for female patients. The cross-corridors are twelve feet wide and twenty feet high, and are roofed with glass. The corridor on each side is a framework of walls of glazed brick, arched overhead, and divided into six segments. In each segment is a separate, light, elegant removable ward, constructed of glass and iron, twelve feet high, fourteen feet long, and ten feet wide. The cubic capacity of each ward is 1680 feet. Each patient who is ill enough to require constant attendance has one of these wards entirely to himself, so that the injurious influences on the sick, which are created by mixing up, in one large room, the living and the dying; those who could sleep, were they at rest, with those who cannot sleep, because they are racked with pain; those who are too nervous or sensitive to move, or cough, or speak, lest they should disturb others, and those who do whatever pleases them: these bad influences are absent.

The wards are fitted up neatly and elegantly. At one end they open into the corridor, at the other towards a verandah which leads to a garden. In bright weather those sick, who even are confined to bed, can, under the direction of the doctor, be wheeled in their beds out into the gardens without leaving the level floor. The wards are warmed by a current of air made to circulate through them by the action of a steam-engine, with which every hospital is supplied, and which performs such a number of useful purposes, that the wonder is, how hospital management could go on without this assistance.

If at any time a ward becomes infectious, it is removed from its position, and replaced by a new ward. It is then taken to pieces, disinfected, and laid by ready to replace another that may require temporary ejection.

The hospital is supplied on each side with ordinary baths, hot-air baths, vapour baths, and saline baths.

A day sitting-room is attached to each wing, and every reasonable method is taken for engaging the minds of the sick in agreeable and harmless pastimes.

Two trained nurses attend to each corridor, and connected with the hospital is a school for nurses under the direction of the medical superintendent and the matron. From this school nurses are provided for the town; they are not merely efficient for any duty in the vocation in which they are always engaged, either within the hospital or out of it, but from the care with which they attend to their own personal cleanliness, and the plan they pursue of changing every garment on leaving an infectious case, they fail to be the bearers of any communicable disease. To a hospital four medical officers are appointed, each of whom, therefore, has six resident patients under his care. The officers are called simply medical officers, the distinction, now altogether obsolete, between physicians and surgeons being discarded.

The hospital is brought, by an electrical wire, into communication with all the fire-stations, factories, mills, theatres, and other important public places. It has an ambulance always ready to be sent out to bring any injured persons to the institution. The ambulance drives straight into the hospital, where a bed of the same height on silent wheels, so that it can be moved without vibration into a ward, receives the patient.

The kitchens, laundries, and laboratories are in a separate block at the back of the institution, but are connected with it by the central corridor. The kitchen and laundries are at the top of this building, the laboratories below. The disinfecting-room is close to the engine-room, and superheated steam, which the engine supplies, is used for disinfection.

The out-patient department, which is apart from the body of the hospital, resembles that of the Queen's Hospital, Birmingham: the first out-patient department, as far as I am aware, that ever deserved to be seen by a generous public. The patients waiting for advice are seated in a large hall, warmed at all seasons to a proper heat, lighted from the top through a glass roof, and perfectly ventilated. The infectious cases are separated carefully from the rest. The consulting-rooms of the medical staff are comfortably fitted, the dispensary is thoroughly officered, and the order that prevails is so effective that a sick person, who is punctual to time, has never to wait.

The medical officers attached to the hospital in our model city are allowed to hold but one appointment at the same time, and that for a limited period. Thus every medical man in the city obtains the equal advantage of hospital practice, and the value of the best medical and surgical skill is fairly equalized through the whole community.

In addition to the hospital building is a separate block, furnished with wards, constructed in the same way as the general wards, for the reception of children suffering from any of the infectious diseases. These wards are so planned that the people generally send sick members of their own family into them for treatment, and pay for the privilege.

Supplementary to the hospital are certain other institutions of a kindred character. To check the terrible course of infantile mortality of other large cities—the 76 in the 1000 of mortality under five years of age—homes for little children are abundant. In these the destitute young are carefully tended by intelligent nurses, and mothers, while following their daily callings, are enabled to leave their children under efficient care.

In a city from which that grand source of wild mirth, hopeless sorrow, and confirmed madness—alcohol—has been expelled, it could hardly be expected that much insanity would be found. The few who are insane are placed in houses licensed as asylums, but not different in appearance from other houses in the city. Here they live, in small communities, under proper medical supervision, with their own gardens and pastimes. The houses of the helpless and aged are, like the asylums, the same as the houses of the rest of the town. No large building for the poor of pretentious style uprears itself; no men badged and badgered as paupers walk the place. Those poor who are really, from physical causes, unable to work, are maintained in a manner showing that they possess yet the dignity of human kind; that, being worth preservation, they are therefore worthy of respectful tenderness. The rest, those who can work, are employed in useful labours, which pay for their board. If they cannot find work, and are deserving, they may lodge in the house and earn their subsistence; or they may live from the house and receive pay for work done. If they will not work, they, as vagrants, find a home in prison, where they are compelled to share the common lot of mankind.

Our model city is of course well furnished with baths—swimming baths, Turkish baths,—playgrounds, gymnasia, libraries, board schools, fine art schools, lecture halls, and places of instructive amusement. In every board school drill forms part of the programme. I need not dwell on these subjects, but must pass to the sanitary officers and offices.

There is in the city one principal sanitary officer—a duly qualified medical man elected by the municipal council,—whose sole duty is to watch over the sanitary welfare of the place. Under him as sanitary officers are all the medical men who form the poor-law medical staff. To him these make their reports on vaccination and every matter of health pertaining to their respective districts; to him every registrar of births and deaths forwards copies of his registration returns; and to his office are sent, by the medical men generally, registered returns of the cases of sickness prevailing in the district. His inspectors likewise make careful returns of all the known prevailing diseases of the lower animals and of plants. To his office are forwarded, for examination and analysis, specimens of foods and drinks suspected to be adulterated, impure, or otherwise unfitted for use. For the conduction of these researches, the sanitary superintendent is allowed a competent chemical staff. Thus under this central supervision, every death and every disease of the living world in that district, and every assumable cause of disease, comes to light and is subjected, if need be, to inquiry.

At a distance from the town are the sanitary works, the sewage pumping works, the water and gas works, the slaughter-houses, and the public laboratories. The sewage, which is brought from the town partly by its own flow and partly by pumping apparatus, is conveyed away to well-drained sewage farms belonging to the city, but at a distance from it, where it is utilized on Mr. Hope's plan.

The water supply, derived from a river which flows to the south-west of the city, is unpolluted by sewage or other refuse, is carefully filtered, is tested twice daily, and if found unsatisfactory is supplied through a reserve tank, in which it can be made to undergo further purification. It is carried through the city everywhere by iron pipes. Leaden pipes are forbidden.

In the sanitary establishment are disinfecting rooms, a mortuary, and ambulances for the conveyance of persons suffering from contagious disease These are at all times open to the use of the public, subject to the few and simple rules of the management.

The gas, like the water, is submitted to regular analysis by the staff of the sanitary officer, and any fault he may detect, which indicates a departure from the standard of purity framed by the municipal council, is immediately remedied, both gas and water being exclusively under the control of the local authority.

The inspectors of the sanitary officer have under them a body of scavengers. These, each day, in the early morning, pass through the various districts allotted to them, and remove all refuse in closed vans. Every portion of manure from stables, streets, and yards is in this way removed daily, and transported to the city farms for utilization.

Two additional conveniences are supplied by the sanitary scientific work of this establishment. From steam works steam is condensed, and a large supply of distilled water is obtained and preserved in a separate tank. This is conveyed by a small main into the city, and at a moderate cost distilled water can be supplied for those domestic purposes for which hard water is objectionable.

The second sanitary convenience is a large ozone generator. By this apparatus ozone can be produced in any required quantity, and is made to play many useful purposes. It is passed through the drinking water in the reserve reservoir whenever the water shows excess of organic impurity, and it is conveyed into the city for diffusion into private houses, for purposes of disinfection.

The slaughter-houses of the city are all public, and are separated by a distance of a quarter of a mile from the city. They are easily removable edifices, and are under the supervision of the sanitary staff. The Jewish system of inspecting every carcase that is killed is rigorously carried out, with this improvement, that the inspector is a man of scientific knowledge.

All animals used for food—cattle, fowls, swine, rabbits—are subjected to examination in the slaughter-house, or in the market, if they be brought into the city from other depôts. The slaughter-houses are so constructed that the animals killed are relieved from the pain of death. They pass through a narcotic chamber, and are brought to the slaughterer oblivious of their fate. The slaughter-houses drain into the sewers of the city, and their complete purification daily from all offal and refuse, is rigidly enforced.

The buildings, sheds, and styes for domestic food-producing animals are removed a short distance from the city, and are also under the supervision of the sanitary officer; the food and water supplied for these animals comes equally with human food under proper inspection.

One other subject only remains to be noticed in connection with the arrangements of our model city, and that is the mode of the disposal of the dead. The question of cremation and of burial in the earth has been considered, and there are some who advocate cremation. For various reasons the process of burial is still retained: Firstly, because the cremation process is open to serious medico-legal objections; secondly, because, by the complete resolution of the body into its elementary and inodorous gases in the cremation furnace, that intervening chemical link between the organic and inorganic worlds, the ammonia, is destroyed, and the economy of nature is thereby dangerously disturbed; thirdly, because the natural tendencies of the people lead them still to the earth, as the most fitting resting-place into which, when lifeless, they should be drawn.

Thus the cemetery holds its place in our city, but in a form much modified from the ordinary cemetery. The burial-ground is artificially made of a fine carboniferous earth. Vegetation of rapid growth is cultivated over it. The dead are placed in the earth from the bier, either in basket work or simply in the shroud; and the monumental slab, instead of being set over or at the head or foot of a raised grave, is placed in a spacious covered hall or temple, and records simply the fact that the person commemorated was recommitted to earth in those grounds. In a few months, indeed, no monument would indicate the remains of any dead. In that rapidly resolving soil the tranformation of dust into dust is too perfect to leave a trace of residuum. The natural circle of transmutation is harmlessly completed, and the economy of nature conserved.

Results.—Omitting, necessarily, many minor but yet important details, I close the description of the imaginary healthy city. I have yet to indicate what are the results that might be fairly predicted in respect to the disease and mortality presented under the conditions specified.

Two kinds of observation guide me in this essay—one derived from statistical and sanitary work; the other from experience, extended now over thirty years, of disease, its phenomena; disease, its origins, its causes, its terminations.

I infer, then, that in our model city certain forms of disease would find no possible home, or, at the worst, a home so transient as not to affect the mortality in any serious degree. The infantile diseases—infantile and remittent fevers, convulsions, diarrhœa, croup, marasmus, dysentery—would, I calculate, be almost unknown. Typhus and typhoid fevers and cholera could not, I believe, exist in the city except temporarily, and by pure accident; small pox would be kept under entire control; puerperal fever and hospital fever would probably cease altogether; rheumatic fever, induced by residence in damp houses, and the heart disease subsequent upon it, would be removed; death from privation and from purpura and scurvy would certainly cease; delirium tremens, liver disease, alcoholic phthisis, alcoholic degeneration of kidney and all the varied forms of paralysis, insanity, and other affections due to alcohol, would be completely effaced. The parasitic diseases arising from the introduction into the body, through food, of the larvæ of the entozoa, would cease, and that large class of deaths from pulmonary consumption, induced in less favoured cities by exposure to impure air and badly ventilated rooms, would, I believe, be reduced so as to bring down the mortality of this signally fatal malady one-third at least.

Some diseases, pre-eminently those which arise from uncontrollable causes, from sudden fluctuations of temperature, electrical storms, and similar great variations of nature, would remain as active as ever; and pneumonia, bronchitis, congestion of the lungs, and summer cholera would still hold their sway. Cancer, also, and allied constitutional diseases of strong hereditary character, would yet, as far as we can see, prevail. I fear, moreover, it must be admitted that two or three of the epidemic diseases, notably scarlet fever, measles, and whooping-cough, would assert themselves, and, though limited in their diffusion by the sanitary provisions for arresting their progress, would claim a considerable number of victims.

With these facts clearly in view, I must be careful not to claim for my model city more than it deserves; but calculating the mortality which would be saved, and comparing the result with the mortality which now prevails in the most favoured of our large English towns, I conclude that an average mortality of 8 per 1000 would be the maximum in the first generation living under this salutary *régime*. That in a succeeding generation Mr. Chadwick's estimate of a possible mortality of 5 per 1000 would be realized, I have no reasonable doubt, since the almost unrecognized, though potent, influence of heredity in disease would immediately lessen in intensity, and the healthier parents would bring forth the healthier offspring.

As my voice ceases to dwell on this theme of a yet unknown city of health, do not, I pray you, wake as from a mere dream. The details of the city exist. They have been worked out by those pioneers of sanitary science, so many of whom surround me to-day, and specially by him whose hopeful thought has suggested my design. I am, therefore, but as a draughtsman, who, knowing somewhat your desires and aspirations, have drawn a plan, which you in your wisdom can modify, improve, perfect. In this I know we are of one mind, that though the ideal we all of us hold be never reached during our lives, we shall continue to work successfully for its realization. Utopia itself is but another word for time; and some day the masses, who now heed us not, or smile incredulously at our proceedings, will awake to our conceptions. Then our knowledge, like light rapidly conveyed from one torch to another, will bury us in its brightness.

> "By swift degrees the love of Nature works
> And warms the bosom, till at last, sublim'd
> To rapture and enthusiastic heat,
> We feel the present Deity, and taste
> The joy of God to see a happy world!"

Parliamentary and Law Proceedings.

Alleged Poisoning by Godfrey's Cordial.

Mr. A. F. Vulliamy, Deputy Coroner, held an inquest on Thursday, November 11, at the Great Eastern Hotel, Lowestoft, on the body of Elizabeth Ann Welch, aged 7 weeks, who died on the previous Tuesday.

James Welch, father of the deceased, said: The day before she died the child was very restless. He asked Mr. Rayson, chemist, on Monday, November 2, for something to quiet the child, and he advised him to give the child Godfrey's Cordial, according to directions on the bottle. He obtained twopennyworth of the cordial, and in the evening gave the child five drops, but they did not seem to take effect. He did not give the child any more until eleven o'clock last Monday night, the 8th November, when he gave her eight drops. He went up to bed, and his wife laid the child on the bed, but she kept crying until the mother got into bed, when she took the breast, and was afterwards quiet. They fell asleep. His wife awoke him at ten minutes to three in the morning, and said the child was cold. He got a light, and found the child dead lying by the side of his wife. He sent for Dr. Matcham, but as he was not at home he sent for Dr. Clubbe, and his assistant came. The child had always slept on his wife's arm, but that night her arm was above the child. She had been strong from her birth. When he got the cordial he did not know what it was composed of.

Mrs. Welch, the mother of the deceased, corroborated the evidence given by her husband, and in reply to a juror, said the bottle produced was as full after the eight drops had been given to the child as it then was.

Mr. Rayson, chemist, said he remembered Mr. Welch coming some days back for something to sleep the baby. He recommended him to have a little of Godfrey's Cordial, and the bottle produced was the same Mr. Welch had from his shop. He could not say exactly how much was gone from the bottle, but he supposed between fifteen and twenty drops. The cordial was composed of tincture of opium, oil of sasafras, water, and treacle. The dose named on the bottle was from five to ten drops for children from one to three months old. Ten drops would not be too much for a child only one month old. If a person were to ask him for tincture of opium for a child without a doctor's order he should give it. He should advise about a drop of tincture of opium to be given to a child one month old. In the bottle produced, there were about eight drops of tincture of opium. In the doses given from the bottle there would not be quite a quarter of a drop of tincture of opium. He made the cordial, and that in the bottle was made by him. An ordinary child of two months old could take twenty drops of the cordial without danger. Godfrey's Cordial was not a patent medicine. A child two months old could not be killed by taking only ten drops of the cordial, or there would have been many fatal cases. He was in the habit of recommending the cordial as being safe to be given to children. On account of an Act of Parliament, the bottle was labelled "poison," because opium was in the mixture. He was responsible for the printed directions on the bottle. The preparation was the same as all Godfrey's Cordials wherever properly prepared. He had never known a fatal case to arise from using it. He sold one hundred pennyworths of it in a week. He had never taken medical advice as to the propriety of giving the cordial to children, but he had consulted medical works upon the use of opium, and had grounded his practice upon what he had read.

Mr. Arthur Hill Ringland said he was a physician, at present with Mr. Clubbe in practice in this town. He was late lecturer on diseases of women and children at Ledwitch School of Medicine, Dublin. He was called in to see deceased on Tuesday morning at about four o'clock. He found her quite dead, and she had been so about an hour and a-half. He should say that the child died from narcotic poisoning. He took possession of a bottle of cordial which Mr. Welch gave him. He should judge from the smell that the bottle contained opium, but he could not tell the quantity. He had been medical attendant at a large dispensary, and had had great experience. He had also given special attention to the diseases of women and children. For the purpose of quieting a healthy child, he should not give tincture of opium. He should consider it dangerous to give a child two months old in perfect health more than a quarter of a minim of tincture of opium. He would not prescribe the amount of opium a child could take without first seeing the child. If a child two months old were susceptible to the influence of opium, eight drops of the mixture produced (the whole half-ounce bottle containing eight minims) would be sufficient to kill the child. In diseases of children for diarrhœa and other kindred diseases opium was useful. It should be given at first, even in those cases, in the form of an enema. He considered opium a very dangerous remedy for children except when given under great care and special circumstances. By Mr. Saunders, jun. (a juror): He thought it possible that the tincture of opium might rise to the top of the other ingredients in the bottle, so that the first dose might be stronger than intended. By the Coroner: He had not the slightest doubt that the death of the child was caused by an overdose of opium. The stain on the sheet and mother's breast corroborated that opinion. The stain was caused by the disagreement of the milk with the medicine. The Coroner: Would you order opium for a restless child? Dr. Ringland would never think of doing so. The very healthiness of the child in question would make the giving it opium the more dangerous.

The Coroner said a child died recently in Sheffield from having anodyne cordial given it.

Dr. Ringland remembered a case of death in Dublin similar to this. The chief ingredient contained in the mixture was opium. In reply to the Coroner, Dr. Ringland said the indications that the child died from opium were, the peculiar waxy condition of the skin, the suffusion of the eyes, the pin-hole condition of the pupils, and the turgescence of the vessels of the head.

The jury having, after ten minutes' consultation, returned the verdict, "That the child died from an overdose of opium ignorantly administered," the Coroner said he entirely concurred with their verdict. He believed that Mr. Rayson, in giving Godfrey's Cordial to be administered, and Mr. and Mrs. Welch in administering it, erred through ignorance. He would add that, as the evidence and the verdict would be known through the district, the ignorance which he had mentioned would now cease, and if cases of a similar nature should occur, those who might be in any way parties to the administering of a medicine or cordial like that which had been so prominent in this case would probably find themselves on their trial for manslaughter. He should not hesitate to direct a jury to return such a verdict. If he might judge from the feelings of the jury assembled, he had no doubt that future juries would return such a verdict. It was a most dangerous thing to administer opium to children. A doctor would consider it unworthy of his profession if he were to administer opium without first seeing the child for whom he prescribed such a medicine. They had had from Dr. Ringland most excellent evidence on the subject. It followed, as a matter of course, that the chemist who could not be expected to have the same knowledge with regard to medicine, was trifling with the lives of infants if he administered anything which contained opium. He hoped that what had transpired would be enough to prevent a recurrence of such a practice.—*Report in a Local Newspaper.*

Review.

An Examination of the Belfast Address of the British Association, 1874, from a Scientific Point of View. By John Eliot Howard, F.R.S. London: Hardwicke, 1875.

Had the Council of the British Association sought to produce effect by the force of contrast, its purpose could not have been better served than in the Presidential Address delivered this year in Bristol and last year in Belfast, neither of which, we say it with deference, appears to us to have been peculiarly well suited to the requirements of an association established for the promotion of science. In the English city the orator assumed the part of the historian, if that be not too ambitious a title to be conferred for a rather dull compilation, which however ran counter to no principles or prejudices. In the Irish city, on the contrary, the speaker raised a chorus of protests by an eloquent rhapsody which well illustrated the new pseudo-science of which he is chief apostle, the scientific use of the imagination. To use Professor Tyndall's description of the criticisms, they passed by many gradations from fair and manly argument, from the tenderest and holiest sympathy on the part of those who desired his eternal good, through deliberate unfairness, to a spirit of bitterness which desired with a fervour inexpressible in words his eternal ill.

We cannot help thinking that much of this hubbub was due to the admirable skill with which the speaker so marshalled his words, whilst descanting upon a subject necessarily unfamiliar to most of his hearers, as to make them fancy that they were able thoroughly to grasp it, although only presented from one point of view. He thus succeeded in entangling his hearers in a labyrinth from which they found no clue to escape; and whilst some were content to lie bewildered by the mazes of the great word compeller, the struggles of others were in direct relation to their inability to get out. In the pamphlet before us, however, Mr. Howard points out what he considers to be some of the weak parts in the toils.

We allude to this subject here, not because we wish in any sense to decry the value of that eloquence which conveys an author's or speaker's meaning with almost dazzling vividness (we wish the writer of this pamphlet had displayed a little more of it), but because we think there is a danger of excess in this direction, and that even in its own special habitats science is too often made subservient to rhetoric.

After a brief introduction Mr. Howard considers the address first in relation to the philosophical argument and then to the chemical argument. It would be out of place here to do more than indicate the scope of Mr. Howard's remarks, leaving it to those of our readers whose taste lies that way to give the pamphlet itself the closer study of which it is eminently worthy.

In the outset, Mr. Howard attacks Professor Tyndall's proposition that primeval man under an "impulse inherent" evolved by a "process of abstraction from experience" his notions of the origin of things which, after first taking an anthropomorphic form, were afterwards elaborated by the philosophers upon the basis of natural phenomena. It is argued that this, so far as can be judged, is the reverse of what took place, and several quotations are made to show that the earliest records imply a clear knowledge of a supreme ruler, which was afterwards suppressed and distorted. Upon the Professor's summary of the progress made by the atomic philosophers, Mr. Howard, remarks "Then it was all a baseless dream, and the effort to get rid of divine power landed them in the singular absurdity of an eternal ingathering of atoms towards some unknown centre of gravity, which must be eternally receding from the downpour!" The address is then followed step by step up to the point where the orator prolonging his vision backward finds in matter "the promise and potency of all forms of life," a declaration that is pertinently contrasted with the following words used almost simultaneously by A. Wurtz, as President of the analogous French association:—"C'est en vain que la science lui [man] aura revélé la structure du monde et l'ordre des tous les phénomènes; il veut remonter plus haut, et dans la conviction instinctive que les choses n'ont pas en elles-mêmes leur raison d'être, leur support et leur origine, il est conduit à les subordonner à une cause première unique, universelle, DIEU."

In dealing with the chemical argument, whilst giving due weight to the present state of the atomic theory and molecular chemistry, Mr. Howard maintains that still we know absolutely nothing of organization, and that to speak of the potency and promise of matter is to apply to its ultimate particles words expressive of ideas which have no relation to the subject. But we think that much more information is required as to the origin of abnormal forms before the following passage will be generally accepted in its entirety:—

"When life, and consequent organization are present, we have no longer the power to express ourselves as I have done above. To illustrate this, without attempting explanation, let us take the case frequently occurring in the vegetable or animal world, of two germs cohering and interfering with each other's organization. Here we have two wholly different kingdoms coexisting, subject to different laws. All the chemical combinations have taken place, as they always do, with rigid and mathematical accuracy; whilst all the living germ combinations have been going wrong. There never is, nor can be, anything *abnormal* in the structure of the molecules; whilst nothing is more common in organized vital structure."

In the conclusion, several other topics are ably dealt with, and an amusing deduction is made relative to the production of a finished organism, but we cannot do more than allude to them here.

Notes and Queries.

WARBURG'S TINCTURE.—In a letter addressed to the medical journals, Professor Maclean publishes the formula of the preparation known as "Warburg's tincture," communicated to him by its discover, Dr. Carl Warburg, late of Vienna, now of London. At the same time Professor Maclean testifies to the value of the preparation in the treatment of malarial fevers. The formula is as follows:—

℞. Aloes (Socotr.) libram;
Rad. Rhei (East India);
Sem. Angelicæ;
Confect. Damocratis; ana uncias quatuor.
Rad. Helenii (s. Enulæ);
Croci Sativi;
Sem. Fœnicul.
Cret. Præparat.; ana uncias duas.
Rad. Gentianæ;
Rad. Zedoariæ;
Pip. Cubeb.;
Myrrh. elect.;
Camphor;
Bolet. Laricis; ana unciam.

The above ingredients are to be digested with 500 oz. proof spirit in a water-bath for twelve hours; then expressed, and 10 oz. of disulphate of quinine added; the mixture to be replaced into the water-bath till all quinine be dissolved. The liquor, when cool, is to be filtered, and is then fit for use.

The "Confectio Damocratis" or "Mithridatium" was officinal in the London Pharmacopœia of 1746. Its formula is as follows:—

℞. Cinnamomi P. drachmas quatuordecim,
Myrrhæ P. drachmas undecim,
Agarici,
Nardi Indicæ,
Zingiberis,
Croci,
Seminum thlaspis,
Thuris,
Terebinthinæ Chiæ, singulorum P. drachmas decem,
Junci odorati,

Costi, vel ejus loco zedoariæ,
Malabathri folii, vel ejus loco macis,
Stœchadis,
Piperis longi,
Seminum seselis,
Succi hypocistidis,
Styracis calamitæ colati,
Opopanacis,
Galbani colati,
Opobalsami, vel ejus loco olei nucis moschatæ expressi,
Castorei Russici, singulorum P. unciam unam,
Polii,
Scordii,
Carpobalsami, vel ejus loco cubebarum,
Piperis albi,
Seminum dauci Cretici,
Bdellii colati, singulorum P. drachmas septem,
Nardi Celticæ,
Radicis gentianæ,
Foliorum dictamni Cretici,
Rosarum rubrarum,
Seminum petroselini Macedonici,
cardamomi minoris decorticatorum,
fœniculi dulcis,
Gummi Arabici,
Opii colati, singulorum P. drachmas quinque,
Radicis calami aromatici,
valerianæ sylvestris,
Seminum anisi,
Sagapeni colati, singulorum P. drachmas tres,
Mei athamantici,
Hyperici,
Acaciæ, vel ejus loco terræ Japonicæ,
Ventrium scincorum, singulorum P. drachmas duas cum dimidiâ,
Mellis despumati triplum omnium pondus.

Melli calefacto opium vino solutum immisce; galbanum, styrax, terebinthina, et opobalsamum, vel oleum nucis moschatæ, in alio vase simul liquentur, perpetuo circumacta ne urantur; quibus liquefactis immisce mel calefactum, primo cochleatim, deinde copiosius; denique omnibus ferè frigefactis adde paulatim species cæteras in pulverem redactas."

Dr. Warburg states that the cræta preparata is added to correct the otherwise extremely acrid taste of the tincture; many other substitutes were tried but none answered so well.

The "Boletus laricis" is the *Polyporus laricis* (P. *officinalis*, *Boletus purgans*, or Larch agaric); "formerly," says Pereira, "used as a purgative, and still kept by the herbalist."

Obituary.

Notice has been received of the death of the following:—

On the 21st of October, 1875, Mr. David Rees, Chemist and Druggist, of Conwill Elvet, Carmarthenshire. Aged 40 years.

On the 31st of October, 1875, Mr. John Guthrie Iverach, Pharmaceutical Chemist, of Kirkwall, Orkney. Aged 39 years. Mr. Iverach had been a Member of the Pharmaceutical Society since 1861.

On the 4th of November, 1875, Mr. Richard Holt, Chemist and Druggist, of Liverpool. Aged 77 years.

On the 6th of November, 1875, Mr. William Sanders Worboys, Chemist and Druggist, of New Cut, Lambeth. Aged 66 years.

Correspondence.

IMPURE BISMUTH.

Sir,—I have already twice called attention in the pages of the Journal to the very unsatisfactory state, as regards purity, of the salts of Bismuth sold for medicinal purposes in England.

My experience since amply corroborates all I have said before. As the subject of the purity of bismuth preparations still remains on the blue paper of the Pharmaceutical Conference, I propose to take the subject up again and report upon it at the next meeting of the Conference. To enable me to do this, I shall feel much obliged if a few of your readers would send me samples of the carbonate and subnitrate (say ʒij or ℥ss of each) they have in use in their shops. If they will give me as well the name of the manufacturer, and state whether I am at liberty to publish it or not, I shall be still further obliged.

As an instance of the inconvenience the present state of things leads to, only quite recently a physician who prescribes bismuth largely told me that he found some of his patients positively refused to take any more of his medicine (a simple bismuth mixture), on account of the intolerable smell of garlic it gave to their breath almost immediately after taking it. These effects were all traced to one sample, which was then tried upon two other patients with precisely the same result. I should be glad to know if any of your readers have ever known a similar case. The physician in question is much perplexed what to do. He does not like to give up a favourite drug which in the cases he prescribes he has found to be efficacious, and yet he is afraid to prescribe it.

CHARLES EKIN.

8, *Argyle Street, Bath, Nov.* 17, 1875.

ALUMINA IN PLANTS.

Sir,—In your issue of the 13th inst., on page 388, the following sentence occurs:—"Notwithstanding the vast amount of attention that has been given to the analysis of ashes of plants, we are not aware of any instance in which alumina has been found in the ash of any plant." It is true that alumina has never been found in the ash of any carefully cleaned phanerogamous plant, and therefore the argument of the article quoted from is not affected. The statement, however, is likely to mislead, for alumina has long been known to occur largely in club mosses (Lycopodium). It exists in the plant combined with an organic acid which has been variously stated to be tartaric, malic, and acetic. An infusion of lycopodium has been used as a mordant on account of the quantity of aluminium salt that it contains. Recent analyses by A. H. Church (*Chem. News*, xxx. 137) gave in the ashes of *Lycopodium alpinum* 33·50 per cent. of alumina, *L. clavatum* 15·24, and *L. selago* 7·29 per cent.; and in the allied genus *Selaginella*, in one species, *S Martensii*, ·26 per cent. was found, but this was probably accidental. A remarkable relation between the botanical character and the quantity of alumina in the ash is here noticeable. As the species of Lycopodium approach the genus Selaginella the alumina decreases and disappears in this latter genus. Specimens of other cryptogams from different natural orders contained no alumina.

E. K.

India Museum, South Kensington,

[*⁎* The alumina well known to be present in the *juice* of lycopodium (See Watt's 'Dictionary,' I. 417) is a case totally apart from the point referred to in our remarks.

ED. PH. JOURN.]

J. Y. Allan.—The questions for the last Jacob Bell Memorial Scholarship examination will be found in the Journal for October 9, p. 292.

"*Inquirer.*"—Any person whose name is on the Register of Chemists and Druggists may commence business on his own account, or conduct the business of a deceased chemist and druggist for the executor, administrator, or trustee of the estate.

"*Tom.*"—We cannot publish your question as it is unadvisable that this portion of the Journal should be made the medium of advertisements.

W. H.—Registers of Pharmaceutical Chemists and Chemists and Druggists are published annually, in compliance with the Pharmacy Act, 1868, by the Registrar, 17, Bloomsbury Square.

"*A Chemist by Examination.*"—Vermin killers, if preparations of the poisons contained in Schedule A of the Pharmacy Act, must not be sold by unregistered persons.

N. S.—You will find instructions for making the calculation in most elementary works on chemistry.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. De Vrij, Mr. P. Wells, Mr. Gostling, Mr. Jackson, Mr. Allard, Senex, G.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(Continued from p. 162.)

Amongst the many adaptations of polarized light there are a few which, though trivial, are interesting and useful. Such is the use of a Nicol prism in examining pictures badly hung in an excess of direct light, which being reflected from their varnished surfaces seriously detracts from distinct vision of the picture and mars its beauty. Glass cases in museums also frequently reflect so much light that their contents are nearly invisible. In both these cases the Nicol is helpful by shutting off in either of two angles of rotation, in which it should be placed, nearly all the objectionable light. The astronomical uses of polarized light will be considered after its microscopical use, as also will the chromatic phenomena of crystals, etc.

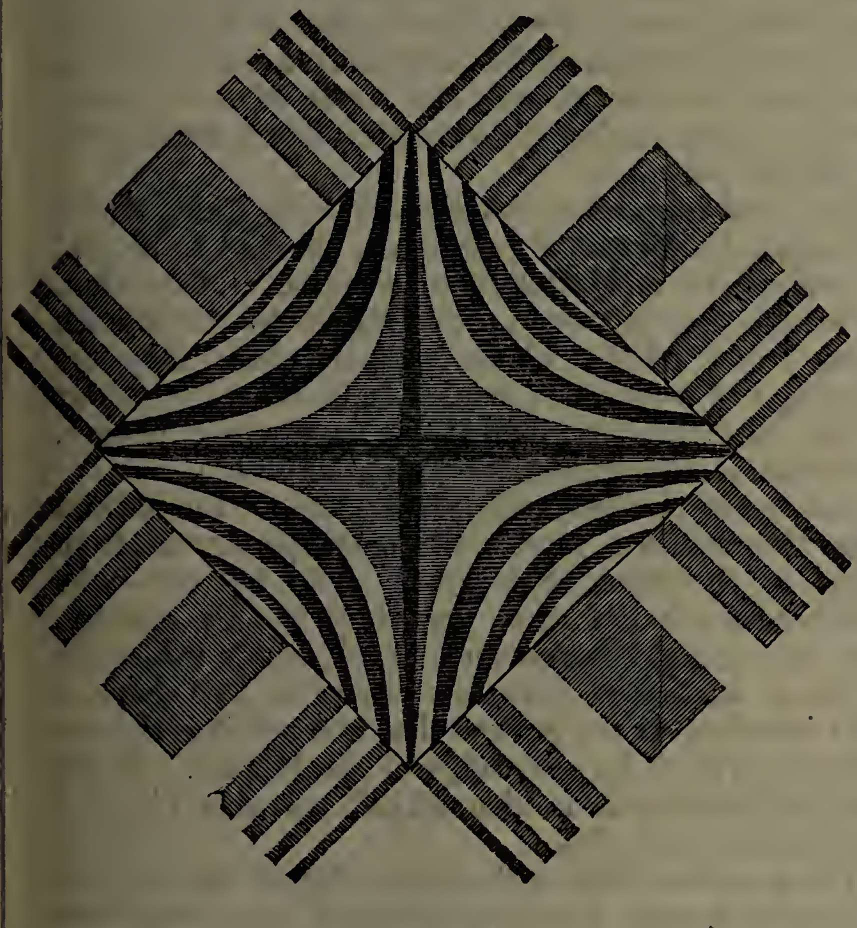

Fig. 10.*

The use of polarized light in conjunction with the use of lenses or a microscope will now engage our attention and require somewhat careful and close study.

The polarizing apparatus of a micro-polariscope usually consists of a Nicol prism applied between the mirror and stage, and a similar prism placed either immediately above the object glass, or before the eye lens of the eyepiece in place of the usual cap. It is not necessary that either the polarizer or analyser should be a Nicol; glass plates may be used very effectively as polarizers, and the analysing prism may be superseded with advantage in some work by tourmalines, or still better, by sufficiently large crystals of herapathite. Glass plates or piles may be employed as analysers, but they are extremely awkward to use, and open to so many objections that they are seldom if ever used for this purpose. The best, and in every way the most convenient polarizer for the microscope is a good Nicol prism of sufficient size to permit the illumination of a large field. Such prisms can now be procured at a reasonable price, and they are so superior to other polarizing agents that they have quite superseded them for the purposes of the microscopist.

The fittings of the polarizing Nicol are shown in Fig. 11. The prism (*e*) is fixed securely by means of cork in the tube (*d*), care being taken that it is perfectly vertical and central. The tube (*d*) revolves in the outer tube (*c*) by the milled head (*a*). The outer tube (*c*) is encircled by a collar (*b*) securely fixed to it which slides into the stage aperture (as will be shown in Fig. 14) or drops into the movable sub-stage. It is quite essential that the utmost care be taken to secure that the axis of the prism (I am not now referring to its optical but to the mechanical axis) shall remain fixed in position during the whole rotation, and that it shall be rigidly a prolongation of the optical axis of the microscope. The construction of the fittings necessary to apply a polarizing bundle of glass plates will readily occur to any one who wishes to use them, and may be extemporized out of pasteboard cylinders and the like. They should be permanently fixed in position, and any needful adjustment as to illumination should be made by shifting the microscope, inclining it, or moving the artificial light employed (if any).

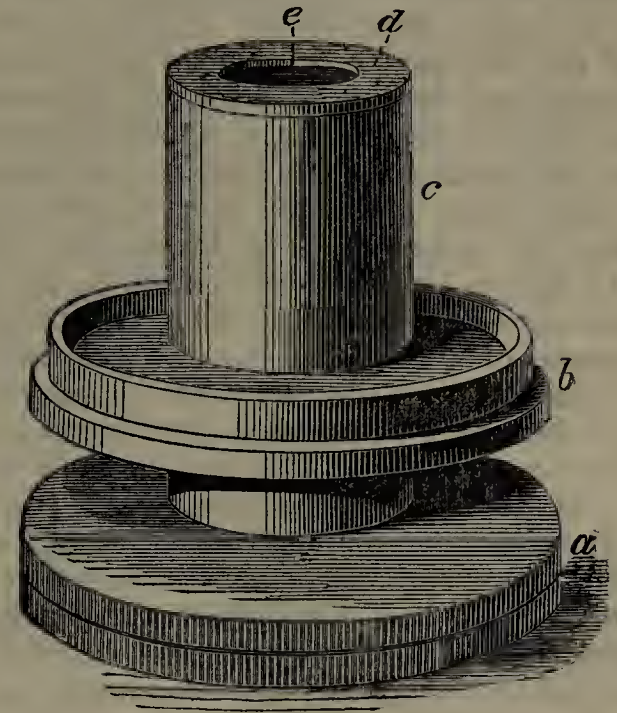

Fig. 11.

The analysing Nicol is used, as before said, in one of two positions. The most generally adopted position is within the body of the microscope immediately above the objective, to which it should be as close as possible. When thus used, its fittings are extremely simple, shown in Fig. 12 (as if transparent to show position of prism). The prism, mounted in blackened cork as before, is enclosed in a brass tube of sufficiently small diameter to permit it to enter the nozzle of the microscope. The tube is slightly prolonged downwards and tapered to enter the upper part of the objective mount, into which it should fit accurately with perfect centring. Extreme accuracy in this respect, as well as accurate working and good quality of the prism are here of the first importance, and their absence will seriously impair the perfec-

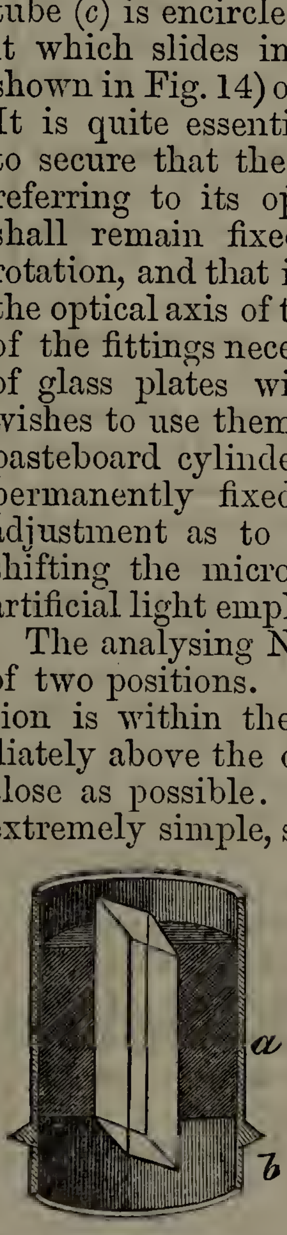

Fig. 12.

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* By an oversight Fig. 10 was omitted from the last article to which it relates. The reference in line 16 from top, on page 162, should read "Figs. 9 and 10." Fig. 8 refers to Nickerson's researches.

tion of the image formed by the optical series of the microscope. Fitted in this position the analyser does not permit of being readily rotated, for although rotating mounts have been devised they are liable to throw the objective out of focus or centring unless very carefully made, and even then their frequent use will cause their dis-adjustment. There is the further objection that insertion of the prism involves the unscrewing of the objective from the nozzle of the microscope, frequently the removal of its back stop, and the loss of a considerable amount of time. To obviate this Mr. C. Collins introduced into the construction of his Harley microscope a feature that many opticians have since adopted. The Nicol is mounted in a brass box similar to that in which the Wenham prism of the binocular microscope is mounted, or when the microscope is a binocular one, the Nicol is sometimes mounted in the same box with the Wenham prism, so that a touch of the finger will push it into or out of position. The convenience of this arrangement is very great, but it necessitates the removal of the Nicol to what appears to me to be an undue distance from the objective, and is likely to introduce an objectionable increase of the loss of definition which is always experienced when the Nicol is used between the objective and the eyepiece. At the same time I am not at all prepared to say that this in any way counterbalances the convenience of the arrangement, which, however, precludes the use of the same analyser in a separate fitting above the eyepiece, in which position it permits far greater sharpness of definition, and the use of very much higher magnifying power. The fitting necessary for the convenient use of the analyser in this position is shown in Fig. 13, where (*c*) is a tube which slides over the eyepiece, in place of the usual "cap;" (*b*) a tube containing an inner tube, capable of being revolved by the milled head (*a*). The Nicol prism and its mount are fixed in the inner tube with the already indicated precautions. The advantages of this method are, superior definition, with plenty of light and facility of rotation of the analyser, whilst the polarizer, object, and any selenite in use remain fixed. Its disadvantage is that unless the Nicol be very large, a considerable portion of the field is cut off, and the great length of a Nicol possessing a sufficiently large aperture, presents an obstacle to its adoption, since it very materially disturbs the corrections of the objective, and many microscopists prefer to use a tourmaline or herapathite instead. The objection to a tourmaline is that it is of a more or less dark colour, and when of fine quality and large size is very expensive. The herapathite is free from objectionable colour, but is difficult to obtain of sufficiently large size even at great cost, and cannot be relied upon for permanency, being too liable to break up. If it were otherwise the herapathite would soon supersede all other analysing agents, on account of its perfect absorption of the one set of undulations, even when it is very thin, and also on account of its great transparency.

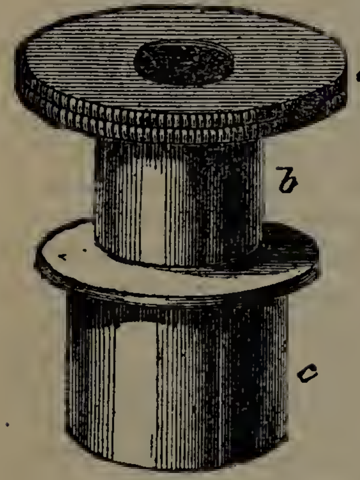

Fig. 13.

(*To be continued.*)

THE INDIA MUSEUM AT SOUTH KENSINGTON.

(*Continued from page* 242.)

The specimens in the India Museum which represent those articles of the native materia medica that have not been deemed worthy of notice in the Indian Pharmacopœia possess, as might be expected, but little importance. A few of them, however, possess some little interest on account of having been formerly used in this country; others may be regarded in the light of curiosities. Among those drugs formerly well known in this country may be mentioned fenugreek seed, salep, *Aristolochia longa* and *A. rotunda*, the bark of *Alyxia stellata*, remarkable for its odour and flavour, resembling those of the tonka bean, lignum aloes from Malacca, and several others. Several of our well known garden herbs also furnish medicines to the natives of India; thus the leaves and stems of the garden mint, balm, hyssop, and sweet marjoram, and the seeds of the lettuce, cucumber, and garden cress are all made to serve some medicinal purpose.

The little round fruits of *Embelia ribes*, Lam., which have a slight degree of pungency, are said to be sold to traders to mix with pepper as an adulteration. It would not, however, be difficult to distinguish them from whole black pepper, since they are smooth, not wrinkled; while their blackish colour would readily distinguish them from white pepper, which they otherwise more nearly resemble.

The pods of *Helicteres Isora*, L., of the natural order Sterculiaceæ, have a singular appearance from being in the form of a screw. The natives—who still hold the belief once prevalent in this country, that the external appearance of objects is indicative of their medicinal virtues—prescribe this curious fruit in colic, on the ground that because it is twisted it must be good for twistings of the bowels. In the form of powder it is also mixed up with oil as a liniment for sore ears.

The granular white substance labelled Shirkhi'st is a kind of manna probably obtained from the *Cotoneaster nummularia*, Fisch et Mey. It is described in 'Pharmacographia,' p. 372.

Of the few drugs in this section, which probably possess active properties, may be mentioned *Datisca cannabina*, L., or Bastard Hemp, which is said to produce sedative effects. This plant is well deserving of notice, both from a chemical and botanical point of view. The leaves yield a yellow colouring principle called "datiscin," which needs further investigation. It is said that the ovary of this plant can produce perfect seeds without the application of pollen to the pistil, a statement which needs verification.

Another drug, the inner bark of *Samadera indica*, Gaert., has been the subject of chemical investigation, and is found to contain a bitter principle analogous to quassia*; of this principle the fruits are found to contain more than the bark.

The specimens of East India cinchona barks in this collection are remarkably meagre. The small specimens in the tin cases devoted to materia medica are about a dozen in number, and with a few exceptions are similar in character to those in one of the central cases. The exceptions are a small specimen of bark from the Darjeeling plantations, presented by Mr. J. E. Howard, F.R.S., and another small one of cinchona, cultivated at Kangra, in the Punjaub, presented by Major E. Parkes, and a few from Sikkim.

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* *Pharm. Journ.* [3], ii., p. 644, 656.

The specimens of cinchona barks in the central case are almost exclusively from the Neilgherries, and consist for the most part of fine looking quills. They include one bundle of the bark of *Cinchona officinalis*, from trees nine years old, one of *C. micrantha*, ten years old, one of *Cinchona crespilla* (*crispa?*), and several of the bark of *Cinchona succirubra*, both of ordinary and of mossed bark. One specimen from Burmah has neither the name of the species yielding it nor any other particulars attached to it.

This part of the museum is, we understand, about to be altered by the reception of several additional cases, and although it is perhaps too much to expect to see specimens of the cinchona barks cultivated in Ceylon, it is to be hoped that this comparatively new but most important branch of industry will then be represented as it deserves, and be rendered, as many other industries so well illustrated in this museum have been, more instructive by the presence of pictures of the plants yielding the different kinds of bark, and illustrations of the method of mossing the trees, drying the bark, etc. Specimens of the barks would be rendered much more useful for reference and comparison if the circumstances attending the cultivation of each specimen were mentioned on the labels, such as elevation, exposure, soil, age of the tree, and date of collection, as well as the percentage of quinine in each. The specimens from Sikkim, although very small, are much more instructive in these respects than those from the Government plantations in the Neilgherries.

The fact that there is so small a number of specimens of bark in this national museum, and that several of the more valuable varieties cultivated in India are absent, will, it may be hoped, attract the attention of those who have it in their power to supply typical specimens from the various private plantations in India, together with full information concerning them. It is only by the careful accumulation of facts from as many sources as possible, and the publicity given to them, that the laws regulating the production of the more valuable alkaloids of cinchona bark can be elucidated. When this has been done, the time may be not far distant when it will be possible to develop the production of quinine, quinidine, cinchonine or cinchonidine at will.

It may here be remarked that the mixture of the bark of different species in the same package throws great difficulty in the way of practically ascertaining the value of the bark of any one species, and prevents the analysts from throwing so much light upon the subject as might otherwise be done.

For information concerning the gums and gum resins of the India Museum the reader cannot do better than consult the voluminous report already published under the direction of Dr. Forbes Watson. We understand that Dr. Cooke is now engaged upon a similar report upon the vegetable oils and fats, and will afterwards commence a report upon the volatile oils and similar products used in perfumery.

DAMIANA.

At a recent meeting of the New York Alumni Association of the Philadelphia College of Pharmacy, Mr. Wellcome read a paper on damiana, the new aphrodisiac, presenting specimens of the leaves and fluid extract received from Washington; also a specimen received from San Francisco, and three specimens obtained in the New York market. He stated that the specimens from the three different sources were from distinctly different plants.

That obtained from Washington (Fig. 1), is a smooth, dark-green, broadly lanceolate, dentate leaf, usually having six teeth on each side, heavy mid-rib and ribs extending to the point of the teeth, from two to five lines in width and from six to twelve in length; the stem is red and woody, and the leaves give a minty flavour when chewed, which is fully represented in the fluid extract.

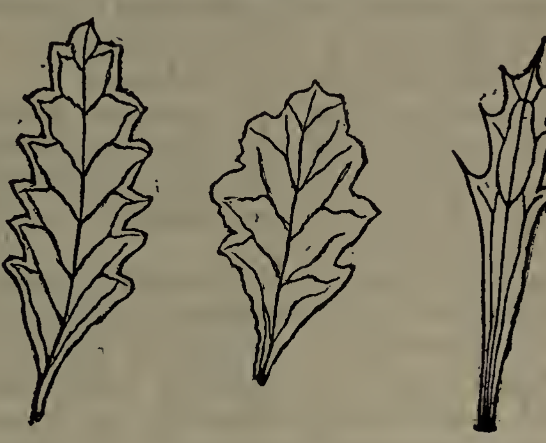
Fig 1. Fig. 2. Fig. 3.

(The full size.)

The San Francisco damiana, which also claims to be derived from Mexico (Fig. 2), is a light-green obovate, deeply toothed leaf, having three and occasionally four teeth on each side, with a heavy mid-rib, and branching ribs extending to the edge. The surface is rough and both sides are covered with short white hairs; it is from two to five lines in width and five to eight in length. Its flavour, when chewed, reminds of sage; the stem is very woody, and near the apex it is quite hairy.

The three specimens found in the New York market (Fig. 3), are identical. This leaf is light-green, lanceolate, with three teeth on each side, which terminate with hard, sharp points; it has a distinct mid-rib, and is rather indistinctly veined, is from one and a half to three lines in width and four to ten in length; it is quite thick and has a rough surface with occasional black dots. To the naked eye the leaf appears to be covered with shining scales, which under the glass appear as minute resin-like globules. This is the only specimen accompanied by flowers. They are compound, with yellow florets and white pappus, the stem is woody, with green epidermis, and covered with a resinous secretion. This feature calls to mind the statement of Dr. Caldwell, that the stem was covered with a gum of peculiar fragrance; although this cannot be called fragrant, it has a distinct balsamic odour and taste. A considerable quantity of this variety was brought into the New York market, and has found ready sales; what is yet to be determined is, which is *the true damiana.*

NOTES ON TARTARIC ACID.*

BY R. WARINGTON, F.C.S.

Crystallized tartaric acid is allowed by all to have the formula $C_4H_6O_6$; it suffers no loss at 100°. In reporting analyses of tartar, etc., it is usual to express the tartaric acid in terms of the crystallized acid.

Strong solutions of tartaric acid contract on mixing with water even more than citric acid liquors. 500 volumes of a solution of sp. gr. 1·338 (bright liquor of the factory) required 505·508 volumes of water to produce 1000 volumes. 250 volumes of sp. gr. 1·3387 required 754·472 volumes of water to produce 1000. As with citric acid no rise in temperature was observed on mixing, the rise at least did not exceed ½° C.

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* Abstract of a paper read before the Chemical Society (*Journ. Chem. Soc.*, vol. xiii., p. 926).

Free tartaric acid can be determined without difficulty by titration with caustic alkali, the final reaction with litmus being much sharper than is the case with citric acid, though distinctly less sharp than with hydrochloric or sulphuric acid. The value of alkali in terms of tartaric acid may be determined indifferently by direct experiment with tartaric acid, or by calculation from the value in terms of sulphuric or hydrochloric acid.

Qualitative reactions of Tartaric, Metatartaric, and Ditartaric Acid.—With the view of distinguishing between tartaric acid and the acids which it yields on the application of heat, some qualitative experiments were made with the fused acid.

When dry tartaric acid is carefully melted, a mixture of metatartaric and ditartaric acid is produced. The author does not think it is possible to melt the dry acid without producing some ditartaric acid; the formation of this acid being readily shown by the alteration in the neutralizing power of the mass. Half a gram of powdered tartaric acid, requiring 50 c.c. of alkali for its neutralization, was spread on a watch-glass, dried at 100°, and then heated in an oil oven for six minutes at 172°; it had then just begun to fuse at the edges. Redissolved in water, it took 49·4 c.c. of alkali for neutralization. Another half gram heated to perfect tranquil fusion, the temperature not exceeding 174°, required, when redissolved, 41·8 c.c. of alkali. A third half gram heated for half-an-hour at 176°—182°, swelled up a good deal, and when redissolved required only 31·3 c.c. of alkali for neutralization.

When a solution of the fused acid* is neutralized with soda and boiled, it becomes powerfully acid; the acidification is more rapid when chloride of calcium is added. If the acidity is neutralized from time to time, and boiling continued, it will be found that the total alkali consumed by the fused acid is equal to that required previous to fusion, the whole of the ditartaric acid being reconverted into metatartaric or tartaric acid. In the second experiment mentioned above, the total acidity neutralized in an hour's boiling, after addition of chloride of calcium, was 7·8 c.c. (41·8 + 7·8 = 49·6).

A solution of fused tartaric acid is readily and completely neutralized by chalk in the cold, but at a boiling heat it is very difficult to neutralize, the continual splitting up of the ditartrate of calcium producing a fresh acidity.

If acetate of calcium is added to a pretty strong solution of fused tartaric acid, a flocculent precipitate is formed, which, on heating, agglutinates, becomes perfectly plastic, and in its purest form can be drawn out into transparent threads. If the solution of the acid be weak, acetate of calcium produces no immediate precipitate, but if alcohol is added a bulky precipitate is produced, which on heating agglutinates and becomes plastic as before. Solutions of fused tartaric acid, treated with excess of calcium acetate, also produce on standing a crystalline precipitate of calcium metatartrate.

The plastic precipitate the author considers to be ditartrate of calcium. It is easily soluble in cold water, and the solution neutralized with soda and boiled becomes strongly acid. A further proof is afforded by the fact, that if a pretty strong solution of fused tartaric acid is treated with excess of potassium acetate, and the metabitartrate precipitated and filtered off, the filtrate gives the reaction of the plastic salt quite plainly, but the metabitartrate dissolved in dilute nitric acid gives with acetate of calcium only a crystalline precipitate of calcium metatartrate. The statement of Braconnot that metatartrate of calcium can be obtained as a "viscid mass" ('Gmelin's Chemistry' *in loco*) the author is inclined to think erroneous, and that it was the ditartrate which he had in view.

Ordinary tartaric acid treated with acetate of calcium yields, even in dilute solutions, a crystalline precipitate of calcium tartrate. Free tartaric acid is also precipitated by chloride of calcium in the presence of alcohol; the fused acid is less easily precipitated.

A curious form of tartrate of calcium occurs when the tartrate crystallizes from cold dilute solutions which are at rest. The first crystals are usually of the ordinary kind, then tufts of long fine needles begin to appear, and exquisite stars and parachutes of needles are seen floating in the liquid. The growth of these needles may become so great that the solution is changed into a magma by their interlacing. But this form is not permanent, the needles soon begin to diminish, and in a day have generally altogether disappeared, leaving in their place only a small bulk of the ordinary salt. These needles appear in a variety of solutions; but as they were observed when only tartaric acid and lime-water were present, the author has no doubt that they are really tartrate of calcium, and not a double salt containing alkali. Racemate of calcium crystallizes under similar circumstances in feather-shaped crystals, quite distinct from the needles of the tartrate.

Barium tartrate also assumes a very characteristic form. If chloride of barium be added to dilute sodium or ammonium tartrate, or if barium acetate be added to tartaric acid, the precipitate is at first generally bulky and flocculent, but in a few hours this precipitate disappears, and the sides of the vessel become coated with clear globular masses. Acetate of barium produces this salt even in a 1 per cent. solution of tartaric acid.

When acetate of lead is gradually added to a boiling solution of tartaric acid, the precipitate at first redissolves, and then suddenly comes down as a heavy precipitate of microscopic needles. With a solution of fused tartaric acid, the reaction is very different. A curdy precipitate is produced, which speedily shrinks into a mass which is plastic while hot, and brittle when cold. The solution crystallizes on cooling, small rectangular, or nearly rectangular plates being a common form of the crystals. During cooling clear globular masses are also sometimes deposited on the sides of the vessel. The same globular salt is obtained when a hot solution of the fused acid is treated with carbonate of lead not in excess, and the filtered liquor allowed to cool. It may also be obtained by precipitating a solution of the fused acid with acetate of lead in the cold, saturating dilute nitric acid with the washed precipitate, and pouring the nitric solution into boiling dilute acetate of ammonium; on cooling the globular salt is deposited. The globular salt redissolved in nitric acid yields the plastic salt in perfection on the addition of lead acetate. The following facts seem to prove that neither of these salts is a metatartrate:—The plastic body decomposed with sulphuric acid yields a solution which neutralized with soda and boiled becomes acid. A solution of metabitartrate of potassium in nitric acid yields a curdy precipitate with acetate of lead, but the precipitate i scarcely coherent. The globular body is formed most freely when the tartaric acid has been kept rather long in fusion. A specimen of the globular salt, obtained by the carbonate of lead method, was dried over oil of vitrol heated to 120° it lost 4·04 per cent., at 150° the total los was 4·67 per cent.; it had then become slightly brownish The oxide of lead, determined as sulphate, was 55·05 per cent. of the original salt, 57·37 per cent. at 120°, and 57·74 per cent. at 150°. The results agree best with Fremy's tartralate of lead ($C_{16}H_{16}Pb_3O_{23}$), containing 56·0 per cent. of lead oxide. Fremy's tartralates are intermediate in composition between metatartrate ($C_8H_8M_2''O_{12}$) and ditartrates ($C_8H_8M''O_{11}$).

A solution of fused tartaric acid gives with acetate o potassium a precipitate of acid potassium metatartrate in dilute solutions this precipitate forms far more slowly than in the case of tartaric acid; the precipitate is also more bulky, and less crystalline. Both the potassium and ammonium acid metatartrates are decidedly more soluble than the corresponding tartrates.

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* The acid employed in all these experiments was powdered tartaric acid, heated till complete tranquil fusion was attained, and no longer; tartralic acid was therefore probably not formed

Tartrate of Calcium —The neutral tartrate of calcium is known to have the composition, $C_4H_4CaO_6,4H_2O$; it is stated in 'Gmelin's Chemistry' to have the compositions when dried at 100°, though two out of the three analyses quoted show a higher percentage of lime. Finding that some tartrate of calcium obtained from old liquor contained only 1—1½ molecule of water after drying in the water-bath, the author was led to inquire if this was also the case with normal tartrate of calcium.

Rochelle salt was precipitated with chloride of calcium, and the washed precipitate dried over oil of vitriol. The tartrate of calcium thus obtained lost 17·78 per cent. of its weight in the water-bath, and had not then quite ceased to lose ; when removed from the bath it contained 11·0 per cent. of water. At 200° the total loss of water was 26·83 per cent. ; the formula, $C_4H_4CaO_6,4H_2O$, requires 27·69 per cent.

As the tartrate experimented with above contained a little alkali, it was redissolved in cold hydrochloric acid, a little chloride of calcium added, and then ammonia in slight excess. On stirring, the tartrate of calcium came down as a perfectly white highly crystalline salt ; it was thoroughly washed, and dried over oil of vitriol. Placed in the water-bath this tartrate lost in six hours 14·45 per cent., at the end of 24 hours the total loss was 15·97 per cent., and it was still losing weight very slowly. The salt was then ignited, and the lime determined as sulphate. By calculation it appeared that the salt dried over oil of vitriol contained 21·66 per cent. of lime ; the formula, $C_4H_4CaO_6,4H_2O$, requires 21·54 per cent.; the substance used was thus the normal tartrate of calcium. After 24 hours in the water-bath the salt would contain, lime 25·78, and water (assuming the normal formula for the original salt) 13·94 per cent. The nearest formula to these numbers is $C_4H_4CaO_6,1\frac{1}{2}H_2O$, which requires 26·05 per cent. of lime, and 12·56 per cent. of water. It is evident, however, from the slowness with which the water was given off, that tartrate of calcium has no definite composition at 100°.

Solubility of Bitartrate of Potassium.—In the author's experiments on the solubility of bitartrate of potassium in water a refined tartar was used containing 99·33 per cent. of real bitartrate, with a little tartrate of calcium ; which, though not chemically pure, was much purer than any cream of tartar. The amount of bitartrate dissolved was determined with standard alkali. 100 parts of water dissolved:—

at 14°	·431	parts bitartrate,	or 1 in 232,
at 22°	·600	„	or 1 in 167,
at 80°	4·027	„	or 1 in 25.

These numbers agree with those obtained by Chancel, whose results are for 14° ·434, and for 22° ·598 of bitartrate in 100 of water, but are below those obtained by Alluard, namely, ·468, ·636, and 4·500, and are still further below the numbers obtained by Kissel for the first two temperatures, namely, ·479 and ·657. Supersaturated solutions of bitartrate of potassium are obtainable by cooling without agitation.

The solubility of bitartrate of potassium is greatly affected by the presence of certain salts. If to a cold saturate solution of the bitartrate, crystals of chloride, sulphate, or nitrate of potassium are added, a considerable precipitation of the bitartrate speedily takes place. The same effect follows the addition of Rochelle salt ; but acetate and citrate of potassium, and chloride of sodium, produce no precipitate.

Different acids also very differently affect the solubility of bitartrate of potassium. In a series of experiments on this subject, various dilute acids of nearly the same acidity were digested with excess of powdered bitartrate, the solutions filtered, and the increased acidity of the filtered solutions determined. The solubility of bitartrate in acetate and citrate of potassium was at the same time ascertained. For this purpose, solutions of acetic and citric acid of known acidity were exactly neutralized with solid caustic potash, then digested with excess of bitartrate of potassium, and the acidity of the resulting solutions determined.

The solubility of the bitartrate in water was also determined for comparison. The data and calculated results are shown in the following table. All the experiments were made at 14° C.

	Grams of acid or salt in 100 c.c.	Original acidity of solution.	Increase of acidity after digestion with bitartrate.	Grams of bitartrate dissolved in 100 c.c.
Water	—	—	8·5	·422
Acetic acid ($C_2H_4C_2$)	·8106	51·2	8·5	·422
Tartaric acid ($C_4H_6O_6$)	1·0331	52·2	6·5	·322
Citric acid ($C_6H_8O_7$)	·8448	49·7	11·0	·546
Sulphuric acid (H_2SO_4)	·6853	53·0	34·3	1·701
Hydrochloric acid (HCl)	·5037	52·3	39·3	1·949
Nitric acid (HNO_3) ..	·8445	50·8	39·7	1·969
Potassium acetate ($C_2H_3KO_2$)	1·3875	[53·6]	15·0	·744
Potassium citrate ($C_6H_5K_3O_7$)	1·3966	[51·5]	17·0	·843

It is seen from this table that acetic acid has no effect on the solubility of bitartrate of potassium, that tartaric acid diminishes the solubility, that citric acid produces a small increase of solubility, while with sulphuric, hydrochloric, and nitric acid, the increase of solubility is very considerable. If we take these acids in the proportion of their chemical equivalents, that is in quantities of equal neutralizing power, nitric acid appears to exert the greatest solvent action ; but if we take equal weights of each acid, hydrochloric acid has the greatest effect. The table also shows that neutral acetate and citrate of potassium have actually a greater solvent power for bitartrate than is possessed by equivalent quantities of their respective acids.

If crystals of chloride, sulphate or nitrate of potassium are added to the acetic or citric acid solution, a considerable precipitation of bitartrate speedily takes place. If the same salts are added to the hydrochloric, nitric, or sulphuric acid solutions, considerable precipitation also occurs, but rather more slowly ; the sulphuric solution is perhaps the most difficult to precipitate. Nitrate of potassium has decidedly less efficacy as a precipitant than the chloride or sulphate.

When solutions of bitartrate in acetate or citrate of potassium are treated with crystals of sulphate of potassium, a very small precipitate is slowly formed. When similar solutions are treated respectively with acetic and citric acid a rather larger precipitate is produced; but the addition of sulphate of potassium together with these acids produces an immediate and very considerable precipitation of bitartrate.

These facts will be seen presently to have a direct bearing on the quantitative determination of tartaric acid, and the above trials were mostly made as test experiments with this object in view.

Lees, Argol, and Tartar.—The materials from which tartaric acid is made may be classed as lees, argol, and tartar. Lees is the solid matter collected from the bottoms of the fermenting vessels. Argol is the thin crystalline crust deposited on the sides of these vessels. Tartar is manufactured from the two former by a rough process of extraction with hot water and crystallization. Italy is the great producer of the tartar exported to England ; a smaller quantity comes from France. Other European countries export no tartar ; but lees and argol are obtainable from all wine-producing countries having easy communication with the sea. The quantity of tartar exported by a country depends not only on the extent of its home consumption, but very greatly on the fact whether the wine is plastered or not. If the wine is plastered, the lees contain tartrate of calcium instead of acid tartrate of potassium, and consequently there is little material from which tartar can be made.

The influence of plastering on the composition of lees is very great. Analyses of lees classified according to the countries from which they were exported, and the average composition of the lees of each country calculated, gave the following results :—

	Tartaric acid as		
	Bitartrate of potassium	Tartrate of calcium.	Total tartaric acid.
Italian lees (33 samples)	24·1	6·1	30·2
Greek lees (14 samples)	19·9	11·8	31·7
French lees (9 samples)	17·3	6·0	23·3
Ditto (30 samples)	5·3	20·5	25·8
Yellow Spanish lees (59 samples)	8·7	18·2	26·9
Red Spanish lees (17 samples)	8 8	17·4	26·2

The tartaric acid in Italian lees is seen to exist almost entirely as acid tartrate. In the 33 samples of Italian lees there is only one in which the neutral tartrates exceed the acid tartrate, and the excess in this case is but small. In the 14 Greek lees there are two in which the neutral tartrates considerably exceed the acid tartrate ; the remainder are similar in composition to the Italian lees, containing, however, rather more tartrate of calcium. Plastering is known to be practised in the island of Crete. The French lees have been divided into two classes. The first includes all in which the acid tartrate exceeds the neutral tartrates. The composition in this case is similar to that of the Italian lees, though the lees are poorer in tartaric acid. In the second, and larger class of French lees, the neutral tartrates greatly exceed the acid tartrate. These lees have undoubtedly resulted from plastered wines. It is probable that some of the lees in this second class are really Spanish lees reshipped from the south of France. It is well known, however, that in the southern districts of France plastering is largely practised. Of the 59 yellow Spanish lees there are only eight in which the acid tartrate exceeds the neutral tartrates ; the excess of acid tartrate is in these instances but small, and only in one case equals the average excess in Greek lees. In the 17 red Spanish lees there are two instances of an excess of acid tartrate over neutral tartrates. Judging from these analyses of lees, it may be concluded that plastering is all but universal in Spain, common in the South of France, occasional in Greece, and unknown in Italy.

The amount of sulphates contained in lees of course depends very much on whether or not plaster has been used, and thus becomes another indication of this practice. Of 12 Italian lees noted, 7 contained a "trace," and 5 a "small," quantity of sulphuric acid. Of 50 Spanish lees 7 contained a "small," 18 a "considerable," and 25 a "very considerable" quantity of sulphuric acid. Few other descriptions of lees came under notice. Two Greek lees were noted, 1 as "small," and 1 as "considerable." Three French lees, 1 as "considerable," 2 as "very considerable." Three Sicilian lees were noted, 1 as "small," and 2 as "considerable." Quantitative determinations of sulphuric acid were made in four Spanish lees ; the amounts found were equal to 6·51, 12·32, 12·93, and 13·67 per cent. of gypsum.

A sample of the "Yeso," or plaster, which is employed in Spain, obtained through the kindness of the manager of La Andaluza Wine Company, in the condition of a coarse white powder, had the following composition :—

Water (at 150°)	3·00
Matter lost at low red heat . .	·64
Lime	36·15
Magnesia	2·92
Ferric oxide	·30
Sulphuric acid	47·61
Carbonic acid	4·76
Sand	2·70
	98·08

The acids determined are not quite sufficient for the bases. In addition to the above ingredients, a small quantity of sulphuretted hydrogen was detected on treating the substance with an acid. The amount of carbonate is considerable, equivalent to 10·82 per cent. of carbonate of calcium.

The yeso is trodden with the grapes, about 10 lbs. being added to the quantity of grapes required to make a butt of wine (108 gallons). This proportion is nearly 1 per cent. Chancel mentions 1 per cent. (1 kilo per hectolitre) as being a usual proportion in the south of France. The yeso is used equally for red and white wines, but is not employed in the preparation of the sweet wine, "vino dulce," made from over-ripe grapes for the purpose of tempering sherry.

The action of sulphate of calcium on wine has been thoroughly studied by Chancel (*Compt. rend.*, lx., 408), and by Bussy and Buignet (*Compt. rend.*, lx., 200 ; *J. Pharm.* [4], ii., 5). When an excess of gypsum, free from carbonates, acts either on an aqueous or alcoholic solution of bitartrate of potassium, the potassium parts with half its tartaric acid, taking sulphuric acid in its place, and a precipitate of tartrate of calcium is formed. The action of the gypsum ceases as soon as one-half of the tartaric acid has been removed. The resulting solution contains, according to Chancel, neutral sulphate of potassium and free tartaric acid; according to Bussy and Buignet the acids are distributed, and bitartrate and bisulphate of potassium are present in equal proportions. The weight of evidence, the author thinks, favours the latter view. The acidity of the solution is unchanged by the action of the gypsum. The action described is that which must take place when pure calcium sulphate is added to wine after fermentation is completed.

When, however, gypsum is added to the must the effects produced are far more considerable. If a cold saturate solution of bitartrate of potassium is divided into two parts, one treated with gypsum, the other not, and alcohol is gradually added to each, so as to represent the change which occurs by fermentation, it will be found that the acidity of the solution containing no gypsum rapidly falls, from the precipitation of the bitartrate of potassium by the alcohol, while the acidity of the plastered solution does not fall till the amount of alcohol becomes considerable, and then only to a small extent, so that at the end of some days the plastered solution is found to be far more acid than the other.

It appears, then, that the addition of pure plaster to must saturated with bitartrate of potassium will produce a wine of much higher acidity than unplastered wine from the same grapes, and that this increased acidity will consist in great part of acid sulphate of potassium. The action of sulphate of calcium in increasing the acidity of a wine is, according to Chancel, carried still further, from the fact that grapes contain in their pulp undissolved bitartrate of potassium. When there is no plastering, this bitartrate can never come into solution, but when the plaster decomposes the bitartrate already dissolved, the liquid becomes capable of dissolving more, and a fresh action is set up.

The above reactions are produced by pure sulphate of calcium ; the results are modified when the plaster used contains carbonates. These will, of course, tend to diminish the acidity of the wine, and thus more or less counteract the acidifying effect of the sulphate of calcium. The carbonates in the yeso received from Spain are not easily attacked by a cold solution of bitartrate of potassium. On mixing two grams of yeso with 200 c.c. of a cold saturate solution of bitartrate of potassium, and stirring frequently for an hour, the neutralization effected was equal to only one-sixth of the carbonates present ; on boiling the mixture for ten minutes, the neutralization was equivalent to one-half the carbonates present. To ascertain more exactly the effect which these carbonates would produce on the acidity of a wine, a set of experiments was made similar to that just described, yeso being substituted for the pure gypsum then used, from which it appeared that the carbonates of the yeso exercise nearly their full neutralizing power. The acidity of the alcoholic fluid is, however, diminished far more than can be accounted for by the action of the carbonates. The acidity of the solutions treated with yeso was in both cases less at the close of the experiment than the acidity of the unplastered solution, and this not because the acid tartrate of potassium has been neutralized to this extent, but because it has been thrown out of solution, for a considerable quantity was found in the solid matter at the bottom of the flask. The presence of this precipitated bitartrate in solutions of such low acidity further shows that the solubility of bitartrate in alcoholic solutions treated with yeso was less than in pure alcohol of the same strength. We have here the key to the greater neutralization effected by the yeso. The carbonates of the yeso neutralize the acid sulphate of potassium formed by the action of the sulphate of calcium, neutral sulphate of potassium is thus produced, and the presence of this salt diminishing the solubility of bitartrate of potassium (as we have seen in an earlier section of this paper) the acidity of the solution is finally reduced to a lower point than that of the unplastered liquor.

The carbonates of natural plaster, therefore, will have a greater effect in diminishing the acidity of a wine than is due to their own neutralizing capacity, and the nett result of plastering is probably in all cases the diminution of the acidity of the wine, and the introduction into it of neutral sulphate of potassium.

Besides plaster, other substances are sometimes added to wine, and affect the composition of the lees. "Spanish earth" is commonly employed in Spain for the purpose of fining the wine, and is sometimes used by English wine-merchants for the same purpose.

It appears to be a tolerably uniform substance, answering to the following physical description :—"Earthy, more or less coherent, fragile; slightly soapy in feel; impressible by the nail, and yielding a polished streak; strongly adherent to the tongue; evolving an argillaceous odour when breathed upon; varying in colour from a pale warm grey in the more compact varieties to a light buff in the less coherent and more sandy specimens; hardness 1 to 1·5." Some specimens contain many fragments of shells. When rubbed in the hands under water, Spanish earth is resolved into an unctuous paste, and is in this condition applied to the wine which it is desired to clarify. The chemical characters of Spanish earth are very uniform, it consists of a hydrated silicate of aluminium, iron, and magnesium, with a variable quantity of sand. Lime is absent, or occurs only as a trace; a trace of carbonic acid is sometimes present. Boiled with dilute hydrochloric acid it is sufficiently decomposed to yield abundant evidence of magnesia.

A specimen of light colour and smooth texture, was submitted to quantitative analysis; it was decomposed with sulphuric acid; the sand and silica were separated with solution of sodium carbonate. The percentage results were as follows:—

Water, lost over Oil of Vitriol . .	7·69
Loss on ignition.	9·84
Sand	11·01
Silica	47·92
Ferric Oxide	5·24
Alumina	6·05
Magnesia	11·27
	99·02

This specimen of Spanish earth contained no lime or carbonic acid, also no phosphoric acid; a part of the iron was in the ferrous state. There was no blackening on ignition. At a white heat the substance fritted, and fused at the edges.

Resin is another substance which may occasionally be present in lees; it is applied in Greece as an internal coating to the wine casks. Samples of lees have occasionally been met with possessing a distinct odour of pine-resin.

The general composition of the lees of various countries has been already given, so far as their contents in tartaric acid is concerned, the following analyses show the other ingredients present:—

	I. French Lees.	II. Spanish Lees.	III. Spanish Lees.
Tartaric acid as acid tartrates...	4·48	5 27	22·66
Tartaric acid as neutral tartrates	21·34	19·13	11·67
Total tartaric acid	25·82	24·40	34·33
Water at 100°	11·305	10·694	9·750
Sand	4·600	4·900	4·730
Silica	2·130	1·960	
Ferric oxide	·394	·351	·214
Alumina....................................	·844	·832	·578
Phosphoric acid	·527	·486	·569
Lime	10·567	10·600	4·514
Magnesia	·327	·363	·209
Potash......................................	1·868	2·123	7·115
Soda	·100	·060	—
Sulphuric acid	4·566	5·729	—
Chlorine	·040	·042	—
Carbonic acid	·435	·388	—
Tartaric anhydride	22·721	21·472	30·210
Combined water *	5·904	5·552	4·159
Vegetable matter.....................	33·672	34·448	[37·952]
	100·000	100·000	100 000

The French lees is so similar in composition to the first Spanish lees, that it seems probable that the French lees was really a Spanish lees re-shipped (as is the custom) from the South of France. The second Spanish lees (III) is of high quality, and must be the product of an unplastered wine. The lees I and II are undoubtedly plastered.

The sand, soluble silica, and alumina in lees, may arise from soil adhering to the grapes, or from the Spanish earth employed to clarify the wine. The magnesia may also arise, in part, from the employment of Spanish earth. The phosphoric acid is doubtless precipitated from solution as phosphate of iron or aluminium. Carbonates can hardly be original constituents of pure lees, but may arise from a subsequent admixture of dirt or soil, or from a decomposition of the tartrates, which readily takes place when the process of sun-drying is inefficiently performed. Carbonates may also possibly be a residue of yeso used in such coarse powder as to be only partially acted on. In some cases, however, carbonate of calcium is present in such large quantity, and in particles of such size and purity, that it must have been intentionally added, either to diminish the acidity of the wine, or as a direct adulteration.

The vegetable matter of lees contains much nitrogen. Nitrogen was determined in the insoluble residue of a Spanish lees remaining after extraction with hot hydrochloric acid and water, the amount found was 3·24 per cent of the dry matter. A similar residue from a French lees gave 3·07 per cent. of nitrogen. As these residues contained a good deal of sand, the percentage of nitrogen in the vegetable matter would really be much higher than these figures indicate. Wine lees have been commonly employed as manure in the countries where they are produced; they are well suited for this purpose from the considerable quantity of nitrogen and potash which they contain.

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* In calculating the combined water, it is assumed that the tartrate of calcium retained half its water, and the gypsum one-fourth its water at 100°.

Argol exhibits a wide range of composition, containing from 40 to 70 per cent. of tartaric acid. Very low argols resemble superior lees, while first-class argols are equal to ordinary tartar. In argol, even of low quality, the tartaric acid is chiefly present as bitartrate of potassium. Small lumps of melted sulphur are not unfrequently found associated with argols. They probably arise from the sulphuring of the casks. Rather large quantities of sulphur are often burnt in wine casks before the introduction of the wine; this fact should not be forgotten by analysts who look on the presence of sulphates in the wine as evidence of plastering.

Tartar, as already mentioned, is manufactured from lees or argol, by extraction with hot water and crystallization. The highest quality tartars are those of south Italy and Messina, they contain about 76 per cent. of tartaric acid, and in some instances reach as much as 77[*] per cent. Of this tartaric acid 1½—3½ exists as neutral tartrate of calcium. The good ordinary Italian tartars, as those of St. Antimo or Naples, contain 74—75 per cent. of tartaric acid, of which 3—4½ exists as calcium tartrate. Vinaccia tartar[†] is of poorer quality; it will contain 70—73 per cent. of tartaric acid of which 5—7 per cent. will exist as neutral tartrates. Of French tartars I have but little experience, they appear to contain more tartrate of calcium than good Italian tartars. The following tolerably complete analyses by Mr. Grosjean of Messina and St. Antimo tartar will serve to compare with the analyses of lees already given. Sulphuric acid was unfortunately not determined.

	Messina Tartar.	St. Antimo Tartar.
Tartaric acid as acid tartrate	74·05	69·34
Tartaric acid as neutral tartrates	2·60	4·66
Total tartaric acid	76·65	74 00
Sand	·140	·425
Silica	·055	·130
Ferric oxide	·053	·086
Alumina	·021	·092
Phosphoric acid	0·41	·068
Lime	1·081	1·778
Magnesia	·025	·041
Potash	[23·236	[21·773]
Tartaric anhydride	67·408	65·120
Combined water	5·688	6·396
Water, vegetable, and undetermined matter	2·252	4·091
	100·000	100·000

The potash in the above analyses is calculated from the acidity of the tartar.

(*To be continued.*)

THE DETECTION OF ARSENIC.[‡]

BY C. PATROUILLARD.

One of the most characteristic reactions of arsenic is that given by arsenious acid in acid solution in the presence of sulphuretted hydrogen or a soluble sulphide, in the production of a yellow flocculent precipitate of tersulphide of arsenic soluble in ammonia and alkaline liquids. But in the detection of arsenic acid, sulphuretted hydrogen acts more slowly and less surely than with arsenious acid.

The brick-red precipitate given by arsenic acid in the presence of neutral nitrate of silver is very characteristic; but in a great number of cases this reaction may be masked by the simultaneous formation of chloride of silver, as the alkaline and alkaline-earth salts of commerce always contain variable proportions of chlorides. Hence it is preferable to convert the arsenic acid into arsenious acid, and for this purpose either sulphurous acid, according to Wohler's method, or hyposulphite of soda is principally used. Sulphurous acid dissolved in water is a very unstable reagent, and its preparation is sometimes attended with inconvenience. Hyposulphite of soda is suited rather for the estimation of arsenic than to reveal clearly its presence; for the precipitate of arsenic produced is always accompanied by "milk of sulphur" that masks the colour and may mislead as to its presence.

The author prefers to employ as a reducing agent crystallized oxalic acid, and operates in the following manner. 10 to 15 grams of the salt to be tested are dissolved in about 50 grams of distilled water; 50 centigrams of crystallized oxalic acid are added, and the solution is boiled for about five minutes. The solution is then filtered if necessary, and when it has slightly cooled, it is acidified pretty strongly with sulphuric acid (in preference to hydrochloric acid, because frequently the hydrochloric acid of commerce, though sold as pure, is arsenical). Into this acidulated liquor is passed a current of sulphuretted hydrogen gas, or a few drops of solution of sulphydrate of ammonia in glycerine are carefully poured into it. If the salt tested contains 2 per cent. of arseniate of potash, for example, the yellow flocculent precipitate of tersulphide of arsenic is instantly formed. If it contains less than 1 per cent., the precipitate does not appear directly; the vessel should therefore be covered, and set on one side, and after an hour or two the precipitate will have formed. In some cases it is necessary to wait even three or four hours. When it is desired to test a carbonate or bicarbonate, it should first be saturated with pure sulphuric acid.

Instead of using oxalic acid, the reduction may be effected by the neutral oxalate of ammonia employed in the same proportion. In this reaction, as in all others where oxalic acid acts as a reducing agent, arsenic acid in passing to the state of arsenious acid loses two equivalents of oxygen which are taken up by the oxalic acid, transforming it into carbonic acid.

SOLUTION OF CITRATE OF MAGNESIUM.[*]

BY A. G. SCHLOTTERBECK.

The last revision of the United States 'Pharmacopœia' presents a changed formula for the above preparation, by the substitution of carbonate of magnesium in place of magnesia. This change is undoubtedly a great improvement, although the resulting preparation is still unsatisfactory on account of its turbidity and a certain floccular deposit which will show itself in the course of a very short time after completion.

In experimenting to produce the solution free from the above-named objections, without deviating from the formula of the United States 'Pharmacopœia,' I find that the following *modus operandi* will give the desired result:—

℞.—Magnesii Carbonatis	gr. cc
Acidi Citrici	gr. cccc
Syrupi Acidi Citrici	f ℥ii
Potassii Bicarbonatis	gr. xl
Aquæ Puræ	q. s.

Dissolve the citric acid in four fluidounces of water, and, having added the carbonate of magnesium, previously rubbed through a sieve of about 30 meshes to the square inch, stir until it is dissolved. Then add the syrup of citric acid and sufficient water to make the mixture measure eleven fluidounces. Filter this product and introduce into a suitable bottle.

Then dissolve the bicarbonate of potassium in one fluidounce of cold water; filter this solution, and add to the solution of citrate of magnesium contained in the bottle, which must be closed with a cork, and secured with wire or twine.

Solution of citrate of magnesium made in the above way will look clear and bright, and will retain its transparency for any length of time.

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[*] Pure bitartrate of potassium would contain 79·7 per cent. of tartaric acid.

[†] Vinaccia tartar is made in various parts of Italy and France, from the solid matter of the grape remaining after the must is expressed. This solid matter is fermented, distilled, and tartar made from the residue.

[‡] Abstract of paper in *Répert. de Pharmacie*, iii. 582.

[*] *Am. Jour. Pharm.*, Nov. 1875

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 27, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PROJECTED PHARMACEUTICAL CHEMIST (IRISH).

WE regret that it is still impossible for us to place before our readers any information that would serve to indicate in a positive manner what is to be the character of the examination by which the Council of the Pharmaceutical Society of Ireland intends to gauge the qualification of pharmaceutical chemists under the new Act. All attempts in this direction have either failed to elicit any reply at all, or have at most produced only an evasive response. A letter addressed on the 22nd inst. by the Secretary of the Pharmaceutical Society of Great Britain to Sir DOMINIC CORRIGAN, the President of the Council, with that object, still remains unanswered. Another letter, addressed to Mr. FENNELL, College of Physicians, Kildare Street, Dublin, who has been referred to as competent to give any information required, has simply been answered by an intimation that the letter shall be laid before the Council of the Pharmaceutical Society of Ireland at its next meeting.

In any case the question naturally suggests itself—what is the meaning of this mysterious reticence? Is it to be attributed to the bashfulness of the Council of the young Society, or to a sense of shame that the examination it is reported to have agreed upon is so far inferior to that required for the qualification of pharmaceutical chemists in Great Britain? Or can it be that the Council, regardless of past protestations that, in Ireland, at least, the standard of pharmaceutical qualification must not on any account be lowered to the level required for the chemist and druggist, is now, for the sake of plenishing its coffers, endeavouring to slip through the ordeal of Privy Council approval a system of examination totally inadequate to secure any kind of competence for the dispensing of medicines?

We hesitate to adopt any one of these views; but at the same time it is impossible to avoid the suspicion inspired by the evident disinclination to furnish any account of what is being attempted, or what is intended. This feeling of suspicion is moreover strengthened by facts that have recently come to our knowledge, in regard to the intended regulations for the qualification of pharmaceutical chemists in Ireland, and their circulation in a printed pseudo-official form throughout the country, much as a wholesale trader's circular, with an intimation that a cheap article was now in the market, and buyers had better come forward promptly. It is true that we are not in a position to state that this has been done by the Council of the Irish Society, or that this has been done with its sanction and approval; but at any rate it has been done by individual members of the Council; the President of the Council has been made aware of the fact, but he remains silent, and on the part of the Council there is neither recognition nor repudiation of this proceeding.

We have been disposed hitherto to regard as premature, if not altogether unfounded, the reports that have been put in circulation mainly by the *Medical Press and Circular* as to the contemplated nature of the Irish Pharmaceutical Society's examination, which, as described by those reports, we have already characterized as being inferior even to the standard of the minor qualification of the chemist and druggist. We have been induced to adopt that belief, because one of the chief arguments urged against the extension of the Pharmacy Act of 1868 to Ireland, was the disinclination to have such a reduction of the standard of pharmaceutical qualification as would thus have been involved by the establishment of a class of chemists and druggists in Ireland. But it would be affectation now to refuse accepting these reports as having some kind of foundation in fact or intent, and as we perceive the journal just mentioned has this week announced that the programme of subjects of examination of the Irish Pharmaceutical Council, as printed in that journal the week before last, has now been finally adopted, we feel justified in calling upon the Council to state whether this statement is correct or not.

If, in addition to our own opinion of the miserably insufficient nature of the alleged programme in regard to conferring the qualification of pharmaceutical chemist, any further justification were needed for condemning the course of action that the Council of the Irish Society is reported to be taking, we do not require to go beyond the pages of the journal abovementioned. We there find our opinion fully endorsed by Dr. REUBEN BOLTON of Belfast, who, in a letter on this subject, condemns the creation of an inferior class of dispensers as a proceeding unsupported by any existing necessity. Surely it cannot be contended that the class of dispensers proposed to be created during "the year of grace" can be anything else than inferior in regard to all requirements essential for the public safety, even though they should be legally dubbed pharmaceutical chemists, after the performance of the farce of a "comparatively easy" examination by an impecunious society. That under existing conditions the examination would be "easy" may well be inferred from the tempting solicitations held out to candidates for "pharmaceutical" qualifications, and we can imagine the Society will not be extra willing to create any occasion for returning the receipts "of having paid the fee of five guineas into the Royal Bank to the credit of the Society," which, according to the most pertinent of the regulations, candidates for pharmaceutical qualifications are required to lodge.

We trust, however, that the Privy Council of Ireland will not be misled into giving its sanction to a scheme of examination so totally inadequate for the purpose of providing duly qualified dispensers, and of certifying that the persons licensed in such a manner are qualified to perform the functions of pharmaceutical chemists. But if that should prove to be the result, our congratulations on the establishment of the pharmaceutical chemist qualification as the sole standard in Ireland must give place to profound regret that the proceedings of the Irish Society will have only resulted in debasing the creditable character that has already been to some extent associated with this title, by those who have endeavoured to give practical reality to the aspirations of William Allen, Jacob Bell, and Thomas Morson.

REGISTRATION OF TRADE MARKS.

The paper read by Mr. Wood at the Society of Arts last Wednesday on this important subject fell short of furnishing the chief desideratum—viz., specific information as to the nature of the regulations under which the Act of this year is to be carried out when it comes into operation at the beginning of next year. These regulations have not yet been published, and we have some reason for believing that they are yet far from having been definitely framed.

Failing this essential supplement to the Act, it was, therefore, only possible to give a general *résumé* of the policy and utility of trade marks as a means of protecting manufacturers as well as the public from imposition. But these advantages of an efficient method of registering trade marks will scarcely be questioned by any one, and consequently there is but little necessity for their elucidation. As regards the more important question of the mode in which the Act is to be carried out the reader of the paper was only able to speak in a speculative manner, and to offer his own views as to the particular details to be adopted in the regulations.

The chief points referred to in the paper were the following:—

1. As to novelty and the question how far the responsibility of search should be thrown upon the registrar, or upon the applicant, Mr. Wood was of opinion that until all existing trade marks are entered upon the register, a great many difficulties will arise, and on account of the frequent similarity of such marks, as shown by the fact that a large number of firms now use such marks as a crown, anchor, or eagle, he considered, that there must be at first a certain amount of laxity in registration for which there would be no excuse in the case of newly invented marks.

2. As to the classification, it was pointed out that there is extreme difficulty in so classifying different industries, that no one shall overlap the other. Thus, while a cutler and a starch manufacturer might be allowed to use the same mark, Mr. Wood thought it would be inexpedient to allow two makers of any two articles of food, however dissimilar, to designate them by the same symbol. This is indeed the chief practical difficulty of the whole scheme.

3. As to the period for which registration should hold good, Mr. Wood's opinion is that the right to a mark should lapse after a certain interval, but that it should be renewable on payment of a suitable fee.

4. As to the fee, it was considered that until some estimate can be formed of the probable number of applications, it would be impossible to fix the exact fee, but probably a fee of two guineas would suffice, with a further fee of 10*s*. for renewal of registration.

The further points of the procedure to be adopted in registering a mark, and of publishing the marks registered were also discussed, and the various difficulties connected with them were pointed out.

SOLUBILITY OF PHOSPHORUS IN ALCOHOL.

In the November number of the *Journal de Pharmacie et de Chimie*, M. Méhu, after stating that Mr. J. Ashburton Thompson, in his work 'Free Phosphorus in Medicine' (see before, p. 398), "accepts as a constant figure that absolute alcohol dissolves $\frac{1}{320}$ of its weight of phosphorus," adds some remarks upon the preparation of a saturated solution of phosphorus described by Mr. Thompson. M. Méhu says "To this saturated liquid, I should have preferred a solution of a determined weight of phosphorus in an equally fixed weight of alcohol at 95°C., for in the former case the saturation cannot be effected by an unskilful operator, and on the other hand it is never prudent to use a saturated liquid, as a lowering of the temperature would sensibly modify the strength. Finally, every one knows it is difficult to procure rigorously anhydrous alcohol."

COTO BARK.

In a communication to the *Pharmaceutische Zeitung* (Nov. 10), Herr Jobst, of Stuttgart, states that he received a specimen of Coto Bark, *viâ* London, in the spring of 1873, but delayed examining it, whilst he endeavoured, but vainly, to learn more of its origin. Early in the present year he commenced the investigation and obtained a body crystallizing in handsome prisms. This substance has the peculiar pungent taste of the bark, and, Herr Jobst thinks, possibly possesses also the therapeutic properties attributed to it. He is now engaged in a closer investigation of the subject.

BRISTOL PHARMACEUTICAL ASSOCIATION.

We learn from the Programme of Monthly Evening Meetings in connection with the Bristol Pharmaceutical Association, just received, that the arrangements comprise a series of three lectures on the Influence of Physical Laws in some of the processes employed in Pharmacy. On Friday, November 19, Mr. G. F. Schacht dealt with the Mechanical Processes, as reported on p. 435; Mr. W. W. Stoddart takes up the Chemical Processes on Friday, December 17, and Mr. A. Towerzey the Galenical Processes on Friday, January 21. The evening in February (18), is to be devoted to the reading and discussion of papers, the Council suggesting for topics, Syrup of Saffron, Compound Ointment of Subacitate of Lead, B.P., and Salicylic Acid. On Friday, March 17, Mr. L. Siebold is to lecture on Fluorescence; and on Friday, April 21, Mr. Thomas Wills is to lecture on the Relation of the Atmosphere to Plant Life. Evidently the Council of this Association is bent upon keeping up its reputation.

SOCIETY OF ARTS.

Three courses of Cantor Lectures are announced by the Council of the Society of Arts. The first course on the Discoveries and Philosophy of Liebig, with special reference to their influence upon the advancement of Arts, Manufactures, and Commerce, to be delivered by Dr. Thudichum, commenced on Monday last, the 22nd inst., at eight o'clock. The second course is to be on the Steel Manufacture, by Mr. W. Mattieu Williams; and the third on Wool Dyeing, by Mr. George Jarmain. On Friday evenings during December, January, and February, Dr. B. W. Richardson will deliver a series of Lectures based upon the results of a special inquiry into the subject of Unhealthy Trades, undertaken for the Society.

THE ROYAL SOCIETY MEDALS.

At the Annual meeting of the Royal Society on Tuesday next, the 30th inst., the Copley medal for the present year and two Royal medals are to be presented. The Copley medal has been awarded by the Council to Professor A. M. Hofmann, F.R.S., for his contributions to the science of Chemistry, and especially for his researches on the derivatives of ammonia. One Royal medal has been awarded to Mr. William Crookes, F.R.S., for his chemical and physical researches, especially those in connection with thallium, and for his discovery of the repulsion referable to radiation. The other Royal medal has been awarded to Dr. Thomas Oldham, F.R.S., for his services to the science of Geology.

SINGULAR ORIGIN OF A FIRE.

The *Stamford Mercury* is responsible for the following account of the origin of a fire by which the shop of Mr. Beardsley, Pharmaceutical Chemist, of Nottingham, has been recently destroyed. It is stated that "while Mr. Beardsley, jun., was waiting in the shop, his coat tails came into contact with the gas and took fire, and before he was aware of it he placed himself near some benzoline, which immediately ignited." The flames spread quickly and considerable damage was done; but we are glad to learn that the unwitting cause of the fire was not severely injured.

Provincial Transactions.

MANCHESTER CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual general meeting was held in the rooms of the Association, on Monday evening, November 1st, the president in the chair.

The secretary read the report for the past session, in which it was regretted the Association could not be congratulated on any advancement; in fact, a serious deterioration had taken place; the only redeeming feature being a slight increase in the balance, from £1 10*s.* 6*d.* to £2. It was hoped however, by the introduction of new blood, that the association might revive, and be of service to those for whose benefit it was designed.

The following officers were elected for the ensuing session:—President, Mr. F. R. Cooper; Vice-President, Mr. A. N. Palmer; Secretary and Treasurer, Mr. T. A. Moss; Committee, Messrs. Highmoor, Fewster, Hurst, Ridley, Hetherwick and Chatwood. Several new members were elected.

Votes of thanks to the retiring president, Mr. Lane, and to the secretary, Mr. Clegg, for their services during the past session, terminated the business of the meeting.

The first ordinary meeting of the session, was held in the rooms, Blackfriars Street, on Monday evening, Nov. 15th. The president, Mr. Cooper, in the chair.

The minutes of the previous meeting having been read and adopted, the president introduced Mr. A. N. Palmer, who commenced a most interesting and instructive lecture on "Crystallography."

Mr. Palmer not being able to complete his lecture in time, kindly promised to continue it at the next meeting, to be held on Monday evening, Nov. 29th.

HULL CHEMISTS' ASSOCIATION.

The winter course of lectures on Chemistry and Materia Medica, in connection with the above society, commenced on Friday evening, November 12th, at the society's room at the Church Institute, the lecturer appointed for the session being Mr. James Baynes, jun.

The president (Mr. Anthony Smith), attended, and in addressing the students, called their attention to the great advantages offered by their being able to attend lectures of this character, and contrasted their position with that of young men in towns where no classes were established. He remarked that Hull had compared most favourably with other large towns in the facilities it had offered for preparing for the examinations of the Pharmaceutical Society, and he felt more every year the great responsibility attached to himself and the other founders of the association in connection with providing suitable instruction for them. He felt perfectly satisfied that in Mr. Baynes they had been fortunate in securing an able lecturer, and he trusted the end of the session would show that great strides had been made.

The vice-president (Mr. George Myers) called the attention of the students to the prizes offered by the association, and stated he should with great pleasure supplement the list of donors, if at the end of the session the attendance had been good, and the progress made satisfactory.

LIVERPOOL CHEMISTS' ASSOCIATION

The third general meeting of the twenty-seventh session was held at the Royal Institution, on Thursday evening, the 18th inst., the President, Mr. A. H. Mason, F.C.S., in the chair.

The minutes of the previous meeting were read and signed, and Messrs. W. H. Ashwin, J. Simpson, F. J. Burd, and W. C. Bustard, were unanimously elected members, and Mr. A. Freeman was duly elected associate.

The President presented a specimen of Coto Bark to the museum.

Several inquiries were found in the question box, and replied to by the members present.

Mr. Thomas Garside, F.C.S., of Southport, read the following paper on "The Organic Constituents of Sewage":—

The Organic Constituents of Sewage.

BY THOMAS GARSIDE, F.C.S.,

Public Analyst for Southport.

At the time when Swift held up to ridicule the philosophers of his day, little might his readers have thought that the illustration of the satirist which was perhaps the most objectionable, on the ground of decency and good taste, pointed to a problem which should appear so important in the eyes of their descendants as to require special and urgent legislation, and that the task of the reviled *savant* of Lagado should grow to such proportions that it should actually come to pass that one of the great parties of the state, and that the one to which Swift himself belonged, should adopt it in a modified form as a part of their policy; nay, that it should seriously be charged against them at one time by their opponents, that a policy of sewage was the only one they possessed.

However this may have been there can be no question that the effectual and harmless disposal of the effete portions of the human body in such a way as not to be ruinously expensive is a thing which has sorely exercised many a municipality and many a parliamentary committee of the present day, and many a grumbling ratepayer may yet have to wish that the Lagadan philosopher had lived long enough to complete his task.

The subject naturally divides itself into two; in the first place there is the question of health which is most important and most pressing, and in the second that of pocket, which we may suppose will weigh most heavily on future generations. Where population has been thinly scattered the ordinary forces of nature with very little help on the part of the inhabitants have generally been sufficient to deprive effete matters of all noxious properties, but where men live in dense masses, the work given to the oxidizing and disinfecting powers of the atmosphere and soil at a given point is greater than they can accomplish, and especially is this the case in our own country where the habits of the people tend to concentrate all noxious matters rapidly to one vortex.

A useful lesson might be taken from the way in which nature acts in this matter. Her tendency is always to distribute these substances as quickly and as widely as possible; the conversion of organic solids into gases, and their rapid diffusion through the atmosphere is an illustration. The way in which we usually go to work is in direct opposition to this. We collect the fecal matter into masses in our privies and ashpits, where they are left festering and fermenting, sometimes for months together, or we collect it from extensive districts by water carriage and wash it in one huge volume from the sewer culverts into the nearest stream and leave it to find a channel for distribution as best it can, often down the throats of the people in the town next lower down the stream. We adopt the same policy with regard to dead bodies; we collect them together in one spot, and retard the process of decomposition. On the other hand, when a dead animal is left exposed, the sunshine and rain, with the help of active corps of little scavengers make comparatively short work with it.

The financial question is usually regarded as the key to the previous one, and the large number of patents which have been taken out having for their object the separation and ultilization of fecal matters, etc., shows how great an amount of attention has been paid to the subject.

To enter into any detail of the various schemes which have been proposed for the purification of sewage and the manufacture of manure from the separated matters would be to go beyond the province of my paper this evening. The actual accomplishment of these objects in the laboratory is a comparatively easy task, but in practice the difficulty consists in the highly diluted condition in which the useful portions are found in the case of sewage, and in the conservatism of habit on the part of people generally, which prevents the extensive adoption of those schemes, which like that of Liernur aim at keeping animal refuse from contact with the drainage of the town. The direct application of it to the land for the purpose of manure appears to be the most rational and natural method of overcoming the difficulty in the case of sewage, but the feasibility of this is apparently limited by various circumstances, such as the nature of the soil, and the position of the town. The schemes which aim at the precipitation of the various matters do not appear to have been on the whole very successful, and their failure is owing no doubt in most cases to the disproportion on the wrong side, between the value and cost of application of the precipitating ingredients and the value of the manure when made.

The transformation of the offending matter into manure appears to be almost the exclusive aim of all attempts hitherto. I believe it has been proposed somewhere, to convert the solid matters into illuminating gas, and there is also a method for making cement from it, but beyond these, I do not remember to have come across any other plan.

It has occurred to me that the problem might be attacked from another side, and my object in bringing the subject before you has been not so much to impart information, for of that I have very little to offer, as to open the question, and elicit opinion and discussion. My idea may at first sight appear to you absurd, and such it seemed to me when it first presented itself to my mind, but one or two facts which I noticed while examining some samples of sewage, led me to think that even if improbable, it might be worth such an amount of discussion and investigation as might either give it its quietus, or lead to some tangible results. I have thought, that if from the organic constituents of sewage, any substance could be obtained, which might be of such value in the arts and manufactures as to pay a considerable portion of the cost of obtaining it, and if by the same means, the sewage were rendered innoxious, the result so much desired would be achieved.

This of course is merely a statement of the aims of the schemes before mentioned; but these, as I said before, relate almost exclusively to the production of manure, and I have thought that a use for it in other directions might be found. For a long time the only use to which coal was put was for fuel; but now it needs only that I should mention the thing for you to bring to your minds the great number of useful products derived therefrom.

I do not wish you to have the impression that I expect any present relief to come to the sewage question from the quarter I suggest. I do not look for there being any lucky hits, which shall make the fortune and the fame of the investigator; I would look upon it rather as one of those subjects in which a great deal will have first to be found out, which shall apparently have no practical value, before anything of a useful nature is discovered, and the investigation must be carried out with the conviction that all accurate knowledge, however trivial it may appear, will one day be of service to mankind.

In working upon the subject in this spirit it would be necessary at first to leave out of sight entirely the commercial aspect of the question, such for instance as the extreme dilution of the substance worked upon, and to look solely to the elimination of new facts, and it is more than merely possible that such an investigation would be productive of something useful even if the particular object aimed at were not achieved.

In observing the material under consideration by the light of previous knowledge, we see that it is a heterogeneous mixture of substances of almost every conceivable kind, both solid, liquid, and gaseous, and that it varies in composition and also in the proportion of the ingredients every minute of the day. By taking large volumes into account, however, it would be correct to suppose that those ingredients which enter most largely into its constitution would be tolerably constant for any one locality and the same would hold good for other localities of sufficient area in which the nature of the soil and the habits and occupations of the people were similar. On the other hand, where these conditions varied, so would also to the same extent the general character of the sewage. In a town where waterclosets were few and where regulations for enforcing the drainage of ashpits were not enforced, the fecal element in the sewage would be but small, and again in manufacturing districts the differences of composition would be great according to the extent to which the sewers were made use of for conveying away the waste products of manufacture. It is obvious therefore, that in inquiring into the constitution of sewage these liabilities to variation must be taken into account. There are, however, certain ingredients which are pretty sure to be in tolerably large proportion in the sewage of all towns having a regular system of drainage, and there are others which are very seldom in small and usually in very large proportion. It is to these ingredients that we must confine our attention.

In seeking information on, and detailed analyses of the organic constituents of sewage, I have found very little, and that little has been chiefly with reference to its calculated value as a manure based upon the percentage of nitrogen which it contained.

The following occurs in the report of a paper read by Dr. Letheby[*] before the Metropolitan Association of Medical Officers:—"Sewage is composed of the fluid-refuse of every branch of industry, as the filth of kitchens, laundries, and dye-houses, the drainings from stables, slaughter-houses, and the public markets; the various liquid impurities of trades and manufactures; and the washings of streets and alleys with the ejecta of the inhabitants and a large volume of water. * * * The clear liquor is found to contain a large quantity of amorphous organic matter, with filaments of fungi, and it swarms with the lower forms of animal life. * * * The sedimentary matter consists of the remains of undigested food, as muscular fibre, husk and hair of wheat, the cells and starch of potato, and the tissues of vegetables, as cotton, cabbage, etc., and fibres of wool. It contains also the products of some of the secretions, as yellow biliary matter, intestinal mucus and crystals of uric acid and triple phosphate; besides the *debris* of the streets, as particles of granite, flint, and carbonate of lime, with a large quantity of black amorphous matter."

In the same paper Dr. Letheby gives the quantities of solid matter in London sewage as 94 grains per gallon, of which 32 grains were organic, and 62 grains inorganic.

I have determined the proportions in an average sample of Southport sewage to be as follows: 54 grains per gallon total, of which 37 grains were inorganic and 17 organic.

With regard to the organic matter suspended and in solution the quantity above given in the case of my own analysis was the difference between the weight of total solids when dried at 130° C., and the same after ignition. If this organic matter is calculated as flesh meat, which contains about three-fourths of its weight of water, it would represent nearly one pound of organic matter in 100 gallons of sewage at Southport, and nearly one pound in 54 gallons of that of London.

Of all the important ingredients which go to make up this organic matter, probably that which has been studied the most is urine. The chief portion of this is urea, which rapidly undergoes alteration under the influence of the mucus of the urine in which it combines with two molecules of water, forming ammonium carbonate. The most important constituent of sewage in a sanitary sense is undoubtedly the solid excreta of men and animals, as this is the chief vehicle by which the germs of disease leave the body, and will thus act as a virus to inoculate the whole of the sewage. Its composition is much more variable than that of urine, and the proximate analysis has apparently received very little attention. Consisting chiefly of the indigestible portions of food, it must vary according to the nature of the food. It contains also the bile and nitrogenized bodies partially oxidized to which the fetid odour is due. During their passage down the sewer no doubt the oxidation of these will be complete.

With regard to the proportion which these animal excretions bear to the whole of the solids it is difficult to arrive at accurate data upon which to estimate it. Possibly the phosphoric acid might furnish a ground upon which to make the calculation, as probably very little of this finds its way into the sewage from any other source. Lawes and Gilbert compute the total amount of dry solids, for each person, at 2oz. per day, and Way finds the average amount of phosphoric acid to be 30·4 grains, that is about 3½ per cent. This factor therefore would enable us to arrive at the desired estimate if the proportion of phosphoric acid in the total solids were known.

Refuse animal matters from other sources must also be present to a certain extent. Shambles and butchers' shops will supply their quota, but the chief source will be the waste from kitchens. A large portion of this will be animal fat, which the somewhat extravagant habits that prevail in ordinary cooking allow to run to waste down the sinks. As an illustration of this I may mention that a gentleman who had an opportunity of observing the fact informed me that during the repairing of a sewer connected with the kitchen of a large hotel, the drain pipes for several feet were found to be almost choked up with a hard solid fat, which he accounted for by supposing that the water in which meat had been boiled and dish water had been emptied down the drain while hot, and the temperature being speedily lowered on its way to the sewer the fat was deposited and gradually accumulated. The decomposition of albuminous and gelatinous compounds into various ammonium salts speedily takes place. When fresh sewage was distilled with carbonate of soda, the ammonia yielded was about eight times greater than that afforded by subsequent treatment with potassium hydrate and permanganate. It is well known that fats become rancid, owing to mucilaginous and albuminous bodies in the tissues in which they occur acting as a kind of ferment, and that they are comparatively stable bodies when this is quite removed. It is very probable that the fat in sewage would be subject to similar changes.

Another important item in sewage is soap; for whatever arrangements there may be in a town for the disposal of fecal matters, all the soap except a very small percentage must find its way into the drains. Hence if the amount of soap used in a town were known, the proportion of sewage matter from that source could be ascertained with tolerable accuracy. In a paper read before the Chemical Society, by Mr. Campbell, in 1857, I find it computed that the annual volume of London sewage was nearly 61,000,000,000 gallons; the weight of soap used he estimates at 8705 tons. Taking Dr. Letheby's determination of the total solids, 94 grains per gallon, this would give nearly 324,000 tons of dry solid matter in which the proportion of soap would be 2·7 per cent., and the sewage would contain about 2½ grains of soap per gallon. The soap, however, while being used would undergo partial decomposition; a small portion would be altered by the detergent process and there are few natural waters which do not contain sufficient lime or magnesia to precipitate the remainder where the quantity is not considerably more than 2½ grains per gallon. The fat and resin of the soap will thus appear in the insoluble portion of the sewage as compounds of lime or magnesia.

The presence of fat from one or both of the last-named sources is shown in the following somewhat remarkable manner. When sewage is distilled with a little hydrochloric or sulphuric acid a white fatty body is found floating on the distillate to the amount of a grain or two per gallon of the sewage employed. This comes over most abundantly at the commencement of the process. I have not yet examined this substance so completely as I could have wished, but so far as I can judge at present it consists of fatty acids. It is soluble in hot alcohol and in ether. A portion dissolves without cloudiness in alkaline solutions from which it is precipitated by acids. When the alcoholic solution is allowed to evaporate or when the substance is melted and cooled it assumes a crystalline form. It appears to be carried over mechanically during the distillation and when the sewage is well filtered, previously only a very minute quantity indeed is formed.

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[*] *Pharm. Journ.*, July 9, 1870.

Of the remaining organic constituents of sewage vegetable refuse must form a large part. The sources whence it is derived are numerous and almost universal. Vegetable cells and vessels are much less readily decomposed than those from animals, and being thus kept longer in an insoluble condition, and being much lighter than the mineral detritus, I should expect to find that they formed almost the whole of the suspended matters.

In speaking of the decompositions of these various ingredients, the changes mentioned have been those which occur when the substances are alone and under ordinary circumstances, but the question arises whether these changes will not be considerably modified when the whole of the heterogeneous mass is brought together under such conditions. The question as to what modifications are likely to take place is rather a complex one and facts are wanted to throw light upon it. For instance, is it probable that hydrocyanic acid or any of its salts would be found in the sewage? I have looked for these, but hitherto with negative results. With regard to this substance an interesting controversy occurred many years ago between Dr. Ure and Dr. Playfair, as to its alleged presence in a sewer in which a number of men met their death.* "Dr. Ure maintained that the sewage stuff would yield nearly two ounces per gallon of Pharmacopœia proof pure prussic acid. Dr. Playfair in his rejoinder states that he would drink the whole of that acid which Dr. Ure could obtain from the distillation of ten thousand gallons."

The source of the prussic acid here, however, was stated to be a quantity of gas lime which was deposited over the brickwork of the sewer, the cementing of which was imperfect.

Again with regard to the evolution of sulphuretted hydrogen and ammonium sulphide, these are often spoken of as producing the nauseous effluvia of sewers and cesspools. For my own part, I must say that I have never smelt anything approaching sulphuretted hydrogen, from either sewer, cesspool, or closet. Any such product must be very small in amount, and other odours from the same source are so abundant that it would be quite disguised. I have sought for it in vain in the Southport sewage, as it issues from the culvert; but on the other hand I noticed in the settling tanks connected with the Birkdale system of drainage, that the white paint on some of the ventilators was blackened to a considerable extent.

Dr. Letheby has stated that whenever putrefying organic substances come into contact with soluble sulphates, in sea water for example, it decomposes them, and causes the evolution of sulphuretted hydrogen; and he thinks that this offers an explanation of the unhealthy atmosphere and malignant fevers which prevail at the mouths of those rivers in hot climates, which bear a large quantity of putrefying organic substances to the sea; such as those on the West Coast of Africa. An experiment which I made does not seem to confirm the above statement. A Winchester quart bottle was one third filled with sewage, four ounces of solution of calcic sulphate were added. A piece of filtering paper steeped in solution of plumbic acetate was then suspended in the bottle which was placed in a warm place. After a week no appearance of blackening was produced on the paper. But even if sulphuretted hydrogen were evolved, what evidence is there that malignant fevers are produced by its means?

Of nitrates I have found very little in fresh sewage, but a sample which was kept about six weeks contained eight or nine times as much, and the ammonia had diminished to a very large extent.

In concluding this paper I may refer to an account of a fungus found by Professor Buckman in certain waters, supposed to have been contaminated with sewage. The account is copied into the *Pharmaceutical Journal* of November 1, 1873.

To the presence of this sewage fungus he attributes the unwholesomeness of the water in which it occurs. In a bottle of sewage which had been standing about a fortnight I found round the neck a gelatinous scum, which, under the microscope, showed the presence of a fungoid growth which appears to answer the description given in the place referred to.

Mr. J. F. Robinson said he had listened to the paper with much interest, but regretted Mr. Garside had not come to any conclusion for the disposal of sewage. From personal experience he could corroborate the observations referring to the large quantity of fat accumulated in sewage pipes—more than a wheelbarrow full having been found in the drain belonging to a house in the immediate neighbourhood of his residence.

Mr. E. Davies, F.C.S., criticized the paper, and in eulogistic terms proposed a vote of thanks to the author.

Mr. Withread, in a lengthy speech, gave some valuable and interesting information of his experience in experimenting upon sewage for its constituents at Tottenham and Ponder's End; he did not think that it would ever prove remunerative to work upon sewage with the hope of getting any reliable compound from it.

Mr. Robinson seconded a vote of thanks to Mr. Garside, which was carried by acclamation.

MIDLAND-COUNTIES CHEMISTS' ASSOCIATION.

An ordinary meeting of the above Association was held on the 18th inst., at 90, New Street, Birmingham. The President, Mr. T. Barclay, in the chair, and there was a good attendance of members and associates.

The minutes of the previous meeting were read and confirmed.

Mr. H. W. Jones, who was called upon by the President to review the events of interest to the members which had transpired during the recess of the association, spoke for a short time on the New Adulteration Act, which became law in October last, and gave the chief points of difference between the present and former measure; noticing the appointment of analysts, and how this affected the pharmaceutical chemist; the penalties for selling adulterated drugs; the right of appeal to quarter sessions, and other provisions of the act. The various meetings of interest, which had taken place since the former meeting of the association, were noticed, and an account of the British Pharmaceutical Conference, and of the American Convention, was given. Reference was made to salicylic acid, and the experiments with this substance by Mr. Thresh, on infusions, and Mr. Rother, on syrups. The discovery of the new metal, gallium, was also noticed, and an account was given of Glenard's process for obtaining pure emetine, and reference made to the fact that this author was the first chemist who had obtained well-defined crystalline salts of the alkaloids, it being generally stated that such salts could not be obtained in any but the amorphous state. The amount of emetine found by some chemists in ipecacuanha, in former times, was referred to as being very much too high, the speaker stating that it was now understood that the root yielded less than 1 per cent. and that by a process similar to Glenard's, the yield of emetine, which varied in different samples, was from ·2 to ·8 parts per hundred. A few other references, including the conversion of brucia into strychnia, as discovered recently by Sonnenschein, brought the remarks of Mr. Jones to a close.

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* *Pharm. Journ.* vol. ix., 1st series, p. 287.

After a vote of thanks had been passed to the speaker, an interesting discussion took place, in which several of the members joined.

The meeting next proceeded to consider the question of the annual *soirée*, and it was unanimously resolved to engage the town hall for that occasion. A committee was appointed to carry out the necessary arrangements.

BRISTOL PHARMACEUTICAL ASSOCIATION.

On Friday, November 19th, the first of a short series of lectures on "The Influence of Physical Laws in some of the Processes employed in Pharmacy," was delivered by Mr. G. F. Schacht, F.C.S., the subject selected for illustration being that of Filtration.

The lecturer commenced by pointing out that, although at first sight the process of Filtration appeared to be as essentially mechanical as that of sifting, it really depended upon many more physical principles than could possibly apply to the latter; the distinction between the two lying in the circumstance that in sifting, the process consisted in the separation of one portion of matter from another portion of like kind, whereas, in filtering, a separation is made of particles of matter of one kind, from particles of matter of another kind. This would necessitate the consideration of a larger variety of physical influences.

After a hasty discussion of the expressions "matter," and "force," and a closer definition of the terms "mass," "molecule," and "atom," with a reference to the fact that both matter and force might be considered under each of these three aspects separately, he proceeded to show how the special force Attraction acted in mass for mass under the title Gravitation—in molecule for like molecule under the term Cohesion—in molecule of one kind for molecule of another kind, under the term Adhesion—and in atom of one kind for atom of another kind under the term Chemical Affinity.

Each of these forms of attraction was then in turn discussed and illustrated—that of Adhesion being somewhat amplified by references to capillary phenomena, and to the subject of Solution, which it was contended was the result of the mutual adhesion of the ultimate *molecules* of the respective substances; if the two substances happened both to be fluids, they mingled molecule for molecule, the resulting mixture displaying the properties of both sets of molecules; if one happened to be a solid, the reduction of its substance to its molecular condition rendered it of course invisible, but still, as in the case of the two fluids, it conveyed to the mixture all other properties it originally possessed. It was remarked that solution did not take place between *all* fluids and solids, which was a parallel phenomenon to that which had just been shown, viz., that some solids could be *wetted* by certain fluids, and some could not; the same explanation, it was contended, applied in both cases—there was no adhesion between the molecules.

The lecturer then proceeded to show that all these principles were really concerned in the simplest case of filtration. Holding up a little paper filter, into which had been poured a few drops of water, he said, "Let us now see what forces are here at work. In the first place, gravitation is drawing this water towards the earth's mass; cohesion is binding the molecules of this water closely together; adhesion is striving to bring into contact the molecules of this water with the molecules of the solid matter that constitute the fibre of the paper. This last force is for the moment triumphant. By it cohesion is overcome, and the molecules of the water enter the substance of the paper; the continued force of gravitation draws the liquid to the under side of the filter, where the cohesive force once more asserts itself, collecting the molecules into a drop, which, when sufficiently heavy to overcome the adhesion between itself and the paper, falls to the earth."

He then drew attention to some of the methods that had been suggested for the purpose of aiding and accelerating the sometimes tedious process of filtering, exhibiting models and diagrams of apparatus thus employed.

These were found to consist in plans, either directly to increase the pressure of the fluid upon the upper surface of the medium, or to diminish the resisting pressure of the air upon its under surface; and the principles upon which these different contrivances depended, viz., the static force of the hydraulic column, and the force of the air's gravity, were discussed and explained.

Reminding his hearers, however, that his duty that evening was not so much to instruct them in the practice of their art as to suggest the habit of philosophic thought whilst employed in its details, Mr. Schacht thus concluded:—

"I wish you both now to observe and in quiet moments of leisure to reflect upon the singularly varied operations of this great force. Let your thought first carry you to the vast masses of the stars and worlds that are distributed through space in numbers and magnitudes, and at distances too great for calculation; and let it dwell for a while upon the consideration that all this immensity is controlled and ordered by this great force.

"Let it then bring you home again, to rest amid the so-called commonplaces of your daily surroundings, and note that *here also* all, from the phenomena of the broad Atlantic to those of the smallest dewdrop, is controlled and ordered by the same great force.

"Let it now strive to place you within the inner mechanism of things, amidst the harmonies, the sympathies, and the apparent antipathies that exist among their minutest particles, and it will see once more the same strange force, the key and guide to all.

"Lastly, let it contemplate the subtlety of this same wonder-working force as with God-given power it combines together the ultimate atoms of opposite kinds of matter, and creates a new thing.

"I think such moments of leisure may bring to you as many blessings."

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, November 18th, 1875.—Professor Abel, F.R.S., President, in the chair. After the usual business of the Society, the Secretary read a paper by Mr. T. M. Morgan, on "Ethylphenyl Acetylene," in which he described the preparation and properties of this derivative of the hydrocarbon phenyl-acetylene, discovered some years ago by Glaser. The second communication on "Narcotine, Cotarnine and Hydrocotarnine, part II.," by Mr. G. H. Beckett and Dr. C. R. A. Wright, was a continuation of their investigations of this subject. Mr. W. Noel Hartley then gave an account of "The Presence of Liquid Carbon Dioxide in Mineral Cavities," in which he proved, from the physical properties of the liquid enclosed in a cavity of a quartz crystal in his possession, that it is carbon dioxide. The last paper by Mr. W. H. Perkin was a "Preliminary Notice on the Formation of Coumarin, Cinnamic, and other Similar Acids." The meeting finally adjourned until Thursday, December 2nd, when the following communications will be read:—"On Certain Bismuth Compounds," by M. M. Pattison Muir; "On Bismuthiferous Tesseral Pyrites," by Dr. William Ramsay; "On the Decomposition of Alcohol and its Homologues by the Joint Action of Aluminium and its Halogen Compounds," by Dr. Gladstone and Mr. Tribe: "Note on Incense Resin," by Dr. Stenhouse and Mr. Groves; "On the Occurrence of Native Calcium Chloride at Guy's Cliff, Warwickshire," by John Spiller; "On Certain Sources of Error in the Ultimate Analysis of Organic Substances containing Nitrogen," by G. S. Johnson.

PHILADELPHIA COLLEGE OF PHARMACY.

The first meeting of this Society for the present session was held on Tuesday, October 19, Mr. Dillwyn Parrish in the chair.

Several specimens of damiana obtained from various sources were presented to the museum. Some further information about this new drug, and drawings of the leaves will be found on p. 423.

Dr. Miller presented a curious fungous growth obtained from the south, where it is occasionally found as a parasite on the roots of larch trees; in the far West it is used as an article of food by the Indians, and is known as tuckabo or Indian head. Its botanical name is *Lycoperdon solidum*. Dr. Miller said that it contains about 82 per cent. of starchy and 4 per cent. of nitrogenous matter, so that it is highly nutritious. Occasionally the fungus attains large dimensions, equalling a man's trunk in size or resembling a human head in shape, whence the name of Indian head.

Professor Maisch presented kernels of *Pinus pinea*, which have lately been imported into Philadelphia for the purpose of being used in place of sweet almonds in confectionery. After soaking in warm water their origin is readily recognized from the unfolding of the ten or twelve cotyledons.

Dr. Miller presented a choice sample of California honey obtained by him from Los Angelos, which was clear, transparent and of a very superior flavour; the bees producing it were stated to feed chiefly on the so-called white sage of the surrounding country. It was stated to have cost 12½ cents per lb. in gold, in Los Angelos, and the expense of bringing it on in larger quantities was about 5 cents per lb.

The following paper was then read—

Rectified Spirit.

(*Spiritus Frumenti Rectificatus.*)

BY ADOLPH W. MILLER, M.D., PH.D.

Pure rectified spirit does not appear to have, so far, received much attention from physicians and pharmacists, though it possesses certain merits and advantages, which eminently entitle it to a more careful consideration. As the term may be somewhat unfamiliar, or may sound indefinite and ambiguous to those who are unaccustomed to the liquor merchants' phraseology, it may be as well first to define the title of the present paper. French Spirit, Sweet Liquor and Rectified Spirits are synonyms current among the liquor trade, and used to designate pure rectified whisky, entirely free from the so-called fusel oils, colouring matter and other impurities. It is obtained by slowly percolating the ordinary raw corn whisky, or high-wine through fresh, crushed pine or maple charcoal, for which privilege the Government exacts from the rectifier an annual tax of 20·000 dol. The more dilute the spirit is, the more readily does charcoal absorb and retain the flavouring bodies, while strong alcohol will, on the contrary, redissolve and remove them from the charcoal. Rectified spirit is reckoned among the regular stock of the wholesale liquor dealer. It is generally met with containing exactly 50 per cent. of absolute alcohol by volume, which strength is technically termed *first proof*, or 100 degrees. It is the basis used by the compounders of fancy liquors for their cordials, bitters, ratafias and *crèmes*, the diluent of their pure imported brandies, the chief ingredient of domestic gins, brandies and rums, as well as one of the main components of flavoured sweet wines, such as cherry, blackberry, ginger and the so-called Lisbon wine. Incidentally, it may be remarked, that rectified spirit is much better adapted for the preparation of bay rum than the ordinary diluted alcohol, which is occasionally employed for this purpose.

All the various fusel oils, in a concentrated form, have peculiarly penetrating, oppressive and unpleasant odours, which to many persons are positively disgusting. They frequently bring on violent attacks of coughing, and they are also apt to produce headache, vertigo, nausea and stupor. Dr. Franklin B. Bache, in the 'Dispensatory,' says that amylic alcohol is an active, irritant poison, an assertion in which all the authorities seem to agree. Still, it is on these very bodies, their relative proportion and admixture, that the distinctive flavour of different liquors which are so highly esteemed amongst connoisseurs depends, and for which such almost fabulous prices are often paid. Age, no doubt, alters a small portion of the fusel oil, but the greater portion remains, being much less volatile than the spirit. Considerable obscurity is in fact, still attached to the changes which occur in liquors as a result of age. It is but reasonable to suppose, however, that these are all due to a very slow and gradual oxidation, resulting in the formation of an extensive series of complex ethers. In an able paper read before the American Pharmaceutical Association in 1864, Professor Maisch states that he regards the determination of the amount of acetic acid as a good means for ascertaining approximately the age of brandy and whisky, having found it to increase in proportion to the number of years during which the liquor had been stored. Butyric and valerianic acids, the latter formed by the oxidation of amylic alcohol, are also frequently present in distilled spirits. Propylic, butyric, amylic, capronylic, œnanthylic and other alcohols have been recognized in different varieties of fusel oil, justifying the common acceptation of this term as a generic rather than as a specific name. Very probably, minute traces of the entire series of these alcohols form odorous and fragrant ethers with the acids named above and perhaps also others, and thus give origin to those highly-prized spirituous bouquets. It is well known that an elevated temperature expedites these changes, so that whiskies are now almost universally stored in heated warehouses, whereby the time requisite for their proper ripening or "mellowing down" is reduced to a moiety. Yet, after all, it is the much-decried fusel oil and its derivatives on which the true flavour depends. When this is all removed, there is left simply rectified spirit, no matter how old or how valuable the liquor was previously.

The high therapeutic value of alcohol in disease is disputed by none, unless it be a small band of total abstinence fanatics, who strive, as Professor Stillé expresses it, for a cause intrinsically good, but sadly injured by its too zealous advocates. But it remains yet to be established that the medical virtue of spirit is increased or enhanced to the smallest degree by the costly flavours which characterize the choicest Cognac, the most indubitable Jamaica rum, or the most renowned rye and Bourbon. If fusel oil deserves but a tithe of the opprobrium constantly heaped upon it, we are bound to admit that the more perfectly it is eliminated from any spirituous liquor, the more suitable such spirit is for exhibition in medicine. We possess in the plain, rectified spirit described above, a liquor of almost absolute purity, which deserves to be regarded as the type of a simple arterial stimulant. It can be obtained everywhere with facility, of standard and uniform strength, and at a fraction of the price of the fancy flavoured liquors.

In order to prevent any misunderstanding, it may be as well to interpolate that the writer does not share the popular prejudice against fusel oil, as the quantity existing in liquor, not over one part in five hundred, and perhaps much less, is altogether too trifling to seriously modify the action of the alcohol. From its vast preponderance, it is the latter body alone that is responsible for the endless moral and physical miseries resulting from the excessive and even from only the habitual indulgence in strong drink. Delirium tremens, which generally first suggests itself, is only one of the sequelæ of the daily use of alcohol, which begin with disturbance of the digestion, and go on to cirrhosis of the liver, methomania, fatty degeneration of the heart, atheroma of the arteries, Bright's disease, general poisoning of the blood, gradual alteration in the nutrition of the great organs, and finally the breaking down of the entire system. The anathemas which are, with the flimsiest of sophistry, hurled upon fusel oil and other flavours, should be directed towards the alcohol pure and simple in every form of distilled spirit that is used as a convivial or inebriating beverage, and thus perverted from its legitimate function of succouring the enfeebled system when it is most sorely distressed by agonizing pain or exhausting disease. So high an authority as the venerable Dr. George B. Wood says, in his 'Therapeutics,' that there is little difference between brandy, rum, or whisky in relation to the effects of the alcohol; that medicinally it is of but very little importance that the different forms of ardent spirits are now frequently prepared artificially, by first obtaining rectified spirit free from fusel oil, then reducing this with water to the requisite strength, and finally giving the desired colour and flavour by suitable additions. Dr. Ure gives a formula for a manufactured brandy, which he says "may be reckoned as wholesome as alcohol, in any shape, can ever be." Our late lamented friend, Professor Parrish, in a paper read at the meeting of the American Pharmaceutical Association in 1864, distinctly advocates the plan "of making brandy for ourselves, as there is no merit in having it imported." He says, further: "We should set about substituting the variable, uncertain, adulterated brandy of commerce by a definite liquor of the same alcoholic strength as the standard specimens, and with a new and appropriate name."

While admitting that, considering the relative proportions, the flavours used are infinitely less injurious than the spirit to which they are added, it cannot be denied that the liquor merchant derives a very considerable share of his profits from the mystic art of compounding. It has been shown, *ad nauseam*, that all sorts of queer, if not positively disgusting, substances are added to tickle the palates of the devotees of the grog shop and gin mill, as well as those of the more fastidious *habitués* of fashionable bar-rooms. Even some of the most confirmed topers may be somewhat startled if they learn that they are occasionally imbibing small doses of methylic ether, cocoanut oil, which, to many persons gifted with an acute olfactory sense, is unpleasantly suggestive of negro perspiration, creasote, artificial benzoic acid obtained from the drainings of the stable, tar, butyric acid and ether produced by the aid of decaying cheese or putrefying meat, sulphuric acid, tannic acid, aqua ammoniæ, glycerin, elderberry juice, formic ether, acetic acid, tinctures of Russia leather, Cayenne pepper, pellitory root, green tea, star anise, oak bark, dried peaches, grains of paradise, Quillaya bark, and many others.

Unless we are gifted with an imperturbable faith in the homœopathic doctrine of increase of strength with the division of the dose, we shall be forced to conclude that whatever effect, for good or evil, the flavouring substances of liquors may possess, must be entirely obliterated by that of the vast excess of alcohol with which they are combined. Still, these very flavours are relished by the consumers, as is best attested by the very high prices constantly paid for favourite brands. The chief point of interest to us, however, is the uniform therapeutic effect of the flavoured and the natural liquors.

Raw corn whisky or high-wine, such as is used for the manufacture of alcohol, is undoubtedly strictly pure, as there is no incentive whatever to its adulteration. Nevertheless, many vile epithets, such as Jersey lightning, rot-gut, etc., are heaped upon this, simply because it is lacking in smoothness, oiliness and body; so that it meets with little favour among those who are sufficiently familiar with it to recognize at once its want of age.

In the asthenic forms of many diseases it is of prime and often even of vital importance to administer alcohol. Nothing as yet known so well substitutes the functions of food, and thus bridges over the chasm of greatest prostration, during which the system would otherwise inevitably succumb. The dictum of Professor Henry Hartshorne is to the effect that when alcohol is used only in actual need, and to the extent of that need, there is no inherent tendency towards its excessive use subsequently; that its tendency to inebriate is due only to an excess, though *in perfect health every drop is an excess.* While we cannot and dare not dispense altogether with a drug of such inestimable value, what is there to be gained by running the unnecessary risk of inculcating a taste for the truly fragrant bouquets of choice French brandy, or the almost equally precious old Kentucky Bourbon? We can well afford to dispense with this meretricious and alluring *haut goût* of liquors, which, even in their purest state, are but too apt to win boon companions, ready and willing to follow their enticing solicitations.

The economic aspect is another strong point in favour of the introduction of plain rectified spirit into use as an officinal medicine. Why should the poor day labourer, suffering, perhaps, from typhoid fever, or, it may be, pulmonary phthisis, be compelled to devote his entire compensation for two or three days of hard toil to the purchase of a bottle of pure imported brandy, when the value of an equal amount of pure spirit, from which he will derive quite as much benefit, can be earned by him in as many hours?

We may sum up as follows: Rectified spirit is almost always strictly pure, while the more expensive liquors invariably contain fusel oils, and very frequently other impurities. The current market price of rectified spirit at present is from 1 dol. 25 cents. to 1 dol. 50 cents. per gallon, that of fancy flavoured liquors ranging from 2 dols. 50 cents to 12 dols. While the taste and odour of rectified spirit is not so tempting as that of the choice cabinet liquors, it is entirely free from the disgusting smell and flavour of the ordinary diluted alcohol. It has not yet been established that therapeutically the more expensive liquors are in any way superior to rectified spirit, or that their physiological action presents tangible points of difference.

In view of the above statements, the earnest attention of the next Committee on the Revision of the National 'Pharmacopœia' is respectfully invited to the propriety of expunging *Spiritus Frumenti* and *Spiritus Vini Gallici* from the officinal list; also to the introduction of *Spiritus Frumenti rectificatus*, defined as grain spirit, freed from fusel oil and other impurities by percolation through charcoal, and containing 50 per cent. of alcohol.

The two officinal wines have recently again been shown to be very largely adulterated abroad, so that it is probably impossible to obtain in the United States either port or sherry consisting entirely of the juice of the grape. Port wine is stated to be mixed with an equal bulk o elder-berry juice and a considerable portion of alcoho before leaving Portugal. Sherry and Madeira are openly imitated, and manufactured out of the *vins ordinaires* of Cette and Mèzes, in France, and the parties engaged in this industry feel so proud of the abundant success of their enterprise, that they even invited the National Viticultural Congress to inspect their establishments. On account of the constant admixture and sophistication of these wines, it may also prove necessary, or at least highly advantageous, to dismiss these from our 'Pharmacopœia,' and to substitute in lieu thereof the more reliable wines of the Rhine, the *Vinum generosum album* and *rubrum*, officinal in Germany, which can be procured in a pure and undiluted form without much difficulty.

At the conclusion of the paper, Mr. Bullock spoke of the difference in Cologne spirit arising from the use of different lots of liquor, the odour being sometimes difficult to remove. The method of removing fusel oil by permanganate, which was practised forty years ago, and for which a patent was granted to Mr. Atwood, in America, was alluded to; by this process the fusel oil is destroyed and its repulsive odour replaced by an agreeable one.

Professor Remington said salicylic acid had been used for the preservation of many preparations, and that he had found it to answer an excellent purpose with juices of raspberry and strawberry. He also mentioned an instance in which salicylic acid dusted upon the surface of wounds, could not be endured from the irritation produced, while in solution the difficulty did not arise.

Mr. W. B. Webb inquired as to what was to be understood in prescriptions by solution of salicylic acid, and whether the saturated solution in water should then be dispensed. He prepares it by heating the water and acid together in a closed vessel; it will then contain about 20 grains in 6 fluidounces.

Mr. C. L. Mitchell spoke of the purification of crude salicylic acid as obtained in the process of Kolbe after filtration through animal charcoal; its separation requires the addition of muriatic acid, and it is a curious fact that its solubility in water decreases with its purity.

Parliamentary and Law Proceedings.

POISONING BY HYDRATE OF CHLORAL.

On Friday, November 17, Dr. Hardwicke held an inquest at University College Hospital, on the body of Mr. Edward Ledger, aged 27, a medical assistant, who on the previous Wednesday morning, was found dying in the street from the effect of some narcotic poison.

Dr. W. O'Connor, of 17, Edward Street, Hampstead Road, said the deceased was his assistant for two years, but latterly had been with Dr. Thompson of the Caledonian Road. He was a teetotaler, but was in the habit of taking hydrate of chloral to induce sleep.

A police-constable stated that at 10 minutes past 12 on Wednesday morning he found deceased lying on the pavement in the Euston Road, on the George Street side of the Gower Street Station. He thought he was in a fit, and with assistance he removed him to the hospital.

The resident surgeon said that when admitted the deceased was dead. Death had resulted from an overdose of chloral, but whether it had been taken by misadventure or purposely to destroy life, it was impossible for him to say. A person might take from 20 to 30 grains without much injury, but more would destroy life.

Dr. O'Connor said the deceased would take the chloral carelessly without weighing or measuring the dose, and he was inclined to think he had taken it as an overdose by misadventure, and not to destroy his life.

The jury agreed to a verdict of "Death by misadventure."—*Times.*

On Saturday an inquest was held before Mr. G. Hull, Coroner for West Surrey, at the Devil's Jump Inn, near Haslemere, on the body of Mrs. Rosa Helen Carrington, the wife of Mr. Richard Carrington, a Fellow of the Royal Society. It appeared from the evidence that the deceased was found dead on Wednesday morning. It was her custom to take nightly a dose of hydrate of chloral. Death had resulted from suffocation; how produced the doctor could not say. The jury returned a verdict accordingly.

POISONING BY OXALIC ACID.

On Saturday Dr. Hardwicke held an inquiry at Paddington, as to the death of Henrietta Wilkins, aged 26, who had been an inmate of the Colney Hatch Asylum for five months, and only left that institution the day before her death. The husband said that he left deceased in order to go to business, and she then seemed all right. On returning at one o'clock he found her room door fastened inside, and on knocking could get no reply. An entrance was effected when he found deceased lying partially on the bed, half undressed, and dead. A paper was found which had contained oxalic acid, on which was written "Don't blame anyone for this." Verdict "Suicide whilst in a state of unsound mind."—*Echo.*

ALLEGED ADULTERATION OF PEPPER.

At the Cardiff Police Court, on the 5th inst., Mr. John Williams, grocer, Hayes, was summoned for selling adulterated pepper. The case had been adjourned several times. The public analyst gave the result of his analysis, which showed that the pepper contained 3 per cent. of sago and 10 to 11 per cent. of ash. Genuine pepper ought not to contain more than 5 per cent. of ash. As this ash was sand to a great extent, he attributed its presence to adulteration. Dr. Hassall had analysed the pepper, and his results were very similar, but he attributed the presence of the sand to accident, and the imperfect manner in which the berries were dried in the open air, exposed to the sun and mud. Mr. Drane, chemist, of Cardiff, had also analysed the pepper, and his analyses were very similar. He also attributed the presence of silica to accident and the method of drying the berries. He considered the sample as genuine pepper, but of inferior quality, and it was probably the last fraction of a bag down which the sand from the pepper in the whole bag had settled by gravitation. He considered also that genuine pepper might contain 20 per cent. of sand in this way. The bench, after a long investigation, dismissed the case.—*Grocer.*

Reviews.

BOTANY. By Professor BENTLEY, Etc. London: S. P. C. K. 1875.

This little work forms one of a series of inexpensive manuals of elementary science published by the Society for Promoting Christian Knowledge, and is especially intended to form a simple introduction to the use of the Rev. C. A. Johns' 'Flowers of the Field,' an excellent little work, published by the same society, and also to be used as a stepping stone to Bentley's well-known 'Manual of Botany.' It contains in a condensed form, and in a book of convenient size for the pocket, all the information necessary for a young beginner to know concerning the various organs of plants before commencing systematic botany. The first part of the work is devoted to the description of the various external organs of plants and their modifications, and the second part to the more difficult and usually less interesting portion of botany—viz.: that relating to the internal structure or histology of plants. This arrangement is decidedly an improvement upon that so often followed, in which the microscopical details are placed first, and generally appal or, at least, discourage the would-be student of the science.

The excellent plan of giving numerous questions at the end of each chapter, is adopted in this little work. By means of these questions it is easy for the reader to ascertain if he has apprehended the meaning of the writer or not. A general plan of the contents of the book is given in the commencement, but the absence of an index is conspicuous.

In a few cases only is the meaning of the writer obscure; thus, on p. 85, the apple is said to consist of the ovary with the *calyx* adherent to it; on p. 86, the following remarks are made: "The fruit is formed essentially out of the *ovary*;" "The fruit consists, when perfectly formed, of pericarp and seeds;" "The pericarp consists of three layers, epicarp, mesocarp, and endocarp;" "In the apple and pear the skin is the epicarp."

If in the apple the outer portion is the calyx tube, as tated by the author, and the epicarp is the skin or pidermis of the mature ovary, we fail to see how the pidermis of the calyx can, with propriety, be termed an picarp. We must also protest against the use (in which he author is not singular) of the term simple fruit for chene and follicle, as very confusing to young students, since it is in rare cases only that achenes or follicles re met with except as parts of a *compound* apocarpous ruit, and are therefore in such cases carpels, and not imple fruits. The student of botany will, however, do vell to study this little work before dipping deeper into he wells of knowledge contained in the larger and wellnown work of the same author.

HE HARVEIAN ORATION, 1875. By WILLIAM A. GUY, M.B., F.R.S., Fellow of the Royal College of Physicians. Henry Renshaw, Strand. London, 1875.

Harveian orators group themselves into two classes: he one devoted to Harvey and his labours, the other to ome topic connected with modern research. Dr. Guy lects to associate himself with those who have chosen to liscourse of Harvey.

The orator begins his account by noticing the advanages which Harvey enjoyed. He possessed independent neans; he had the very best education England or Italy ould give; and he could secure by purchase or through oyal favour whatever he needed for purposes of experinent and illustration.

Commonly speaking, a man in his circumstances has no notive, no natural stimulus, to undertake any extraordiary mental task, or pursue any toilsome investigation. But Harvey lived in an age of great political and theoogical excitement; and men's minds continued to be ctively influenced by the Renaissance and the Reformaion. Many of his contemporaries were great thinkers nd discoverers. "He might have known both Shakepeare and Milton, for he was thirty-eight years old vhen Shakespeare died, and thirty when Milton was orn. He was well acquainted with Lord Bacon, who lied when Harvey was forty-eight years of age; Lord Napier, the inventor of Logarithms, Hobbes of Malmesury, author of the 'Leviathan,' Robert Boyle, Dryden, Cowley, and rare Ben Jonson were among his contempoaries. The Marquis of Worcester was busy with his vater-compelling engine and 'Century of Inventions;' Sir Hugh Middleton was at work with the New River; John Woodall, author of the 'Surgeon's Mate,' was comnending lemon-juice as preventive and cure of scurvy; nd Sydenham (thirty-three years of age when Harvey died) was collecting materials for his immortal works, when Harvey was demonstrating the circulation of the blood. It is worthy of note that the 'Novum Organon' and Harvey's great work 'De Motu Cordis et Sanguinis' appeared within a few years of each other. Need I add that Harvey, surviving the execution of his royal master and patron, died in the same year with Oliver Cromwell." Then, as to his foreign contemporaries: "Harvey was only by seven years the junior of Kepler, and by fourteen of Galileo, and the senior by several years both of Descartes and of Spinoza."

Being inspired then by the *Zeit Geist*, Harvey betook himself to unravel the secrets of nature in emulation of his distinguished contemporaries. The exact nature of the work which Harvey took in hand, and the character of intellect requisite for its prosecution, are next considered and graphically described in the oration.

The orator then enters into an able, instructive, and highly interesting narration of the method of preparation and order of study which Harvey pursued, and which led to the discovery and afforded the most convincing evidence in verification of the fact that the heart is the central propelling organ of the systemic circulation. And Dr. Guy very justly and eloquently adds that such "a truth discovered and established is an everlasting gain, conferring on generations yet to come—in the life that now is—priceless benefits, some by direct application, some through indirect and unexpected developments."

Before concluding this admirable sketch, and as if to complete the portraiture of the great discoverer in his more homely features, the learned orator gives us two or three instances of Harvey's poetic imagination and unsuspecting credulity.

Speaking of the heart, Harvey says: "The vesicle and pulsating point construct the rest of the body as their future dwelling place; 'developed into' the heart, it enters and conceals itself within its habitation, which it vivifies and governs, and applying the ribs and sternum as a defence, it walls itself about. And there it abides, the household divinity, first seat of the Soul, prime receptacle of the innate heat, perennial centre of animal action; source and origin of all the faculties, only solace in adversity!" The blood is "spirit," and "the soul in this spirit and blood is identical with the essence of the stars."

He accepted the evidence of an eye-witness respecting the existence in Borneo of a race of human beings with tails; and he believed in the efficacy of the application of a dead man's hand in dispersing certain tumours. Robert Boyle declares that Harvey told him he had sometimes tried this strange remedy "fruitlessly, but often with good success."

Dr. Guy observes that "the portrait of the discoverer of the circulation will not be the worse for a few shadows; they will but make it the more real." And we quite concur in this opinion.

We take the opportunity, however, of expressing the hope that scientific men would refrain from making themselves absurdly ridiculous by thinking aloud, in public lecture-rooms, their wild speculations and poetic fancies on matters that lie beyond the sphere of their special inquiries.

Notes and Queries.

[451]. EAU DE BOTOT.—Mr. P. Wells sends the following formula:—

℞. Ol. Anisi	ʒij
Ol. Menth. Pip.	ʒiv
Ol. Cinnam. Ver.	ʒij
Cocci Exot. Cacti	ʒss
Ol. Caryoph.	ʒj
Gum. Guaiaci Contus.	ʒij
Cort. Cinchonæ Contus.	ʒij
S. V. R	℥xxx

Macerate 14 days and filter.

IRON AND QUININE SESQUICHLORIDE.—Pavesi recommends (according to the *Pharmaceutische Zeitung*, Oct. 6), as a new remedy against intermittent fever, a double salt of quinine hydrochlorate and ferric chloride. The salt is prepared by heating an aqueous solution of ferric chloride in a porcelain dish to about 70° or 80° C., adding thereto as much pure finely powdered quinine as it will dissolve, quickly filtering the hot reddish yellow solution, and slowly evaporating it in a porcelain dish over a water-bath. The salt forms a crust of small crystals, having a bitter and styptic taste, and soluble in water and alcohol. It is questionable whether the salt has the exact composition indicated by the name given to it.

Obituary.

Notice has been received of the death of the following:—

On the 24th of October, 1875, Mr. James Brand, Chemist and Druggist, of Gosberton, Lincolnshire, aged 67 years.

On the 13th of November, Mr. James Picknell, Chemist and Druggist, of Cuckfield, Sussex, aged 62 years.

On the 17th of November, 1875, Mr. Joseph Heaven, Chemist and Druggist, of Southsea, Hants, aged 32 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE BENEVOLENT FUND.

Sir,—Although the administration of the Benevolent Fund may be, and doubtless is, in accordance with the spirit of the donors, it must yet fall short of their good wishes, when an aged man like Mr. Eastes (whom I knew more than forty years ago as a prosperous chemist) becomes in his eightieth year the recipient of an annuity; it cannot be expected he should live very long to enjoy it.

The majority of decayed chemists and druggists have to take up their abode with the son or daughter-in-law, perhaps surrounded by the discomforts and noises inseparable from a small family.

Almost every trade, profession, or calling possesses its asylum, almshouse, or retreat, and surely should not men of our profession, who have borne the burthen and heat of the day, be able to look forward to such a climax to their labours?

I was much grieved to notice the proposal made by a wealthy Manchester man to reduce the average annual stipend—not only so, but to add fresh restrictions and humiliations. I have inquired into the working of several benevolent institutions, and am much satisfied on finding that in some instances they not only relieve the originators from all expense, but are actually self supporting.

One in particular was originally designed to accommodate twenty poor men and twenty poor women; by judicious investment of money the trustees were enabled a few years since to build ten additional houses, thus accommodating twenty more inmates. Having still an excess of means, they annually bestow coats and blankets upon other less wealthy charities; each of these houses has attached a pleasant piece of garden ground; some of the old men cultivate their plat so successfully as to realize a considerable addition to their allowance by the sale of fruit and flowers—spending the autumn of their days in a state of comfort they never knew even in the most prosperous days of their existence.

SENEX.

"BISMUTH AND CO."

Sir,—In reply to Mr. Ekin I desire to say that about two years ago I was consulted by a physician on the very subject Mr. Ekin has broached. The physician had a strong bias in favour of arsenic being the sinner in the matter of the garlic-like odour of the breath; this I directly negatived—firstly, because arsenic, when it gets into animal tissue, is too fond of staying where it is; secondly, I never can detect the garlic-like odour except when I put "metallic arsenic" into the flame. In a medico-legal examination a short time ago I put some white arsenic into the flame and asked, Who smells garlic? No one. By-the-bye, I was told years ago by an expert that arsenic alb. was of a sweetish taste; to me it is gritty and tasteless, or rather, as if I had sedulously sucked a palette knife with some on my palate. Some six or eight months elapsed and I was again consulted much in the same manner as Mr. Ekin seems to have been. Patients became impatient. The theory I gave the physician based on animal chemistry and nerve action (I will spare your columns a repetition) I put on trial. I directed to every twenty-four pills one drop of creasote to be added; to every dose of mixture $\frac{1}{24}$th of a drop; since then, a pretty good test, I have heard no more of garlic-like odours from doctors or their patients, so I hope I have scotched the miscreant. I am not sure cinnamon water does not answer as well as creasote in mixtures. I am inclined to think it does. When bismuth took its rank as a medicine was it absolutely pure? Do patients, when they take arsenic, have a garlic-like odour to their breath? When we consider the place arsenic now takes in the treatment of neuralgia, may not the reputation bismuth has so long enjoyed be due, at least in part, to Bismuth and Co. I repeat, in endeavouring to purify our chemicals we must take care we do not lose our medicines.

GEORGE MEE.

79, *Grosvenor Road, Highbury, N.*
November 21, 1875.

ALUMINA IN WHEATEN FLOUR.

Sir,—Your leader of the 13th inst. gives prominence to the question whether alumina can be found in wheaten flour unless added with a fraudulent intention.

The negative which you give to this query is somewhat too sweeping, because the question is not limited to one of vegetable physiology and the assimilation of alumina by plants, but is one directly raised by considerations of the working of the "Sale of Food and Drugs Act."

In the *Pharm. Journ.*, vol. xvi., p. 558 (1857), I described a case in which I found a considerable quantity of alumina in wheaten flour, being derived from the soil adherent to imperfectly cleansed Egyptian wheat. Although the extended employment of Egyptian wheat soon led to the use of more careful methods of cleansing it, I am convinced that analysts ought not now to overlook this possible source of error.

RICHARD REYNOLDS.

13, *Briggate, Leeds, Nov.* 22, 1875.

ELEGANT PHARMACY.

Sir,—I send the following specimen of what we may term "Elegant Pharmacy," which I have obtained from a friend, tendered to him in the course of the day:—

Sefrenated Oil	1d.
Busis and Honey	1d.
Surrip of Rubid	1d.
Surrip of Bufhorn	1d.
Parid Garrit	1d.

I presume the old nomenclature is here used, according to the present medical nomenclature it would doubtless read:—

Camphorated Oil	1d.
Borax and Honey.	1d.
Syrup of Rhubarb (evidently they wavered between Rhubarb and Rubidium) . .	1d.
Buckthorn	1d.
Paregoric	1d.

Can any of our readers kindly recommend me a good medical vocabulary? if so they will greatly oblige

BRUMMAGEM.

61, *Sherlock Street, Birmingham,*
November 22, 1875.

E. J. Clark.—As the person who keeps the shop would be held responsible for the manner in which the business is conducted it is only reasonable that he should be allowed to exercise his discretion in such a case as that referred to.

S. V. R.—The question can be answered by the Inland Revenue authorities only.

F. B.—Such a practice as that described would undoubtedly be illegal. You are recommended to communicate the full particulars to the Registrar.

R. T. Holdsworth.—The answer to your question would depend upon the nature of the business, and the ability of the assistant to make the most of his opportunities.

"*An Inquirer.*"—The sulphate of magnesia being insoluble in dilute alcohol would be precipitated.

"*Nuda Veritas,*" "*Ned Delt,*" and "*Syrupus, B.P.*"—The circumstance causing the annoyance felt by our correspondents is what might reasonably be expected when answering advertisements. It is not probable that advertisers will ever, as a rule, answer applications that have no further interest for them.

W. Archer.—(1) Use the granular form of the chloride, reducing it first to a fine powder. (2) The change has not yet been explained. (3) The solidification is due to the evaporation of the ether.

"*Ireland*," and *E. H. W.*—No person who is not on the Register of Chemists and Druggists can legally carry on business in Great Britain.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Voelcker, Mr. Siebold, Dr. De Vrij (The Hague) Dr. Radius (Leipzig), E. H. W.

NOTES ON THE PREPARATION OF PURE CHEMICALS.*

BY LOUIS SIEBOLD.

The preparation of pure pharmaceutical chemicals is so wide a subject that the remarks which I shall have the honour of addressing to you to-night must necessarily be confined to the consideration of but a small number of these substances. No reference will be made on this occasion to the purification of the mineral acids, as I have dealt with that subject in a previous report which was read at the Bradford meeting of the British Pharmaceutical Conference.

Oxalic Acid.—The standard of purity of this preparation required by the B. P. is unattainable by the official process, for the mere recrystallization of the commercial acid from its solution in boiling water never yields a product which is entirely dissipated by a heat below 350°. The alkaline oxalates which are the principal impurities in the crude acid are less soluble in a solution of oxalic acid than in water, and therefore do not remain in the mother liquor but always crystallize along with the acid. Some chemists have expressed a doubt that perfectly pure oxalic acid can be at all produced from the commercial article, and prefer the acid prepared from sugar, for the purposes of quantitative analysis. It certainly appears difficult, if not impossible, to procure the chemically pure acid from manufacturers of pure chemicals. Such a preparation can, however, be obtained by the following process:—

Agitate the produced commercial acid with five times its weight of distilled water at about 100° F. for some time, allow the mixture to stand in a cool place for about six hours, then filter the solution, evaporate it to about two-thirds of its original bulk, and stir well while it is cooling. Collect and wash on a filter the crystals which have formed, and purify them twice by recrystallization from boiling distilled water. The acid thus obtained leaves no residue whatever when ignited in a platinum crucible. The large portion left undissolved by the tepid water, along with that still contained in the evaporated solution, may be recrystallized and sold as commercial acid. Stolbe recommends the commercial preparation to be crystallized from a hot solution in HCl, and then to be recrystallized from boiling water; but the product in this case is, according to my experience, less satisfactory than the one obtained by the method I have just described. The purification of oxalic acid by sublimation yields a very pure preparation, but is an exceedingly wasteful process.

Sodium Carbonate.—Pure crystallized sodium carbonate is easily obtained by repeatedly recrystallizing the commercially pure salt. The anhydrous carbonate is generally made by washing and heating the bicarbonate, but though this process, if carefully worked, is a very good one, it frequently seems to fail with those engaged in the production of this salt on a large scale, for it is difficult to procure it from manufacturers and dealers in a fit condition for delicate analytical operations. The failure is mostly due to insufficient washing of the bicarbonate. In washing large quantities of the latter with distilled water, the solutions passing through the funnels cease to give indications of chloride and sulphate long before these impuritie are completely removed, for the moist bicarbonate contained in the funnels soon forms a compact mass which is not uniformly penetrated by the water. If the mass is then rendered homogeneous in a mortar and again transferred to the funnels, the further washings acidulated with pure HNO_3 will again produce distinct reactions with $AgNO_3$ and $BaCl_2$, and it is only by repeating this process several times that a perfectly satisfactory result is obtained. Not less than four fluid ounces of the washings should be submitted to each test at a time.

Potassium Carbonate.—The B. P. preparation made from pearl ash though good enough for some is hardly suitable for all pharmaceutical purposes, as the appreciable quantities of sulphate, chloride, and other impurities which it always contains find their way into a number of other chemicals in the preparation of which it is used. I think that besides this product from commercial pearl ash, a purer carbonate, such as may be readily obtained from cream of tartar or from a mixture of cream of tartar and pure nitre by incineration, etc., should have been mentioned in the Pharmacopœia. The preparation obtained from pure nitre and charcoal generally contains traces of cyanide, which are difficult to remove. For analytical use, I prepare carbonate of potassium by washing the powdered bitartrate with dilute hydrochloric acid, and afterwards with distilled water, then crystallizing it from boiling distilled water, incinerating the washed and dried crystals, etc. In this manner I always obtain a carbonate absolutely free from chloride, sulphate, phosphate, and silica, and also from sodium, an impurity rarely absent in even the best commercial specimens of pure carbonate of potassium. Purified binoxalate also yields an excellent product.

Sodium and Potassium Nitrates.—The Pharmacopœia directs the sodium nitrate to be made from the native salt by crystallization from water, and requires it to be free from chloride and sulphate. Every chemist who has had anything to do with the purification of this salt will agree with me if I say that no amount of crystallization and recrystallization will produce a salt of the required purity. I admit that sodium nitrate thus prepared may be pure enough for medicinal use, but then the Pharmacopœia ought not to insist on a degree of purity not attainable by the official process. For analytical purposes it ought to be quite pure, and in that state it can only be obtained from pure nitric acid and pure sodium carbonate. Pure potassium nitrate is very easily obtained from the commercial nitrate by repeated and interrupted recrystallization, as there is a much greater difference between its solubility in hot and in cold water than is the case of the sodium salt. Yet we frequently find that nitrate of potassium sold as pure by houses of high reputation is not what it is represented to be, probably because fine crystals are more appreciated by many than purity. I need not point out how very annoying it must be to the analyst engaged in testing for traces of chlorine, sulphuric acid, etc., always having to compare the silver and barium reactions obtained with those produced by his own reagents.

Potassium Permanganate.—The application of sulphuric acid for neutralizing the free alkali in the solution of permanganate previous to its crystallization as recommended in the B. P. is objectionable as it is impossible to separate the sulphate without sacrificing a very large quantity of the permanganate. Carbonic acid is preferable, and yields a preparation which, when thrice recrystallized, is chemically pure, as it proves to contain 100 per cent. of $KMnO_4$ when tested by volumetric analysis. Staedeler's process of passing chlorine through the solution of the fused mass in cold water yields a much larger quantity of permanganate than the ordinary method, but invariably causes the formation of chlorate which is difficult to remove.

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* Read at an Evening Meeting of the Pharmaceutica Society of Great Britain, December 1, 1875.

Sodium Chloride.—The salt is never required in a pure state for pharmaceutical use. For the purposes of quantitative analysis it is generally obtained like chloride of barium, by precipitating it from its solution by hydrochloric acid gas. The purification of common salt by means of barium chloride and sodium carbonate is now less frequently resorted to, as it is assumed to yield a product which is not free from magnesium. By operating in the following manner, however, a perfectly pure chloride of sodium can be obtained in large quantities. The iron present in the filtered solution of common salt is peroxidized by chlorine, and solution of barium chloride is then added in sufficient quantity to remove the sulphuric acid; the filtered solution is mixed with pure sodium carbonate in excess, and boiled for an hour, so as to precipitate the calcium, magnesium, and iron, along with the excess of barium. The filtrate is evaporated to dryness, the residue dissolved in water, the filtered solution again evaporated, and the residue once more dissolved. This solution when filtered, neutralized by pure hydrochloric acid, and evaporated, leaves the salt in a chemically pure condition.

Bismuth Subnitrate.—The common occurrence of impurities in this and other preparations of bismuth has been pointed out repeatedly (see 'Year-Book of Pharmacy,' 1871, pp. 179 and 180, and 1873, p. 150). An examination of a number of trade specimens made a short time ago has convinced me that these preparations have not much improved since Mr. Ekin issued his report in 1873. Arsenic occurs in them but rarely, and silver less frequently than it used to do, but subchloride is contained in nearly every sample, and traces of lead are by no means uncommon. Scarcely less objectionable than the presence of these impurities is the very variable composition of commercial samples of the subnitrate. While the B.P. preparation corresponding to the formula $BiONO_3$, H_2O or $Bi(HO)_2NO_3$ should leave 76·3 per cent. of oxide on heating, the oxide yielded by nine specimens which I examined varied between 77·5 and 84 per cent. Nearly all trade specimens are more basic than the B.P. compound, and the considerable difference in their composition is evidently due to variations in the time of contact with the acid liquid, the temperature at which the operation is conducted, and the quantity and temperature of the water used for washing. The precipitate does not settle down as rapidly one time as another, and unless it is separated from the acid liquid very soon after it is formed, it will never have the exact composition represented by the above formula. Last year I prepared two samples of the subnitrate, one in July and the other in November, both from the same materials, and in strict accordance with the directions of the B.P.; upon examination, one yielded 78·1 and the other 76·9 per cent. of oxide. Both emitted the odour of nitric acid some time after they were made. The precipitation by boiling instead of cold water, as recommended in the German Pharmacopœia, yields a preparation which is somewhat more basic than that of the B.P., but suffers no change on keeping. The nitric acid used in the process should be quite pure, for every trace of HCl which it may contain is sure to pass into the precipitate. The solution of the purified bismuth should be diluted with water, then allowed to settle, decanted from the sediment, and evaporated to the point of crystallization. If these crystals be washed with water acidulated with HNO_3, then dissolved in water and the solution poured into the water intended for precipitation, a purer preparation than that directly produced from the concentrated acid solution of the metal is obtained. A subnitrate free from impurities can thus be prepared, but I doubt that any process, no matter how strictly followed, will produce constant results as regards the composition of the products.

Bismuth Subcarbonate.—This compound, which commonly contains the same impurities as the preceding one, may be obtained in a pure state by observing the same precautions as mentioned in reference to the subnitrate. It is a much more satisfactory preparation than the latter, as it does not present the same variation in its composition. The eight samples I examined left upon heating quantities of oxide varying from 88·5 to 90·8 per cent., the variations being due to the presence of smaller or larger quantities of subchloride, and to differences in the amount of water. The formula $2(Bi_2O_2CO_3), H_2O$, or $2(BiHOCO_3), Bi_2O_3$, requires 89·8 per cent. I do not know whether or not the subnitrate possesses any superiority from a medicinal point of view over the carbonate; if it does not, I think the time has come for medical men to discuss the question whether the latter might not take its place entirely.

Bismuth Oxide.—The trade specimens of this substance appear to be very unsatisfactory. Of five samples which I have recently examined, all contained subnitrate and a considerable amount of subchloride; four contained sodium compounds; and one gave a distinct indication of lead. Upon heating they lost from 2 to 6 per cent. in weight. Unless the subnitrate is boiled with large excess of solution of soda for a considerable time its decomposition is incomplete, and an impure oxide is the result. Prolonged washing is required to effect the complete removal of the alkali. I do not know why the much simpler process of heating the pure subnitrate has not been adopted in the B.P., for I find that with less trouble and care it yields a preparation as pure and as soluble in acids as the best that can be produced by the official process. Considering the unsatisfactory state of the three bismuth compounds as met with in commerce, pharmacists, I feel sure, will all be glad to know that so able a gentleman as Mr. Ekin intends to reinvestigate the whole subject, and to report his results at the next meeting of the British Pharmaceutical Conference.

In conclusion, I have much pleasure in expressing to you, gentlemen, my best thanks for your kind attention and indulgence.

[*The discussion on this paper is printed at p.* 454.]

THE SPICES, GROCERIES, AND WAX OF A MEDIÆVAL HOUSEHOLD, A.D. 1303-10.*

BY THE LATE DANIEL HANBURY, F.R.S.

The antiquarian illustrations in brackets selected from the Author's Memoranda by Joseph Ince.

A volume† which has just been printed for the Camden Society, is devoted to *Accounts of the Executors of Richard, Bishop of London,* A.D. 1303, *and Thomas, Bishop of Exeter,* A.D. 1310, edited from the original MSS. in the possession of the Dean and Chapter of St. Paul's, and from the Archives of the city of Exeter.

The accounts mentioned are replete with interesting particulars throwing light on the style of life of wealthy ecclesiastics at the close of the 13th and commencement of the 14th century; and that relating to the Bishop of Exeter, includes some curious information relative to the consumption of spices, groceries, and wax in a mediæval household. At the period in question, the duty of executor under the will of a defunct person, comprised not only a valuation of his property, but in addition, the production of an account of the money that the property had actually realized.

Thomas Button, Bishop of Exeter, died in the year 1307, and the account filed by his executors in 1310, specifies the items contained in the *Garderoba* or Wardrobe of the deceased prelate. I will give it in the first place as it stands in the original and afterwards offer some remarks in explanation of the several entries. The term *wardrobe,* it may be well to state, had a wider significance in the middle ages than at present; it was the name of the apartment in which was laid up, not only apparel but valuables of almost every kind. That of Richard, the Bishop of London, contained a considerable collection of books, while that of Thomas, of Exeter, was filled by a profusion of spices and grocery.

[The following shows what was in the Garderoba, and how much money the several articles fetched when sold:—]

		£	s.	d.
1	229 lb. Cere	7	13	3
	423 lb. „ liberatis ad expens. funera	14	6	5
	58 lb. „ operate	1	9	1
	3¾ lb. „ liberatis ad expensas familie commorantis post obitum Domini	0	1	10
2	Dj quarteriis et 20 lb. Ammigdalarum venditis	4	17	6
3	74 lb. Ris	0	13	8
4	77 lb. Sucare	3	17	2
5	3¼ lb. Zinsiberis electi	0	6	6
	20 lb. „ Columbe	1	3	2
	29 lb. „ communis	1	17	11
6	29 lb. Canele	1	7	7
7	2 lb. Galonge	0	10	0
8	21½ lb. Nigri Piperis	1	3	3
9	17 lb. Grani Paradisi	1	16	6
10	38½ lb. Croci	5	9	9
11	6½ lb. Gariofoli	1	2	3
12	1¼ lb. Quibibus	0	8	0
13	2⅝ lb. Macis	0	16	0
14	6 lb. Feniculi	0	2	9
15	6 lb. Anisi			
16	15 lb. Liquiricie	0	1	3
17	20 lb. Cotun file	0	14	4
18	4 lb. Orpiment	0	1	8
19	27 lb. Cymini	0	2	3
20	3 lb. Pyon	0	0	6
21	ij gordes de Gyngebrad	1	6	0
22	iij pixidibus de Gengebrad et Pyonad	0	8	0
23	ij pixidibus consimilibus liberatis ad expensas executorum	0	5	4
24	De j libra dimidia Nucis muscate vendita	0	1	6
25	1 lb. de Zedewand	0	0	10
26	23 lb. Lichinorum	0	4	0
27	De iiij Stateris venditis	0	5	4
28	314 lb. Candelarum Parisie	1	12	8
29	j vase pro candelis Parisie facta cum appendiciis vendito	0	0	8
30	De j statera de ferro vendita	0	1	9

Remarks on the foregoing Account.

I. *Cere* [*Cera*], wax. The total quantity in store at the time of the bishop's death was 714 lb., of which 423 lb. were consumed at his funeral. At the obsequies of the Bishop of London, in 1303, the expenditure of wax was no less than 1200 lb. The *Cera operata,* of which the account mentions 58 lb., as well as 3¾ lb. consumed by the family after the death of the bishop, may have been a mixture of wax with tallow, prepared for candles. John de Garlande,* who lived in the 13th century, alludes to something of the kind when, in speaking of the fraudulent doing of the apothecaries, he says:—"Apotecarii, causa lucri, concumulant confectiones et electuaria, radices cum erbis, zedoarium cum zinzibero, piper cum cimino, gariofilos cum cinamomo, anisum cum maratro, *ceram cum cereis ecclesiasticis,* zucuram cum licuricia."

2. *Ammigdalæ* (*amygdalæ*). Almonds.

[Philippe le Bel, date Paris, 1 Fev., 1304, forbad the exportation out of the country of various articles of merchandise without permission of his Government under pain of confiscation. But he makes an exception in favour of edible spices and aromatics, the exportation of which is permitted to friendly states. Not to be exported were wine, honey, pepper, ginger, cinnamon, sugar, galangal, *Almonds,* animals' hides, and metals.

In the Liber Albus, probable date of list about A.D. 1266, almonds are included as liable to Scavage.

Almonds might be substituted for Pignons (nuclei pinei), in preparing the Pignolat.]

3. *Ris,* in mediæval Latin, *risi,* Rice.

4. *Sucare,* sugar.—This commodity at the period under notice used to be imported by way of Italy, from Egypt, Cyprus, and Sicily.

5. *Zinsiber* (zingiber vel zinziber). Ginger,—is mentioned in the account as of three kinds, namely, *electum, commune,* and *Columbe.* The last, which seems to have been of the lowest quality, derived its name *Colombinum,* from Kulam or Quilon, a port in Travancore, whence it used to be shipped.

6. *Canele.*—By this term we must understand *Cassia Bark,* either of Malabar, or China, rather than cinnamon which was only beginning to be exported from Ceylon, and was probably much more rare and costly.

7. *Galonge,* Galangal.—The value received for 2 lb. of this spice is exactly the price of an ox, as reckoned in the account, which states that fifteen oxen were consumed at the bishop's funeral feast.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, December 1, 1875.

† By the late Ven. Archdeacon W. H. Hale, M.A., and the Rev. H. T. Ellacombe, M.A., F.S.A. Printed for the Camden Society, 1874.

* Wright, *Volume of Vocabularies,* 1857, 129.

8. *Nigrum Piper*, Black Pepper.

9. *Granum Paradisi*, Grain of Paradise, often termed simply *Grains*.—The produce of Tropical Western Africa, whence it was conveyed by a long land journey to the Mediterranean ports of the Barbary states, and shipped for Italy. It was used in Europe as a culinary spice, of the nature of pepper.

10. *Crocus*, Saffron.—There is probably some over-statement in the quantity, which is enormous. The value is represented as equivalent to only 2*s*. 10*d*. a pound; while according to Professor Thorold Rogers, the average price of saffron in England from 1259 to 1350, was about 8*s*. 6*d*., and from 1351 to 1400, 14*s*. 2*d*. per lb.

11. *Gariofoli* (Caryophylli), Cloves.

12. *Quibibus*, cubebs.—The spice was sold, it will be observed, at a very high rate. In the description of a grand feast, written towards the close of the 13th century, by Walter de Biblesworth,[*] we find the following:—

Au tercez cours avient conyns en gravé,
E viaunde de Cypre enfundré,
De maces, e *quibibes*, e clous de orré,
Vyn blanc e vermayl á graunt plenté.

13. *Macis*, Mace.

14. *Feniculum*, Fennel seeds,

15. *Anisum*, Aniseed.

16. *Liquiricia*, Liquorice, at only 1d. per lb. Can it have been the extract, or was it only the dried root?

17. *Cotun file*, cotton thread, imported from Italy, and used, according to Professor Thorold Rogers, for the wicks of the better kinds of candles. It is often mentioned in mediæval lists of groceries, as, for instance, in the *Tarif des Péages* of the Counts of Provence, in the 13th century, where it appears as *Coton filat*.

18. *Orpiment*, Auripigmentum, native yellow sulphide of arsenic.—It was used as a pigment in the illumination of manuscripts.[†] In the diploma granted by Chilperic II., King of the Franks, to the Monastery of Corbic, A.D. 716, mention is made of a supply of 10 lb. of *Aurum pigmentum*.[‡] In another list of commodities[§] required for the same religious establishment at a much later period (A.D. 1332?), the following pigments are enumerated—*Sulphus*, lb. 10, *Auripigmentum* lb. 3, *Sanguis Draconis* lb. 3, *Indium* [indigo] lb. 3.

Pliny describes the best quality as resembling in colour the finest gold, dry, pure, splitting into thin layers,—a description according exactly with a specimen in my possession.

19. *Cyminum*, Cumin seed, much used in the middle ages as a cheap and common spice.

20. *Pyon*, in low Latin, *pignolus*, in French, *pignon*, the kernels of the Stone Pine, *Pinus pinea*, L. In the *Liber Albus*, the same article under the name of *pyoine*, and in the *Liber Horn* as *pyoingne*, appears as liable to the King's impost called *Scavage*.

21. *Gyngebrad*, otherwise written *Gingibretum* or *Zinzibratum*, signifies *Preserved* or *Candied Ginger*, a favourite mediæval delicacy, imported from India. The exact meaning of the term *gorde* or *gurda*, applied to this article, is doubtful.[||]

22. Three boxes (*pyxides*) of the preserved ginger and "*Pyonad*;" the latter is the French *Pignolat*, a confection of fine kernels (see No. 20), with white of egg and sugar. Its modern representative is the sweetmeat called *nougat*, still made in the South of France, especially at the town of Montelimart. Minute directions—"*Pour faire le Pignolat*"—are given by Michel de Nostredame (or Nostradamus), the famous astrologer in his *Excellent et moult utile opuscule a touts necessaire, qui desirent avoir cognoissance de plusieurs exquises receptes*, Paris, 1556. An *Ordonnance* of Philippe-le-Bel,—"*touchant les Epiceries et les Denrées, qui se vendent au poids*," issued in the year 1312, contains the following paragraph designed to protect the purchaser of preserved ginger and pignolat:—

Item. Que nuls ne vende, ne achate pour revendre *Gingembrat* ne *Pignolat* embouchié, et qu'il ne soit autel desous, comme dessus, et sans enchapleures, [qui ne soint de même le cucre, et la confiture sans yringes. Et que nul ne le reface en maniere que il melle le viel avecques le nouvel, et que il ne le die a l'acheteur. Et que nuls ne face a confiture *nulle converture* de cucre, qu'elle ne soit dautel dessous comme dessus. Et cil qui sera trouvè faisant contre ceste Ordonance perdra toute *la confiture*, et *sera en l'amende*. Et ladite confiture par le commandement de la justice du lieu sera jugièe par le mestre du mestier du lieu, se mestre y avait, et se mestre n'i avoit, par cette mesme justice, et les dites gens et l'execution sera fait sur ce comme fait le requerra par ladicte Justice.]

23. Two boxes of the same, placed to the account of the executors.

24. *Nux muscata*, Nutmegs; the quantity is half a pound.

25. *Zedewand*, Zedoary, the dried rhizome of one or more Indian species of *Curcuma*. During the middle ages, it was used as a spice of the same class as ginger. Its importance is indicated by it being mentioned in several tariffs as an article of commerce. Thus Jacque de Vitri, who was bishop of Acre, in Palestine, early in the 13th century, names it as *Zedoaria*, vulgo *Citouart*, and says that it is imported into the Holy Land from India.

In the list of *Droits de Rivage* levied by the Podestat and Council of Marseilles, A.D. 1228, occurs the following:—"Grand cabas de Poivre, ou de Gingembre, ou de *Citoual*, ou de Laques, ou d'autres marchandises de même valeur que celles, la paie iv. deniers j. obole."[*] A charter of Henry, King of Navarre, regulating the rights of that sovereign in respect to the town of Provins, A.D. 1273, contains the following regulation:—

"Item paiera de chascune charge de Greinue, de Cire, de Pivre, de Bresil, de Gingembre, de Guenelle [*canelle*], de Citonal [citoual], et de Gérofle II. s., et de chascune charge d' Alun, d' Anis, d' Amendies, de Connin [comin], chascuns qui vendra," etc.

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[*] Wright, *Volume of Vocabularies*, 1857, 174.

[†] *Theophilus de Diversis Artibus*, translated by Hendric, Lond., 1847, 53, 419.

[‡] Pardessus, *Diplomata, Chartæ, Epistolæ, etc.*, Lutet. Paris., II. (1849), 309.

[§] *Polyptique de l'Abbè Irminon*, II., 336.

[||] [Note on the Trade of Montpellier, from Depping (G.B.) 'Hist. de Commerce entre le Levant et l'Europe, Paris, 1830, Tome I., 304.' "Encore une note de la maison du roi d'Angleterre, Henri III., à Bordeaux, qui en 1232, commanda a Montpellier, non seulement vingt pièces d'étoffes de soie, et quatre de drap écarlate, mais encore, trois *gourdes* de *Gingembre confit*." The ipsissima verba are: "tres curdas de gyngibracco." 'Rôles francais de la Tour de Londres extraits par Bréquigny.']

[*] Méry et Guindon, *Histoire des Actes . . . . de la municipalite de Marseille*, 1841, i. 372; Bourquelot, *Histoire de Provins*, 1839-40, i., 425.

There is a similar enactment in which "*Cytoal*," is mentioned, in a tariff of the merchandise sold in Paris, at the close of the 13th century.[*] In the list contained in the *Liber Albus* of the City of London, before referred to, the spice in question appears as *Cetewale*,[†] under which name it is mentioned by the poet Chaucer, and by many writers on drugs.

26. *Lichini*, Wicks for candles or lamps.

28. *Paris Candles*.—Professor Thorold Rogers remarks that candles, called either *White Candles* or *Candles of Paris*, not unfrequently mentioned in mediæval domestic accounts, were imported into England.[‡]

29. *Vas pro Candelis Parisiæ*, with appendages, would appear to be some special kind of candlestick, used for a Paris candle.

27. "*iiij. Stateris*, and No. 30 "*j. Statera de Ferro*." The second of these entries seems to me to relate to a steelyard.

[*The discussion on this paper is printed at p.* 456.]

SENNA EXTRACTED BY ALCOHOL.[§]

BY L. SIEBOLD.

I wish to draw the attention of this meeting to a preparation known as "Senna Extracted by Alcohol," which for many years has been employed on the Continent, and has gained much favour as a mild and pleasant purgative. This purified senna, if I may so call it, is obtained by macerating senna leaves for several days in spirit of wine of 60° over proof, and then pressing and drying them; the spirit is recovered from the strained tincture by distillation, and may be used again for the same process. An aqueous infusion of this extracted senna has a purgative action without occasioning any griping, and is so entirely free from any unpleasant taste, that the most fastidious patient need not object to it; indeed, I know of no other aperient which in like manner combines tastelessness with reliable efficacy. It is the principal ingredient in the so-called St. Germain species, a popular remedy, in which it is combined with elder flowers, fennel fruit, aniseed, and cream of tartar.

The fact that an alcoholic extract of senna is devoid of purgative properties was first pointed out by Heerlein, and has been fully confirmed by the researches of Professor Buchheim. Kubly and Dragendorff have also shown that cathartic acid, the active principle of senna, exists in the leaves in combination with calcium and magnesium, and that in this form it is insoluble in strong alcohol, though very soluble in water. Thus it has been generally assumed that senna extracted by alcohol possesses the full purgative action of the drug from which it is made, and this view appears still to prevail at the present time. I have every reason, however, to doubt the correctness of this supposition, as may be seen from the following:—Some years ago I had occasion to take senna frequently and for a long time, and I always found that the action of the extracted leaves was weaker than that of the same senna used in the original state, three drachms of the former being required to produce the same effect as two drachms of the latter. In a number of experiments, subsequently made with the alcoholic extract, I found that this substance when taken alone produced no effect beyond a slight griping, but when taken along with an infusion of the extracted senna, the action of the latter was increased, so as to be equal to that of the unextracted leaves. An infusion of two drachms of senna exhausted by alcohol taken in conjunction with the corresponding quantity of the alcoholic extract produced the full effect of an infusion of two drachms of the unexhausted leaves, whereas the alcoholic extract, when taken alone, even in much larger quantities, had no purgative action whatever. It appears to me that this alcoholic extract, though not a purgative itself, is capable of exciting peristaltic movements, and thus augmenting the action of the cathartic acid, but whether this effect is due to the chysophanic acid or to some other constituent of the extract, I am not prepared to decide. My observations have not been confined to my own person, for others who are in the habit of taking St. Germain species as a laxative, have informed me that they require a larger dose of this preparation when made according to the German Pharmacopœia, than they do of the same mixture containing ordinary senna in place of the exhausted leaves.

The tincture obtained by the maceration of senna in strong spirit and subsequent filtration remains clear on the addition of absolute alcohol. After standing for several days the mixture forms a very slight deposit, which is devoid of purgative properties, and gives no indication of the presence of cathartic acid. The extract left after the distillation of the spirit appears to consist mainly of crysophanic acid and resinous bodies. As several writers have attributed the purgative action of senna partially to a volatile oil, I have repeatedly tried the effects of water distilled from the leaves, but always with a negative result. My experiments lead to the following conclusions:—

1. Strong spirit does not remove any of the active principle (cathartic acid) from senna leaves.

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[*] *Revue Archéologique*, ix. (1852), 213.

[[†] "There was ike wexing many a spice
As clowe, gilofre, and licorice,
Gingiber, and grein de Paris
Canell at *cetewale* of pris,
And many a spice delitable
To eten whan men rise fro table.."
CHAUCER, p. 224, col. 2.]

[‡] [The Chandeliers formed in Paris a separate guild from the Ciriers. The first made tallow candles, the second only wax candles. In the 'Boke of Curtasye,' date circa A.D. 1460, we read—

"In chambur no lyght ther shalle be brent
Bot of wax, therto yf ye take tent;
In hall at soper schalle candels brenne
Of Parys, therin that alle men kenne."

From which it might be inferred that Paris candles were inferior to wax candles. The following is quoted from the 'Wardrobe Accounts of Edward IV.,' anno 1480, edited by Sir Harris Nicholas:—"William Whyte, tallough channdeller, for iij dosen and ix lb. of p'is candell' for to light when the king's highness and goode grace on a nyght come unto his said grete wardrobe, and at other divers tymes."

'La Bible Guiot de Provins' is a violent satire on the Thirteenth Century. In it complaint is made of the excessive dearness of spices and electuaries.

"S'ils reviennent de Montpellier
Lor lectuaries sont moult chier;
Lors dient-ils, ce m'est avis
Quil's ont gigimbraiz et pliris,
Et diadragum et rosat
Et penidoin et violat."]

[Diadragant, penidium].

[§] Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, December 1, 1875.

2. The therapeutic action of cathartic acid is assisted by one or more of the constituents yielded by senna to strong spirit, though the latter produce no purgative effect when taken alone.

3. Senna exhausted by alcohol is a reliable and pleasant purgative, but somewhat weaker in its action than the unextracted leaves.

The disgusting flavour of senna and its tendency to gripe render it objectionable to many who would otherwise gladly avail themselves of this useful medicine. Yet by a very simple process this nauseous drug may be converted into a tasteless and pleasant remedy, and it therefore appears surprising to me that so valuable a purgative should have been neglected so long by the medical profession of this country. Perhaps I may hope that the subject which I have had the pleasure of bringing before this meeting will receive the attention of those engaged in compiling a future edition of the 'National Pharmacopœia,' and that "senna extracted by alcohol," will, before long, take its deserved place in the list of recognized medicines.

[*The discussion on this paper is printed at p.* 456].

THE PHARMACY ACT (IRELAND).

The following are the circulars which were referred to by Mr. Sandford at the meeting of the Council (see p. 450) as having been issued in reference to the examinations under the Pharmacy Act (Ireland):—

"M'Master, Hodgson and Co. beg to call attention to the Curriculum of the Pharmaceutical Society of Ireland (copy of which they enclose). You are probably aware that under the Pharmacy Act (Ireland), 1875, all who wish to compound prescriptions, and assume the title of Pharmaceutical Chemists, may do so by passing an examination, which, for the first year, will be comparatively easy. From 1st October, 1876, the standard will be considerably raised, and their object in calling your attention to it is, that you may avail yourself of the year of grace, should you be desirous of qualifying yourself as a Pharmaceutical Chemist.

"121 and 122, Capel Street,
"*November*, 1875."

"Pharmaceutical Society of Ireland.

"*Regulations for the Qualification of Pharmaceutical Chemist.*

"Extent and Mode of Examination.

"*Latin.*—To translate into English, and parse, one or more sentences from a Latin author:—Cæsar's 'Commentaries,' first book; or Virgil's 'Æneid,' first book.

"*English.*—To write on a subject selected by the Examiner; and to write from dictation.

"*Arithmetic.*—The first four Rules, Simple Proportion and Decimals. To describe the weights and measures of the Pharmacopœia, and of the Metric system.

"*Botany.*—To recognize the principal indigenous plants used in medicine, and to give the definitions and the distinctive characters of their several parts.

"*Materia Medica.*—To recognize specimens of the drugs in the Pharmacopœia, to describe their characters, the sources from which they are obtained, and the officinal preparations into which they enter. To detect adulterations, and give the active principles, and average doses of such medicines as are poisonous.

"*Pharmaceutical and General Chemistry.*—The Elementary Laws of Chemistry. The chemical preparations of the Pharmacopœia, their characters and tests.

"*Practical Pharmacy.*—To translate Latin prescriptions; to detect dangerous doses; and to compound and dispense correctly.

"To explain the processes of making the non-chemical preparations of the Pharmacopœia.

"Candidates are to give notice to the Council, seven clear days before the Stated Meetings for Examination, of their desire to be examined. And also to lodge a receipt of having paid the Fee of Five Guineas into the Royal Bank, to the credit of the Society.

"Mr. Fennell, College of Physicians, Kildare Street, Dublin, will give any additional information required.

"Form of Notice.—'*I*,.................., *desire to be examined for the Licence to act as a Pharmaceutical Chemist.*'

"All Candidates for this Examination shall have attained the age of twenty-one years, and these Regulations shall be in force up to 1st October, 1876."

"12, Grafton Street, Dublin,
"November 16th, 1875.

"Dear Sir,—You are doubtless aware that an Irish Pharmacy Act, which breaks down the monopoly hitherto existing, passed through Parliament last session, and will be in operation at the end of this month. The Irish Pharmaceutical Council have just issued their curriculum of examination, which will be in force until 1st October, 1876; so that this may be taken as a year of grace to all (both employers and assistants who have attained the age of twenty-one years) who wish to avail themselves of this opportunity to obtain privileges so long wished and sought for.

"I enclose copy of the curriculum, and shall be happy to supply you with as many more as you can distribute among the assistants in your establishment; and I earnestly hope that you will not only yourself qualify for this examination, but use your influence with all whom you know in connection with the trade to take advantage of this modified examination.

"To meet the requirements of those who intend becoming Pharmaceutical Chemists, this Society has resolved on establishing a School of Pharmacy, and a six months' course of education will be given, which it is hoped may be sufficient to qualify for this examination all who heartily go in for study.

"The Committee are seeking more spacious rooms than the one they at present occupy, but in the meantime the classes will be held at 62, William Street, three evenings weekly—namely, Monday, Wednesday, and Friday—at the hour of 8 o'clock, commencing Monday, the 22nd inst. For further particulars I beg to refer you to annexed prospectus.

"I remain, dear Sir, faithfully yours,
"William Hayes, *Hon. Sec.*

"P.S.—If you desire to join the classes please sign the accompanying form, and send it to me at once."

"School of Pharmacy in connection with the
"Chemists and Druggists' Society of Ireland.

"A six months' course of education to qualify for Pharmaceutical Chemist will be given in the following subjects:—

"1. Theoretical and Practical Conversational Classes on Pharmaceutical and General Chemistry, by Professor Tichborne, on Mondays and Fridays, commencing Monday, the 22nd November.

"2. A Class on Materia Medica and Practical Pharmacy, by Dr. Frazer, on Wednesdays, commencing the 24th November.

"3. A course of six practical lectures on Botany, for which the Committee hope to obtain the services of Professor M'Nab in April and May, when the Indigenous Botanical Specimens can be obtained.

"The fees for the entire course is 2*l.*, or 15s. for any one subject. For convenience of pupils, the payment may be divided—half to be paid at commencement of course, and remainder at beginning of fourth month. Classes commence at eight o'clock precisely.

"William Hayes, *Hon. Secretary.*"

The Pharmaceutical Journal.

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SATURDAY, DECEMBER 4, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE BENEVOLENT FUND.

THE desirability of creating greater and more general interest in the Benevolent Fund of this Society has on several occasions been dwelt upon in these columns, and it has often been pointed out that there is ample room for a considerable increase in the number of subscribers. The steps now taken by the Council, as reported at page 449, seem eminently calculated to secure the desired result, and we are disposed to think that they will be at least as advantageous to the Fund as the extension of the right of voting to subscribers of five shillings has been. At the time this was done it was feared that by according a vote to a subscriber of five shillings, many who had previously subscribed half-a-guinea would reduce their subscription; but this has not been the result, and on the contrary, while the number of subscribers of five shillings at once rose from 274 to 480 the number of subscribers of half-a-guinea was not reduced but actually increased from 595 to 695.

In addition to this experience of the result of the last change, the fact that upwards of two-thirds of the subscribers to the Fund are subscribers of small sums also seems in itself to point to the advisability of affording increased opportunity and inducement for supporting the charity. The Committee that has had this subject under consideration appears to have taken this view of the case, and has unanimously recommended that the voting power shall be extended to subscribers of half-a-crown by giving them one vote. In order to equalize the participation of subscribers in the administration of the Fund proportionately to the amount of their contributions, subscribers of five shillings are now to have two votes, subscribers of half-a-guinea five votes, and subscribers of one guinea ten votes.

After this change there can be but very slender reason for abstaining from contribution to the Benevolent Fund, and we hope, with MR. GREENISH, to see a large accession to the list of subscribers from among assistants, and even apprentices. If an early interest is thus established in the progress and promotion of the Fund on the part of the younger members of the trade, there is good reason to expect that it will develop as they advance to the position of acting for themselves, and that they will continue to support an institution the benefit of which they will have had opportunity of observing and appreciating, by having been called upon to exercise the privilege of voters.

The point relating to the Benevolent Fund, discussed by the Council, on the motion of which MR. SHAW had given notice, affords an illustration of one of the difficulties that have to be contended with in the administration of a charity such as the Benevolent Fund. Some of these difficulties seem indeed to be inseparable from such institutions and to become more uncontrollable as the charities themselves gain power to relieve the distressed by the extended support accorded to them. Subscribers naturally desire to be asked for the votes they are entitled to give, and those who take, as many do, an active interest in the administration of the Fund will as naturally have a desire to secure the election of some particular candidate or candidates. We fail to perceive any ground for objecting to the efforts of such persons to secure, with this object, the votes of other subscribers who having no individual interest in the election may be disposed to give their votes in support of a case thus recommended. Though we may sympathize with the candidates who have no friends to undertake the work of canvassing for them and are unable to do this for themselves, we cannot regard the prohibition of canvassing, however well-intentioned, otherwise than as a means of destroying that interest in the Fund which must always be one of the most potent conditions of its successful operation. Moreover the fact that no less than 1700 voting papers were not returned at the last election is evidence that there is much room for more of that earnest desire to make the Benevolent Fund a means of alleviating distress, which may fairly be regarded as one of the chief, if not the only motive for the practice of canvassing on behalf of candidates.

CINCHONA CULTIVATION IN PRIVATE PLANTATIONS.

WE have often in past years had occasion to refer to the cultivation of Cinchonas in India, and in more recent times have been pleased to record the results that have been attained in the acclimatization of the plants. But the bark received in this country from India up to the present time has been chiefly if not all yielded by plants grown in the Government Cinchona plantations. As a private industry, Cinchona cultivation in India has not been taken up by planters as was at first expected. In a report just issued from Madras on the "Agricultural Conditions, Capabilities, and Prospects of the Neilgherry District," it is stated that the area of land under Cinchona cultivation is probably not more than 3000 acres, and of this the greater portion consists of Government plantations. There are two good-sized plantations belonging to private owners, but the remainder of the area is made up chiefly of small plots attached to coffee estates. The general belief among planters is that the crop is of a much too speculative nature to be embarked in. It is not denied that the soil, situation, and climate of the Neilgherries is quite suited to the healthy growth and development of the numerous varieties of Cinchona, but the uncertainty regarding the reproduction of the bark, together with the acknowledged fact that the returns must be somewhat slow, keeps private owners from embarking in the cultivation of the plants. In the Neilgherry district there is a large area of land quite suited to the cultivation of Cinchona, but, as a general rule, this land is equally suited to the cultivation of tea, which, it is known, will at all times realize a remunerative price, and so its growth is adopted in preference to that of Cinchona. Cinchona also, especially the large-leaved varieties, needs shelter from high winds so that the choice of situation is a matter of some care, and consequently to a certain extent restricted. For the proper growth of Cinchonas a good filtering subsoil must underlie that on which the plants are to be grown, and as much land on the Neilgherries rests on an impervious retentive subsoil which would require that subsoil drainage and deep tillage should precede the planting operations, this also tends to limit Cinchona cultivation. The success that has been attained in the Government plantations is due to the care exercised in the choice of situation and to the high state of cultivation under which the plants are placed, "for where Cinchona trees have been planted in the more elevated part of the Neilgherries without a proper regard to soil, exposure, etc., and have been left to fight their way unaided by cultivation, they have turned out stunted, deformed bushes, instead of the tall, healthy, upright growing trees, such as we find in the Government plantations.' While Cinchona cultivation does not succeed on high elevations except under an expensive system of cultivation, it is not at all improbable that its growth in low and sheltered situations, where it grows rapidly under moderate cultivation, would pay the private planter. The bark produced in low elevations it is said is deficient in the valuable alkaloids, and consequently fetches a much lower price in commerce. This, however, is a question that had not been fully proved in consequence of so little Cinchona bark produced in private plantations having yet appeared in the market.

"CARNIVOROUS PLANTS."

Even if the sad character which has lately directed so much attention to what it is now the fashion to call "carnivorous plants" be a true one, it is interesting to know that probably they in their turn are devoured by insects, and thus give a fresh point to the saying that—

> "Great fleas have smaller fleas upon their backs to bite 'em;
> And little fleas have lesser fleas and so *ad infinitum*."

We learn from the *Garden* that a Mr. Riley has recently described in the Transactions of the Academy of Science of St. Louis the curious habits of a small moth and a dipterous insect which occur alive in the pitchers of *Sarracenia variolaris*. The moth is said to lay its eggs in the pitcher, and when the caterpillars make their appearance they weave there a gossamer-like web, and feed on the cellular tissue. The mature fly is credited with dropping "a number of larvæ into the pitchers," where they feed on the decaying remains of other insects, and finally burrow through the bottom of the pitchers to undergo their transformation in the ground.

Professor Morren, of Brussels, however, disputes the alleged carnivorous habits of these plants, and denies to them the power of absorbing and assimilating animal matter. So far, at any rate, as the *Pinguicula longifolia* and *Drosera rotundifolia* are concerned, he says he believes that the glutinous excretions of their leaves simply hasten decomposition, which is attended by the usual concomitant phenomena of the appearance of monads, bacteria, and the mycelia of various fungi.

ERYTHROXYLON COCA.

The investigation of the property attributed to the leaves of the Erythroxylon Coca of replacing food, preserving vigour, and preventing fatigue during severe bodily exercise has been the object of a series of experiments undertaken by Sir Robert Christison, one of them being the ascent of Ben Vorlich. Although at present reserving details, Sir Robert has informed the Botanical Society of Edinburgh that he has "constantly experienced the invigorating effects observed on the natives of Peru by travellers in that country." For an account of these properties, see article in the present series of this Journal, vol. i., p. 43.

IMPORTATION OF DRUGS INTO THE UNITED STATES.

The Drug Inspection Law of the United States, which prohibits the importation of drugs of inferior value,—for instance, of opium containing less than 8 or 9 per cent. of opium,—was the subject of discussion at the last half-yearly meeting of the Philadelphia College of Pharmacy. Whilst admitting that the law had worked well, it was argued by some of the speakers that it might now be so modified as to allow of such low quality drugs being imported for use in the manufacture of chemicals, upon a bond being given to the Government that they should not be used for any other purpose than the isolation of their constituent principles. Eventually a Committee was appointed to confer on the subject with other colleges and to take such other action as it might deem advisable.

A meeting of the "School of Pharmacy Students' Association" will be held on Thursday evening, December 9, at 8 o'clock, when a paper on "The Zoology of the Pharmacopœia" will be read by Mr. Shapley of Shrewsbury.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, December 1, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Atherton, Baynes, Betty, Cracknell, Frazer, Greenish, Hampson, Hanbury, Owen, Robbins, Sandford, Savage, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

Mr. FRAZER asked if individual members of Council were responsible for the opinions expressed in the Journal.

Mr. WILLIAMS said, certainly not. An editor was appointed, who was responsible for all that appeared in the Journal.

Mr. FRAZER said he dissented from the views expressed in an article in the last issue, and thought of writing to the Journal upon the subject; but if it was thoroughly understood that the Council was not responsible for what was there expressed it was sufficient.

The PRESIDENT read a letter he had received from Mr. Rimmington, regretting that he should not be able to attend the Council meeting, and referring to the business of the day.

The PRESIDENT also read another letter he had received from Mr. Shuttleworth, on behalf of the Legislation Committee of the Ontario College of Pharmacy, asking for a copy of the regulations of the Society in connection with the examinations, as it was felt very desirable in Canada that the status and qualification of chemists and druggists there should be as nearly as possible assimilated to those of chemists and druggists in Great Britain, with a view to an interchange of certificates at some future time. He had replied saying that he had requested the Secretary to send a copy of the 'Calendar,' which contained all the information desired, and adding his own opinion that the Ontario College could not do better than follow the footsteps of the Pharmaceutical Society of Great Britain, which course would facilitate the carrying out of the suggestion of an "interchange of certificates," when the time was ripe to discuss the subject.

Mr. GREENISH asked if a copy of the Journal was sent to the Ontario College of Pharmacy. If not he thought it was very desirable that one should be sent.

The SECRETARY, after making inquiry, reported that at present the Journal was not being forwarded; and it was moved by Mr. GREENISH, seconded by Mr. SANDFORD, and resolved—

> "That a copy of the *Pharmaceutical Journal and Transactions* be sent regularly, as published, to the Ontario College of Pharmacy."

The following being duly registered as Pharmaceutical Chemists were respectively granted a Diploma stamped with the seal of the Society:—

Sawden, Alfred.
Senier, Alfred, jun.
Slater, Thomas, jun.

ELECTIONS.

ASSOCIATE IN BUSINESS.

Samuel Sayer Umpleby, of Coatham, having passed the Minor examination, and being in business on his own account, was elected an "Associate in Business" of the Society.

ASSOCIATES.

The following having passed the Minor examination were elected "Associates" of the Society:—

Raynes, Sidney Herbert	London.
Smith, Joseph	Manchester.
Unsworth, John Walter	Bolton-le-Moors.
Woodhouse, George	Ludlow.
Wright, Bentley Warren	Grantham.
Wright, Edwin	Ipswich.

One individual was ordered to be restored to his former status in the Society upon payment of the current year's subscription and a fine.

The name of Felix Robert Clarance, of 18, Northumberland Place, Bath, was restored to the Register of Chemists and Druggists.

REPORTS OF COMMITTEES.

FINANCE.

The Report of this Committee was read and confirmed, and sundry accounts were ordered to be paid.

BENEVOLENT FUND.

The Committee presented a report, recommending that the following grants be made:—

£10 to the widow of a member of the Society, with three children dependent on her; the money to be placed in the hands of Mr. Savage, for the benefit of the children.

£5 to a former member of the Society, in business for twenty-seven years, now aged sixty-seven, and suffering from ill health. Applicant had a grant of £10 in May last.

£15 to the widow of a registered chemist and druggist, and member of the Society. Applicant has four children, two of whom are in an orphan asylum.

£10 to the widow of a chemist and druggist. Two former grants of a similar amount had been made.

The Committee had also considered the regulations in reference to voting, and was of opinion that by extending and increasing the voting power of subscribers and donors, a greater interest would be taken in the Fund by chemists and druggists, whether connected with the Society or not. It, therefore, unanimously recommended that the voting powers of subscribers be increased as follows:—Subscribers of half-a-crown to have one vote; five shillings, two votes; half-a-guinea, five votes; one guinea, ten votes; and to increase in the proportion of five votes for every half-a-guinea.

Mr. SAVAGE feared that many subscribers of five shillings would reduce their subscriptions to half-a-crown. He thought what was gained in one way would be lost in another.

Mr. GREENISH said that the statistics in connection with the last change did not bear out that supposition.

Mr. OWEN said when the voting power was extended from the half-a-guinea to the five shillings subscription the fund did not lose but gained half-a-guinea subscriptions.

Mr. BAYNES did not agree with the proposed change.

Mr. HAMPSON supported it.

The SECRETARY said that an increase of one hundred half-a-guinea subscribers and an accession of two hundred at five shillings had followed the last change.

Mr. SAVAGE still objected, and moved that that portion of the Committee's report be not accepted.

Mr. FRAZER seconded the amendment. He was not present in the Committee when the question was discussed or he should have opposed it there.

Mr. ROBBINS said he had been long opposed to this change but was now converted; he should even like to see a further change, confining the power of recommendations for applicants to subscribers and donors only. Many members who did not subscribe anything recommended persons for relief, but if the subscription were made as low as 2s. 6d. there would be no excuse for their withholding their support to the Fund.

Mr. GREENISH said he had been a member of the Committee ever since he had been on the Council, and he had taken special interest in this subject. He hoped, therefore, this recommendation would be agreed to. He should like to see apprentices, or at least assistants, subscribing to the fund and having votes. If they did so, he had no doubt they would, when they entered into business, subscribe more largely.

Mr. Atherton said he had opposed this change hitherto, but was now in favour of it, principally on the ground mentioned by Mr. Greenish.

Mr. Shaw also supported the proposed change.

The amendment was put and lost, and the report and recommendations of the Committee adopted.

Mr. Robbins said 1700 voting papers had not been returned, at the last election. He suggested that voting papers should in future be first sent out to subscribers only. Non-subscribers might still retain their privileges of voting if they desired it, and have their voting papers sent on application.

The President thought this question had better come before the Committee in the first place. He did not, however, think it would meet with much support.

Law and Parliamentary.

The Solicitor had reported to the Committee the result of the several proceedings in which he had been engaged. In the case of Mr. Carr of Sheffield, who had failed to satisfy the judgment obtained against him, an execution had been issued, under which the judgment had been satisfied. In another case the party offending having stated that she had so done in ignorance, proceedings were suspended to see if any further breach occurred. In one case the prosecution had been withdrawn, and in two others penalties had been recovered. Several other cases were reported as being in various stages of progress, but there was considerable difficulty in inducing correspondents who had complained of infringements of the Act to assist the solicitors in getting the evidence necessary to procure convictions.

Pharmacy Act (*Ireland*).

The minutes of the Committee also contained the following correspondence :—

"November 22nd, 1875.

"Sir Dominic Corrigan, Bart.,
"President of the
"Pharmaceutical Society of Ireland.

"Sir,—I am in receipt of two circulars, one issued by Mr. Hayes, the other by Messrs M'Master and Hodgson, both of which refer to 'Regulations for Examination' said to have been issued by the Council of your Society.

"In one of the circulars was enclosed the printed paper sent herewith and I shall be obliged by your informing me whether the synopsis of the examination for the qualification of 'Pharmaceutical Chemist' therein set forth is official, that is to say, approved by the Privy Council, and whether it has been issued by your Council as stated.

"I have the honour to be, Sir,
"Yours obediently,
"(Signed), Elias Bremridge,
"Secretary and Registrar."

"6, Kildare Street, Dublin.
"November 24th 1875.

"Sir,—I am directed by the President of the Pharmaceutical Society of Ireland to inform you that he has received your letter of the 22nd instant, and will submit it to the next Meeting of the Council of the Society.

"I am, Sir,
"Your obedient servant,
"(Signed), H. J. Fennell,
"Clerk to the Council."

"Elias Bremridge, Esq."

Mr. Hampson said he was sorry the correspondence between the Secretary and the Pharmaceutical Society of Ireland had taken place; and he took this opportunity of protesting against the character of the criticisms which had appeared in the Journal on the proceedings of the Irish Pharmaceutical Society. The recent Act of Parliament did not include reciprocity, and he certainly thought it would be much more delicate on their part to remain quiet and allow their Irish friends a full and free opportunity to carry out the law according to their own circumstances. They must bear in mind that the Pharmaceutical Society of Ireland was engaged in a work which its members were best calculated to judge of; they know their own wants and circumstances better than we know them. He considered the criticisms in the Journal altogether uncalled for. The British Society did not arrive at its present position all at once, it was an example of gradual growth, and the same thing must be looked for in Ireland. The Irish society could not probably all at once attain the standard it would ultimately desire, and he hoped that such adverse and unnecessary criticisms upon it as had lately been made would be discontinued.

It was then moved that the report and recommendation of the Committee be received and adopted.

Mr. Frazer said he must object to that if it included the Irish correspondence. He wished to know whether the Secretary had written under the directions either of the Council or the Committee.

The Secretary : No.

Mr. Frazer thought the correspondence ought to be expunged, or else the Council would be held responsible for addressing an independent society over which it had no possible control. He considered it a piece of unwarranted intrusion to address it at all. The founders of their own Society were not examined, they thought it sufficient for membership that a man should have been in business a certain time. The druggists in Ireland were on a different footing, and it was therefore proposed that there should be a modified examination.

The Secretary said the matter was very simple. A copy of these regulations for examination had been put into his hands, and he thought it only right to ascertain if they were authorized. He was always pleased to supply a copy of their own regulations or give any information on the subject to any one who applied; there was no interference or offence either expressed or implied in his application to Sir Dominic. He was sorry Mr. Frazer took the view he did of his action, but it would very much hamper the business of the Society if he had to obtain the sanction of the Council for every special letter he had to write.

Mr. Frazer said he had no objection whatever to the course taken by the Secretary, but to its being made official by being included in the minutes of the Committee.

Mr. Sandford thought the Secretary was quite justified in the course he had taken. A paper had been received containing a synopsis of the examinations, enclosed in a letter which had been circulated far and wide in Ireland, inviting men to come in and pass this "modified examination," during what was termed "the year of grace."* The promoters of the Irish Act stated that thorough examinations would be instituted, with a hope that there would be reciprocity between the two societies hereafter, but he considered the circulation of these papers would go far to prevent such reciprocity.

Mr. Hampson moved as an amendment that the minutes be received and adopted with the exception of the reference to the Irish correspondence.

Mr. Frazer seconded the amendment.

Mr. Savage thought the Secretary had taken a very proper course. He committed the Council to nothing whatever, but simply asked for information.

Mr. Williams thought the Irish Pharmaceutical Society had scarcely kept to the promises which it had made. It was understood that the examination for the qualification of pharmaceutical chemist should be the same as in England, and that the fee should be the same; but now they were going to examine men according to a far lower standard, and the fee was to be only five guineas instead of ten.

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* The letters and enclosure are printed at p. 466.

Mr. Greenish thought they were all indebted to the Secretary for the vigilance which he had shown.

Mr. Baynes felt satisfied that if the Secretary had not asked for this information of his own accord he would have been requested to do so by the Council. At the same time he sincerely hoped they would abstain from criticizing or attempting to interfere with the Irish Society, for he thought some of the articles which had appeared in the Journal on the subject a great mistake.

The amendment was then put and lost, and the original motion carried.

Library, Museum and Laboratory.

This Committee reported that it had held two meetings during the month. The Librarian had reported the average attendance in the library during the month as 30·16 by day; evening 13·2. In the conversation room, highest number 7; for fourteen evenings out of seventeen no one attended. Circulation of books in London 162; in the country, 28. The following books were recomended for purchase :—

General Fund :—

Elsner's 'Grundriss der Pharmaceutischen Chemie.'
Lockyer's 'Contributions to Solar Physics.'
'Encyclopædia Britannica.'
Gmelin's 'Chemistry,' vol. 8, to supply missing copy.

Hanbury Fund :—

Pfeiffer's 'Synonymia Botanica.'

Professor Attfield had reported that there were 66 students at work in the laboratory, that every bench was occupied, and that there were two gentlemen waiting now for admission. Professor Redwood had reported that 45 students were attending his class, and Professor Bentley had 53 students.

The Committee had considered at some length the means of carrying out the resolution of the Council that a distinct set of specimens should be set apart for lecture purposes, so that the historical value of the museum might not be in any way impaired. It had consulted the Professors and the Curator upon this subject, and had made some suggestions as to possible arrangements for carrying out the proposed change, but the plans were not matured. The Committee had examined the proof sheets of the catalogue of the chemical portion of the museum now in preparation, and recommended that the Curator should proceed with it under the supervision of Mr. Williams, who had kindly consented to assist him.

The Committee, also recommended that purchase and rebinding of books for the North British Branch, according to the list submitted last month by Mr. Mackay, be ordered.

The report and recommendation of the Committee, so far as complete, were received and adopted.

The President read a communication which he had received from Professor Attfield to the effect that every bench in the laboratory was now occupied, including the six additional benches just completed, and that two gentlemen were waiting to enter as soon as vacancies should occur.

House.

This Committee reported that it had been engaged in making arrangements for increasing the amount of fire policy on the Society's premises and property as mentioned last month. They also recommended a new arrangement for lighting the museum.

Report of Examinations.

November, 1875.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major	5	3	2
Minor	10	4	6
	—	—	—
	15	7	8

Four Certificates received in lieu of the Preliminary Examination.

1	University of Cambridge.
1	„ Edinburgh.
1	„ London.
1	„ Oxford.

Benevolent Fund.

Canvassing for the Benevolent Fund.

Mr. Shaw moved the following resolution of which he had given notice :—

"The Council of the Pharmaceutical Society, having in view the interests of the poorer and more friendless Candidates for Annuities on the Benevolent Fund, desire that in future no canvassing cards or circulars be sent to the Members, Associates, or Subscribers, by any of the candidates or their friends."

"The Council will, as heretofore, give a full and impartial statement of the circumstances of each candidate, and will publish the same in the *Pharmaceutical Journal* during four weeks previous to the election; and also insert such statement in the Voting Papers sent to the voters."

He hoped this motion would meet with the unanimous approval of the Council, as it was very desirable to prevent the proceedings of the Benevolent Fund degenerating into the state exhibited by some of the London charities. They were at present free from some of the evils connected with those bodies, such as the polling-day, etc., but the evils of canvassing were becoming so great that he thought some action should be taken in reference to it. His attention had been more particularly attracted to the matter lately from having become a subscriber to one of the London charities, when it became his duty to look into the manner in which it was administered, and he must say he could not justify the way in which candidates were admitted. He brought forward this matter from a desire to prevent the large expenditure to which some of the candidates were put. As a rule, every case which came before the Committee was a case of destitution, and where assistance was immediately required it was usual to make a grant at once, while if the case were very serious, the name of the applicant was placed on the list of approved candidates for an annuity. When that was done the candidate consulted his friends as to how he might hope to succeed, and as a general rule the first thing done was to issue canvassing cards. In some cases, however, the applicant might not have the means to do this, or friends to do so for him, and thus, though he might be the most fitting subject for benevolence, he was placed at a disadvantage. After the last election a letter was read from one of the most unsuccessful candidates, a most deserving case, in which he said "the result might have been different had he not been debarred by extreme poverty from more extensively canvassing the profession." A month ago he visited the poor man and found him suffering from paralysis, thoroughly helpless, and as far as he could judge he would never be able to earn anything again. If he had canvassed he might have been successful, but he might not, and then he would have been at a considerable expense for nothing. The issue of canvassing cards to all members and subscribers cost at least £10, so that if the whole eight candidates used them there would be an expenditure of £80 for which no one would get any benefit. Ought they not, if possible, to try and prevent such an expenditure of time, trouble, and annoyance, which he feared would grow year after year unless a stop were put to it? The result of the present system would naturally be that the most destitute person failed by reason of his poverty and want of friends. If a candidate had wealthy friends on whom he was dependent, there was a strong temptation to them to use every effort to get that man elected, and so far get him off their hands, and it was worth their while to go to some considerable expense to attain their object, and all this acted very prejudicially to other candidates who might be equally destitute and without any friends to depend on in any way. The influence of these cards was very great, as was shown at the last election where there were eight candidates, and the four who issued cards got a great many more votes than those who did not. It had been stated that the Council discountenanced the use of cards, but he did not see how this could be maintained, when, on the last occasion, one candidate, Mr. Eastes, had the names of four members of the Council on his card; an advertisement was also issued in his favour, and it was not to be wondered at, therefore, that he got more votes than anybody else. Another advantage of forbidding this practice was that the Committee would put a plain statement of each case before the subscribers, which could not be departed from, whereas in their own private statements the candidates could put forward anything they pleased. He had looked into the working of several of the London charities, and was prepared with statements drawn from them to support his argument, but would not detain the Council with them.

Mr. **Hampson** seconded the motion, and said he thought there was no need to add anything to the very clear and convincing speech of Mr. Shaw. He would only say that the presumed necessity which existed under the present system for issuing canvassing cards on such a constantly increasing scale was a sad and unnecessary burden on the helpless, and was very likely to prevent the right candidate being elected; but on the contrary, the one who had more friends, and who, therefore, did not want help so badly, rushed in at the head of the poll.

Mr. **Savage** was sorry to oppose a resolution of this kind, which seemed on the face of it to be a very good one, but it appeared to him simply impracticable. There was no penalty on non-compliance with the suggestion, and nothing to prevent persons canvassing in any way they pleased. In the interests of the Benevolent Fund also, he thought it would be the most suicidal thing possible. These applications being sent about brought the Society and the Fund constantly before the members of the trade.

Mr. **Greenish** thought it very undesirable that members of the Council or of the Benevolent Fund Committee should allow their names to appear on any card. He did not see how the Council could prevent cards being issued, because the candidates' friends might circulate them in their behalf even if the candidates did not do so themselves. If the subscribers objected to the cards they might easily put them aside and vote for those who did not use them.

Mr. **Sutton** said the Council had to do justice to the subscribers to the Fund; he believed that if any pressure were exercised in this direction, subscribers would cease to take any interest in the matter.

Mr. **Betty** thought the remarks of Mr. Shaw in introducing this question contained one of the most conclusive statements of any case ever brought before them. No one had ventured to raise his voice against the justice or expediency of agreeing to this motion, but the whole cry was the old one of *non possumus*. He did not deny that there were difficulties in the way of Mr. Shaw's proposition; it was a great change; it had engaged the attention of Sir Charles Trevelyan and many other gentlemen in connection with our great public charities, and they had as yet failed in carrying it out, though as they said only for a time. The Pharmaceutical Society possessed advantages not enjoyed by the administrations of many public charities for initiating reforms that would place all candidates on an equal footing. He therefore suggested that the matter should not be decided offhand, but be referred to the Benevolent Fund Committee to see if there were any practicable means of carrying out the policy of Mr. Shaw.

Mr. **Owen** objected to the proposed change very warmly. The Council had no right to deny these poor people the privilege of asking for votes. It would be utterly impossible to prevent canvassing; for instance the travellers for wholesale houses could canvass at every place of business at which they called.

The **Vice-President** thought the question had better be decided by a vote at once. It had been put on the ground that the issue of cards was a burden on the candidate, but in one case which had been referred to, that of Mr. Eastes, he knew that was not the case. It only showed, therefore, that some persons were more helpless than others, and that some had friends whilst others had not. Mr. Greenish had said that members of the Council ought not to allow their names to appear upon canvassing cards; but why should he because he was a member of the Council be denied liberty of action in his own neighbourhood in serving his poorer neighbours. With regard to Mr. Eastes' case, that was brought under his notice by a gentleman in his own neighbourhood, a justice of the peace, who had known Mr. Eastes many years, and who asked him to take the initiative in raising a small fund from persons in the locality for the benefit of Mr. Eastes. Upon consideration he had thought it was a proper case to be brought before the Society, and the subscriptions that would have formed the local fund had been sent to the Benevolent Fund, and he had no hesitation in saying that the annuity receivable in the first year had been thus provided.

Mr. **Schacht** could see no other way of avoiding the evil complained of, except placing the entire management of the Fund in the hands of the Council; and if they did that they would take all the heart out of the Benevolent Fund. If this were carried he felt he should certainly transgress the rule, by soliciting votes for any particular case with the necessities of which he was acquainted.

Mr. **Shaw**, in reply to the objection that his motion was impracticable, said that no penalty could be attached to breach of the proposed resolutions, but concluded that if the Council expressed its opinion in such a form and advertised it in the Journal, it would be all that was requisite to prevent cards being sent out. His resolution only applied to printed cards and circulars, not to personal application, which of course could not be interfered with, and which would not entail that expense to the candidates which he was anxious to avoid. He could not see why, as Mr. Sutton suggested, all interest should be taken away from the subscribers; they were simply asked to vote for those whom they considered the most eligible candidates, and his desire was that all should have a fair chance, a full statement of each case being put before the voters.

On a division the motion was lost by a large majority.

A second motion, of which Mr. Shaw had given notice, to the effect that voters might, if they pleased, authorize the Council to vote for them was withdrawn.

Examination Pass Lists.—Pereira Medal.—Prize of Books.—Hills Prize.

The report was read of a conference held on that morning between a Committee of Council and a Deputation from the Board of Examiners for England and Wales in reference to the following resolutions passed at a meeting of the Board on October 20th last:—

> "1. That in the opinion of this Board, the system, at present adopted, of publishing, in *two* divisions, the names of candidates who have passed the Major, Minor, and Preliminary examinations be discontinued.
>
> "2. That the system, at present adopted, of publishing the names of successful candidates in order of merit, should also be discontinued, and a list in alphabetical order be substituted for it.
>
> "3. That it be suggested to the Council to open the competition for the Pereira Medal to *all* the candidates who pass the Major examination during the session.

> "4. That it be further suggested to the Council to discontinue offering the Prize of Books for competition to candidates who have passed the Minor examination, and to offer it as a *second* prize in the competition for the Pereira Medal.
>
> "5. That it be suggested to Mr. Hills that the award of the 'Hills' Prize of Books be left in abeyance, pending further consideration.
>
> "6. That a copy of the foregoing resolutions be forwarded to the Board of Examiners for Scotland for their consideration, with a request that they report their opinion upon them to this Board."

A communication had been received from the Scotch Board of Examiners, saying that the Board had for the second time considered the above resolutions. Nos. 1 and 2 had been passed by 5 votes to 1 ; No. 3 was unanimously agreed to; No. 4 their votes were equally divided, upon but the Chairman gave a casting vote against it; and No 5 was agreed to. The Board added that it was quite willing to accept the decision of the Council upon the matter. After full discussion the Special Committee recommended all the above resolutions to the Council for adoption. It was also recommended that the amount given by the Council for the Prize of Books (£2 yearly), and the amount given for the Hills Prize, should be thrown into a common fund to be divided and offered as additional prizes in the competition for the Pereira Medal.

The Council resolved itself into committee to consider this matter, and after some discussion the report and recommendations of the Special Committee were unanimously agreed to.

The arrangement of the details of relative value of the prizes was referred to the Library, Museum, and Laboratory Committee, to consider and report to the Council at its next meeting.

Mr. Greenish suggested that a "Hanbury" gold medal should be founded to be awarded, not for success in passing an examination, which was in any case a very insufficient test of ability, but for some original research in connection with materia medica or pharmacy.

Examination Fees, etc.

The Council then again resolved itself into committee to consider some proposals brought forward by Mr. Williams in reference to examination fees, and other details connected therewith.

On reassembling the following resolution was proposed. Moved by Mr. Williams, and seconded by Mr. Sandford:—

> "That after the 31st December, 1876, the fee for the Minor examination be five guineas instead of three guineas, as heretofore, and that the fee for the Major examination be three guineas instead of five guineas as heretofore."

Mr. Hampson moved, as an amendment, the adjournment of the discussion. He said the division in the committee approving the proposition had been so close that he thought it only right to allow further time for consideration, especially as there was no necessity for hurrying the matter through. The Council would be able to deal with it much better after twelve months' further experience.

Mr. Hanbury seconded the amendment.

Mr. Betty said he was always ready to allow the minority their rights, but the majority had theirs also, and as this was not final, seeing that it involved an alteration of the bye-laws, and must come before three successive Council meetings before it could be adopted, he asked that the amendment should not be pressed.

Mr. Williams suggested that the whole matter should be referred to the February meeting of Council; and after some further discussion this was agreed to.

Mr. Williams then moved:—

> "That inasmuch as the number of candidates for the Minor and Major examinations has not been on all occasions sufficient to necessitate a meeting of the Board of Examiners monthly, it is expedient that the Board meet six times only during the year, viz.:—in February, April, June, July, October, and December."

If it were desired he would omit mentioning the months.

The Secretary said the practice of fixing the dates for the Preliminary examinations beforehand had worked very well. He had no doubt it would in this case also.

The resolution was unanimously agreed to.

Appointment of Examiners.

Mr. Williams then moved, and Mr. Betty seconded—

> "That in view of the reduced number of candidates for examination now presenting themselves, twelve examiners only be appointed for the ensuing year."

On being put, this resolution was rejected, and it was decided to appoint fourteen examiners, as at present.

The following Pharmaceutical Chemists were then appointed Examiners for the ensuing year, subject to the approval of the Privy Council :—

ENGLAND AND WALES.

Allchin, Alfred.
Barnes, James Benjamin.
Benger, Frederick Baden.
Carteighe, Michael.
Corder, Octavius.
Gale, Samuel.
Haselden, Adolphus Frederick.
Linford, John Samuel.
Martindale, William.
Moss, John.
Schweitzer, Julius.
Southall, William.
Taylor, George Spratt.
Umney, Charles.

SCOTLAND.

Ainslie, William.
Borland, John.
Buchanan, James.
Gilmour, William.
Kemp, David.
Kinninmont, Alexander.
Tait, William.
Young, James Robert.

Practical Pharmaceutical Laboratory.

Mr. Schacht moved the following resolution of which he had given notice :—

> "That the following articles be added to the Society's possessions :—
>
> "A stove, adapted to the requirements of an average pharmaceutical laboratory.
>
> "A mill or powdering machine, adapted to the requirements of an average pharmaceutical laboratory.
>
> "And that a small committee be appointed to select them."

On the last occasion he had been almost challenged to put into definite form what he thought it was desirable the Council should do. His fundamental idea was the desirability that all pharmacists should be able to see on the Society's premises something like a good specimen of the apparatus generally required in a moderately sized pharmaceutical laboratory, as distinct from a chemical one. The latter were plentiful and easily accessible, but pharmaceutical laboratories were very few and generally on a large and costly scale. It had been urged that the Society had no room for such a laboratory, and therefore, he had reduced his present proposal to very moderate limits. Since the last meeting he had spoken to several gentlemen on the subject, who agreed with him that this was desirable, and as a mode of carrying it out he would suggest that the Council offer a small prize for the best specimen of the two particular apparatus mentioned. If it were agreed to he should ask Messrs. Williams and Greenish to join him as the Committee.

Mr. SHAW seconded the motion, adding that some time ago Mr. Schacht had proposed something of a more extensive character which the Committee who considered it could not see the way to providing accommodation for; but Mr. Schacht had now confined his suggestions to something very moderate indeed, which would no doubt be very useful, and he hoped it would be adopted.

Mr. SUTTON saw great objections to going into this matter if it were intended to be anything more than a museum for models. If the Society liked to collect specimens of furnaces and mills it was one thing; but if it attempted to begin a practical pharmaceutical laboratory, it was quite another thing, and he did not see the slightest use in beginning with a mill and furnace. They would want to go much further than that to be of any use to anybody. He thought the Society was already going beyond its proper position in leading practice so far as it did; he should prefer to see it confine itself more to principles. It would be putting the Society into an invidious position to come forward and recommend any particular apparatus. Some people already complained of the influence of "the Square" being too paramount, and that they could not put a "Square" man into a round hole. If time permitted he could show many serious objections to this proposal, but it was sufficient to say that the Society had not room. If there were a pharmaceutical laboratory there would have to be a professor to attend to it.

The VICE-PRESIDENT suggested that Mr. Schacht should withdraw his proposal for the present. There was a great deal to be said on both sides, but it was too late then to discuss the matter fully.

Mr. SCHACHT thought the matter could be very soon disposed of, which he should prefer to a further postponement.

Mr. WILLIAMS had two objections to the motion, first, he did not know what kind of collection was meant, and in the next place, they had no room in which to put it.

Mr. SCHACHT said the stove he referred to was one similar to that in common use in Germany, and known as Beindorf's furnace. The smaller size was about 4ft. 6in. by 2ft. 8in., and the larger not much more cumbrous. He believed the lesser cost about £40, and the larger and more complete £50. He had no doubt that English manufacturers might be found who would make a similar furnace.

Mr. SANDFORD said the Library, Museum, and Laboratory Committee had very fully considered this question, but found it impossible to find room for such apparatus; it was puzzled even to find accommodation for the duplicate lecture specimens. If the Society only had a stove and a mill there would not be sufficient to induce people to come and look at. For some time there had been a drug mill in the museum, but it became so much damaged that the owner and exhibitor fetched it away, lest it should become entirely spoiled. If the Society bought a mill or stove now, it might be found next year that one much better was brought forward, and he did not think it would be justifiable to give pre-eminence to one manufacturer's goods over those of another.

Mr. FRAZER said it had been suggested to him by Mr. Kinninmont that the Society might invite manufacturers to submit their latest improvements for exhibition.

Mr. BETTY opposed the motion, since the House Committee had not been able to find accommodation for such apparatus.

Mr. GREENISH had great sympathy with Mr. Schacht on this question, for he had had great difficulty in arranging a small laboratory for his own use. He had frequently seen the furnace referred to by Mr. Schacht at work in Germany; he believed it cost about £40, and it seemed to answer the purpose of any ordinary pharmacist. He felt much interested, when in Germany, in entering the different pharmacies, and asking to be allowed to see the laboratory. He found one attached to almost every establishment; for until the last few years every pharmacist was obliged to make his own preparations. He was sorry to say, however, that he must vote against the proposition on principle, for he did not think it was within the Society's functions to exhibit the stoves of any particular maker.

Mr. HAMPSON would have supported the proposition if there had been a suitable place to accommodate the apparatus, but under the circumstances he must oppose it.

Mr. SCHACHT said he believed room could be found for the small sized stove he proposed in the room below, and that it might be put in operation occasionally as was desired.

The motion on being put to the vote was lost.

PHARMACEUTICAL MEETING.

Wednesday, December 1, 1875.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting were read and confirmed.

The following donations were announced, and the thanks of the Society were awarded to the donors:—

To the Library.—'Statistical Tables of the Patients under treatment in St. Bartholomew's Hospital during 1874,' from the Hospital; 'Untersuchungen über den Einfluss der Temperatur auf Bakterienvegetation,' von L. Bucholtz, from Professor Dragendorff.

To the Museum.—A fine Crystal of Bicarbonate of Ammonium, from Messrs. Hopkin and Williams; a specimen of Coto Bark, from Messrs. Cyriax and Farries.

A paper was then read on—

THE PREPARATION OF PURE CHEMICALS.

BY LOUIS SIEBOLD.

The paper is printed at page 441.

The Chairman requested Professor Redwood to open the discussion.

Professor REDWOOD said that his experience in reference to the matters referred to in the paper had been rather experimental than practical upon the large scale. He had only to state than in common, he was sure, with all the other gentlemen present, he felt greatly obliged to Mr. Siebold for his valuable communication, from which they would, no doubt, all derive considerable benefit when they came to look minutely into the subject, practically as well as theoretically. With regard to the degree of purity which was required in such articles as carbonate of sodium and carbonate of potassium, there was no doubt that, for strictly scientific purposes, it was constantly necessary that those substances should be in a state of great purity; but for pharmaceutical purposes such was not generally the case. He thought that he might venture to say that the object which had been aimed at in the drawing up of the definitions and descriptions of the mode of preparation in the Pharmacopœia had reference rather to what was considered as practically required, and it had not been considered desirable to claim too much in the way of chemical purity, for that was a quality which was almost unattainable. It must be within the cognizance of many, if not all, of the gentlemen present that, from time to time, chemists like Mr. Siebold came forward with the view of promoting the more general use of pure chemicals. Manufacturers, for instance, had professed to supply chemically pure chemicals, but his own experience was to the effect that all attempts in that direction had very shortly failed. Perhaps there had not been sufficient encouragement in the first instance, but more probably there had been a great failure experienced in practically carrying out the processes for the production of the substances in a state of great purity. It was, of course, notorious that carbonate of sodium was never pure in the state in which it was commonly met with in commerce. He understood Mr. Siebold to say that carbonate of sodium could be obtained in a pure state by recrystallization. That statement, certainly, was very much at variance with his (Professor Redwood's) experience upon that subject. This was a point to which he had given a great deal of attention, and on which he had made a great many experiments, and his conclusion was that the complete purification of commercial carbonate of sodium by recrystallization was not to be effected. In the first place, it appeared that the crystallization of that substance was very considerably impeded by the purity of the salt. Many years ago he had communications with a very celebrated firm of chemical manufacturers who took very great pains in the endeavour to obtain pure carbonate of sodium, purified by crystallization, and he was informed by them that they looked upon it as an attainment that really could not be expected. When the carbonate of sodium was purified it crystallized with great difficulty, in a very obscure manner, and not in regular crystals, and, in fact, as a crystalline salt, it was hardly a presentable article.

Mr. **Williams** said that Mr. Siebold's paper was a very interesting and important one. Speaking in the abstract, it was a fact that to obtain pure chemicals was almost an impossibility, and it so happened that carbonate of potassium and carbonate of sodium, caustic potash, and the ordinary acids, were amongst the most difficult chemicals to prepare in an absolutely pure state. He had made many attempts to prepare them in that condition, and to a certain extent he had succeeded, but he should be sorry to say that he had succeeded to his own satisfaction, or to the satisfaction of those more scientific chemists who wished to employ the salts for scientific and analytical purposes. Manufacturers could attain a certain degree of purity, but there was a degree which it seemed almost impossible to attain upon anything like a large scale. With respect to the pure carbonate of potassium, he believed that Mr. Siebold gave his process from the bitartrate of potassium, treating it with hydrochloric acid and nitrate of potash. In that case he would always get a little nitrate of potash as a product. As a general rule, if any given impurity was pointed out, it was possible for the manufacturer to get rid of that impurity; but it would be almost certain that he got another in its place, and that constituted the difficulty. In many cases the impurity depended upon the vessel in which the operation was performed. One vessel would cause one sort of impurity, and from another vessel they would get a totally different impurity. These results depended upon conditions which the operators could not control, for they must make the compound in something, and whatever vessel was used they got some impurity. Nevertheless, a high degree of purity could be reached without any practical difficulty. Manufacturers were often very much obliged to gentlemen like Mr. Siebold, who pointed out to them what the impurities were, because very often they went on selling a thing without the slightest idea that it contained a certain impurity, and when the fact was pointed out they were able to vary their process slightly, and avoid that impurity. It was only by that constant process of instruction, which might be said to result from sending out more or less impure chemicals, that they at last learned what impurities the compounds contained. Manufacturers were constantly in difficulty, and sometimes almost in desperation, in their endeavours to avoid impurities, and to produce that which their own consciences and their own wills would induce them to produce.

Mr. **Groves** said that some years ago he had several samples supplied as subnitrate of bismuth, and after drying them thoroughly he tested them by heat to see what loss of weight took place. He was astonished to find that one specimen suffered no diminution of weight at all, and on further examination it was found to be entirely composed of subchloride. He thought that the question of a single percentage of oxide in the subnitrate of bismuth was of far less importance than the mechanical state of subdivision. He had examined many specimens by the microscope, and he had found great differences between them in that respect. Some were in large crystals and others were much finer, and he thought that it would be well for manufacturers to pay more regard to the mechanical state of subdivision which, at present, varied very considerably in different specimens. That of an impalpable powder was of course to be desired.

Mr. **Martindale** said that he should like to corroborate Mr. Siebold and Mr. Groves with respect to the subnitrate of bismuth. He agreed with Mr. Siebold that it was a very unsuitable salt to use in medicine as compared with the subcarbonate, and unless it was washed to a greater extent than was directed in the Pharmacopœia, and in that way partially decomposed, it was very unsuitable for general dispensing. It was frequently prescribed along with a solution of bicarbonate of potash or soda, and the consequence was that if these were put into a bottle together, the amount of free acid caused so great an effervescence that the bottles sometimes burst.

Mr. **Umney** said that the author of the paper had stated that he had examined specimens of basic nitrate of bismuth, and found considerable quantities of oxychloride present. He (Mr. Umney) had for many years examined basic nitrate of bismuth, as met with in trade, and he believed that that made by English manufacturers was generally almost absolutely pure, and contained no oxychloride. Some of that which was sent into this country from Germany contained oxychloride, but he did not think that it arose from the cause to which Mr. Siebold attributed it, viz.: from the presence of hydrochloric acid in the nitric acid. But he believed that it arose from pouring the acid solution of nitrate of bismuth into common water, instead of distilled water. He should like to ask Mr. Siebold whether he had estimated the amount of oxychloride present. In his experience the amount in foreign nitrate of bismuth would not exceed probably one part of chlorine as oxychloride in ten thousand, which trace could be detected easily by nitrate of silver. Again, Mr. Siebold spoke of oxide of bismuth. The Pharmacopœia directed them to dry that substance at a temperature of 212° F., and he believed that Mr. Siebold had stated that he only obtained 98 or 99 per cent. of real oxide. If Mr. Siebold got such a result, he (Mr. Umney) considered it perfection for such a preparation as oxide of bismuth. They could not expect to get it absolutely anhydrous, except by ignition.

Mr. **Schacht** said that he had very little to add to the critically correct observations which had been made in the discussion; but he must congratulate pharmacy upon the fact that they could now get a good honest bismuth far more easily than they could fifteen to eighteen years ago. Everyone knew the extraordinary variation in the price of bismuth which had taken place during the last twenty or five and twenty years. The price of metallic bismuth had risen from 3s. 6*d.* a pound to 25*s.*, and, as was generally the case, when it was at its highest price it was most impure. It was during that time that he was bold enough to say that the impurities of bismuth had not been sufficiently dwelt upon by the authorities of the Pharmacopœia. He alluded more especially to the large contamination which the metal suffered from the presence of metallic copper. Bismuth could now be obtained very much more pure as regarded that contamination, but it still very frequently contained arsenic, which was a matter that must be carefully looked to. In the preparation of any chemical from bismuth he thought that it was very much better to start with the oxide than with the metal itself.

Mr. **Bottle** desired to bear his testimony to the exceeding interest of the paper; but he would like to ask Mr. Siebold whether his sight was sufficiently clear to enable him to determine that he had a pure bicarbonate of potassium by observing the colour which it imparted to an ordinary gas flame, as the paper had been illustrated by that experiment.

Mr. Siebold, in reply, said that he quite agreed with Professor Redwood that absolute purity was unnecessary in the case of most pharmaceutical chemicals; but he must say that if the Pharmacopœia insisted upon chemical purity, as it did in a number of preparations, giving certain tests with that view, it ought also to give processes which would yield preparations of the required purity. Again, in a number of instances, a certain amount of impurity was permitted by the Pharmacopœia. It was stated, with regard to certain substances, that chloride of barium and nitrate of silver might produce slight precipitates or turbidity, but the statement was not distinct with regard to the quantity which was to be submitted to the test. It would be better that the Pharmacopœia should give the quantities to be used in this method of testing. With regard to Professor Redwood's statement that he found it impossible to obtain pure carbonate of sodium simply by means of recrystallization, he (Mr. Siebold) admitted that it was a very troublesome thing to obtain it from the commercial article in that way. In fact, he had never made it from the commercial salt; he had always used Howard's best crystallized carbonate of sodium to start with; this he recrystallized two or three times. The pure substance might, therefore, be obtained if the recrystallization was carried far enough. He might say at once that the process was not resorted to in the case of anhydrous carbonate. The exsiccation of the crystals in large quantities was such a troublesome process that those who had performed it were not likely to do so again, but would certainly prefer the method of preparing it from the bicarbonate. As to the carbonate of potassium, if a pure bitartrate were taken there would be no difficulty in obtaining a pure carbonate. He never used the nitrate of potassium and charcoal process, for cyanide was always formed in that case, and it was difficult to get rid of that objectionable impurity. In reply to Mr. Williams, he must say that preparations of absolute purity could be obtained not merely in quantities of an ounce, but in moderately large quantities. A solution of half an ounce of the carbonate of potassium he had placed upon the table would not produce the slightest turbidity upon the addition of barium, chloride, and nitrate of silver, but he admitted that it required very great care and attention to produce chemicals of that sort. He could understand why it was difficult, and perhaps impossible, for manufacturers on the large scale to supply such articles. He had spoiled many a preparation of that sort himself simply by making two at the same time within a few yards' distance from each other, particles being mechanically carried by the steam from one to the other during evaporation. As regarded caustic potash, that preparation might be obtained in a chemically pure condition from perfectly pure carbonate of potassium, such as placed on the table, and lime produced from pure precipitated carbonate of calcium. The resulting preparation was in every respect as pure as that which was made from pure sulphate of potassium and caustic baryta. As regarded the occurrence of oxychloride in the subnitrate and the oxide of bismuth, he disputed that it generally did not amount to more than one in 10,000, as Mr. Umney had stated. In the oxide he had obtained such reactions as would point to the presence of something like one per cent., and even more than that in some instances. Whether the preparations containing this large amount of impurity were continental or English he was unable to say, but he had collected them from various retail and wholesale houses. He agreed with Mr. Groves that the state of division of the crystals of subnitrate of bismuth was an important point. In making oxide of bismuth according to the Pharmacopœia process, he had found that the crystalline subnitrate required boiling in the caustic soda much longer than the pulverulent nitrate. He had been misunderstood on one point. He did not say that the samples of oxide left 98 or 99 per cent. of residue on heating, but that the loss was from 2 to 6 per cent., while the Pharmacopœia said that they should suffer no loss at all. It was a matter of surprise to him that the Pharmacopœia made no mention of a test for the presence of arsenic in the bismuth preparations, whilst tests for almost every other impurity were mentioned. With regard to the flame test he had merely wished to show the absolute freedom from sodium in this sample of carbonate of potassium, as that impurity would be detected even in the purest specimens of carbonate which were ordinarily obtained. In the flame shown neither the naked eye nor observation through a green glass could detect any sodium.

The Chairman said he would now called upon Mr. Ince to read a paper by one who, although absent, remained, he trusted, with them in spirit. A man who, with his family, was deservedly honoured by all, but by none more than by the followers of pharmacy—

THE SPICES, GROCERIES, AND WAX OF A MEDIÆVAL HOUSEHOLD, A.D. 1303-10,

BY THE LATE DANIEL HANBURY, F.R.S.

The paper is printed at p. 443, and gave rise to the following discussion:—

Mr. E. M. Holmes asked whether the manuscript gave any clue as to the kind of cubebs which were mentioned, or as to the source from which they were obtained. He believed that Mr. Hanbury, in his interesting and admirable book, mentioned cubebs which were obtained from the west of Africa, and which were used as a spice. With regard to the saffron, there was in the Society's museum, a very old specimen labelled "Oriental Saffron," which consisted of florets of *Carthamus tinctorius*. It had occurred to him, in consequence of the price which was mentioned in the paper, that the saffron alluded to must be such an one, and not the true saffron.

Mr. Groves said that with regard to the cubebs, he supposed they were to be included among the spices, and that being admitted he thought it unlikely that the ordinary cubeb of pharmacy was intended. He remembered seeing at the first Paris Exhibition a sample of cubebs tasting of lemon. They came from the north of Africa, he believed. He once mentioned the fact to Mr. Hanbury, and asked him whether he had ever seen such a specimen. Mr. Hanbury had not at that time, and appeared doubtful of the correctness of the observation, but of the fact he (Mr. Groves) was certain.

Mr. Holmes said that in the Society's museum there was a specimen of cubebs which had exactly the flavour Mr. Groves had mentioned.

A paper was then read on—

SENNA EXTRACTED BY ALCOHOL.

BY LOUIS SIEBOLD.

The paper is printed on p. 445, and gave rise to the following discussion:—

Mr. Groves said that he worked upon senna some years ago, and would like to make a few remarks. He did not think Mr. Siebold had alluded to the fact, although doubtless aware of it himself, that the senna extracted by alcohol was mentioned as one of the preparations in the German Pharmacopœia. He (Mr. Groves) had prepared, about the same time as Professor Dragendorff did, pure cathartates of calcium and lime from senna leaves. Unfortunately, the Professor forestalled him. They were of a very griping character, as he had proved upon himself and his friends. The purgative was a nasty griping one, which, however completely it might be freed from taste and odour, would prevent it from ever being a favourite. The tincture obtained by treating senna with rectified spirit would of course contain the essential oil therefore it could not be used again and again, *ad infinitum*. After a time it acquired so great a flavour of senna that it was impossible to employ it with advantage. He had thought that his inquiries, and the results that he had published, would have brought about the recognition of tasteless preparations, but nothing of the sort had taken place. The mixed cathartates might very easily be obtained by digesting senna leaves in equal parts of rectified spirit and water, and then throwing down from the tincture the cathartates by means of alcohol. The reason why he used weak spirit in the first instance was that if water was used, they would obtain, in addition to the cathartates, a large quantity of saline matter containing two distinct organic acids peculiar to the plant. Hence, by using weak spirit in the first instance, and by subsequent precipitation by alcohol, they got a very near approach to purity in the mixed cathartates. He should like to ascertain from Professor Attfield whether the attempt made to separate the acids by one of his pupils had been followed up.

Professor ATTFIELD said that the inquiry had never been completed.

Mr. GROVES said that the subject was one which was worthy of investigation.

The meeting then adjourned to Wednesday, the 2nd of February.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The second scientific meeting of the session of this Society was held on Wednesday evening, November 10. The President, Mr. Greig, in the chair. There was a very large attendance.

After the usual preliminary business the chairman called upon Mr. William Gilmour, of Edinburgh, President of the North British Branch of the Pharmaceutical Society, who delivered a lecture on "Some Features in the Development of a Modern Science." The lecture treated of optics, and traced the development of the science from Newton downwards. Mr. Gilmour illustrated his remarks by some very beautiful experiments, aided by the oxyhydrogen lime light, and was frequently applauded. At the close, on the motion of the chairman, Mr. Gilmour was awarded a very hearty vote of thanks.

The treasurer intimated the addition of several country chemists to the membership of the Association, including Messrs. Kinnards and Lorne Campbell, Helensburgh; Babtie, Dumbarton; McNaught, Greenock; Freeland, Bathgate, etc. A number of names were enrolled for the tutorial class, but the practical chemistry class, which Dr. Machattie agreed to conduct, has been abandoned, only ten names having been enrolled.

After a few remarks by Mr. Kinninmont and others, urging the young men to take advantage of the classes organized for their benefit the meeting separated.

Dr. A. T. Machattie lectures at the next meeting, in December.

LEEDS CHEMISTS' ASSOCIATION.

The fourth general meeting of this Association for the present session was held in the library on Wednesday evening, November 24. The President, Mr. Yewdall, in the chair.

The minutes of the last meeting having been read and confirmed, the adjourned discussion on "The Sale of Food and Drugs Act" was resumed.

Mr. Yewdall, who at a previous meeting introduced the subject by reading the text of the Bill, and commenting upon its leading features, on the present occasion read the circular issued by the Local Government Board to the county and borough authorities charged with the execution of the Act, and pointed out those passages in it most affecting the interests of chemists.

A somewhat animated discussion followed, taken part in by Messrs. Reynolds, Manfield, Iredale, Child, Payne, and Brown. That portion of section 4 in the Act instituting imprisonment with hard labour for a second offence was strongly animadverted upon as being unnecessarily harsh. It was also thought that as there are many compound articles sold by retail over a druggist's counter not identical with Pharmacopœia preparations, it would be well for the safety of the trade if the standard of purity and strength required by the law in such cases could be ascertained. A resolution was therefore adopted on the motion of Mr. Iredale, seconded by Mr. Payne:—"That this meeting having considered the various sections of the Sale of Food and Drugs Act, suggests that the Parliamentary Committee of the Pharmaceutical Society should take steps to ascertain the intention of the Act so far as it relates to our business, with especial reference to the standard to be observed in *retailing* drugs—not when used in dispensing."

Parliamentary and Law Proceedings.

POISONING BY CHLOROFORM.

An inquest respecting the death of Mrs. Childers was held on Wednesday, December 1, by Mr. Harfield, the coroner, at Lockerley Hall, Hants. Mr. Childers stated that on waking on Tuesday morning about half-past seven he noticed a strong smell of chloroform in the bedroom, and found that his wife was insensible. In one of her hands was a four-ounce bottle which had contained chloroform, but was then nearly empty; a glass stopper and a small medicine "drop" glass was beneath her, and the pillow and bedclothes were saturated with chloroform. Restoratives were applied, and Dr. Fox, of Broughton, was sent for, who on his arrival at half-past eight found that Mrs. Childers was dead, and had, he believed, been dead about two hours. Mr. Childers said that his wife was not accustomed to take chloroform. She suffered from occasional indisposition, which produced sleeplessness, and it had been her custom to keep in her room a small bottle containing eight or ten drops of chloroform, and when she suffered from sleeplessness she would take a "sniff" at this; but sometimes she did not do this for months together. She brought a four-ounce bottle of chloroform from London with her, and the supposition was that she got out of bed, took the four-ounce bottle and the "drop" glass back with her, intending to take a sniff, and that the heat of the bed forced the glass stopper from the bottle. Mr. Ellis, of Sloane Square, London, who had been the friend and attendant of Mrs. Childers for twenty-five years, said the deceased took chloroform occasionally in opposition to his earnest entreaties to her not to do so in any quantity, as her system was not favourable to its inhalation. She waited on him on Friday and Saturday last, and complained of pain, and he applied a remedy from which she had formerly found relief. The effects of this would last over the Sunday and probably part of Monday, and then, probably, finding the pain returning to her, she had recourse to chloroform, and had acted as Mr. Childers had suggested, the result being that she was suddenly overcome, and a fatal result ensued. Dr. Fox, attributed death to an excessive inhalation of the fumes of chloroform. The jury returned a verdict of "Accidental death."

SINGULAR CASE OF OPIUM POISONING.

An inquest has been held this week in Manchester by the city coroner on the body of a male child two days old. James O'Brien said his wife gave birth to it. The child seemed to go on well till Wednesday morning, when the mother told him that it was dead in bed. The mother was subject to fits, in which she talked, and witness thought at first she was suffering from a fit and rambling. He believed that the fits had been brought on by opium, of which the mother must have taken at least "a solid ounce per week." Witness had only been aware of her habit of opium eating for twelve months. He had provided her with opium for six months, having obtained it from his brother, who was a druggist. Dr. Fletcher told witness that the child had been poisoned by opium sucked through the breast, and had died in consequence. Witness had provided his wife with "a week's supply on Sunday." She had no particular disease which necessitated her taking opium. The jury returned the following verdict:—"Found dead from the effects of opium poison through the mother's milk," and cautioned the husband to restrain the habit of opium eating by his wife as much as possible.—*Manchester Courier.*

CURIOUS DEFENCE IN A MILK ADULTERATION CASE.

Three retail dealers in milk were fined at Brighton on Wednesday week for adulterating that commodity with water. A novel defence was set up in one case. The defendant, who had been previously fined, pleaded that he now only professed to sell milk and water, and produced a window-card, which stated that such a mixture could be had within. The local Bench, however, overruled the plea, and imposed a penalty of 10s. and costs.

Reviews.

OFFICIAL GUIDE TO THE KEW MUSEUMS. Sixth Edition. With Additions. By J. R. JACKSON, A.L.S., Curator of the Museums.

It is a well-known fact that casual visitors to large museums, as a rule, acquire but little knowledge from the objects which meet their gaze. This arises from the confusion caused in the mind by the great number of objects to be seen, the short time the visitor usually has to spare in which to see them, and the difficulty in selecting the objects of the greatest interest. We take the opportunity furnished by the issue of a sixth edition to say that this difficulty is well met in the catalogue of the Kew Museums. It is especially intended for the visitor, and consequently does not include the whole of the articles to be found in the museums, but points out those of especial interest, and by means of short instructive notes gives a good general idea of the commercial uses, and of the preparation of the various products of plants. The student of Economic Botany, who desires to go deeper into the subject, will find nearly every object properly labelled, and thus have no difficulty in pursuing his researches. In the present edition, the index has been made more extensive, and new information has been added concerning more recent applications of various substances, and the quantities lately imported; botanical names have been altered in some instances to meet the present state of botanical knowledge; and the position of many of the things has been altered, re-arrangement on account of space having been found necessary.

Those who are studying with a view to pass the botanical examinations of the Science schools, or any who wish to obtain a good practical knowledge of Economic Botany, should not neglect any opportunity to visit, catalogue in hand, these valuable national museums. In no other way can so much be learnt and thoroughly impressed on the mind, as by examining the treasures there deposited. It needs only a glance through the catalogue to see that there are numerous objects in these museums of considerable interest to the pharmaceutical student, and for the benefit of such as may have the opportunity of visiting Kew, we may extract the following explanation from the Catalogue: that the Phanerogamia will be found in Museum No 1, opposite the large Palm-house, and the Cryptogamia in Museum No. 2, near the Herbaceous ground, Museum No. 3 being devoted chiefly to different kinds of timber.

GAZZETTA MEDICA DI ROMA DIRETTA DAL DOTT. FILIPPO CERASI. NO. I. Lœscher e Co. Roma. 1875.

A vigorous effort has been made by the Roman medical school to raise itself to the level of Bologna, Padua, Milan, and other seats of medicine in the Italian peninsula. Last summer the Roman Medical Association was founded, and at its subsequent meetings papers have been read and discussions carried on worthy of any similarly constituted society in Europe. An organ for the publication of these has also been desiderated and accordingly in the *Gazzetta* before us, we have the first instalment of what bids fair to be a well-conducted and valuable periodical.

The editor is Dr. Filippo Cerasi, a name already favourably known to medical literature, and his collaborateurs are evidently men accustomed to scientific research and proficient in scientific style. From the programme we learn that the *Gazzetta* will give the place of honour in its pages to original investigation, while next in importance will be that reserved for practical suggestions, such as will prove serviceable to the profession in its daily work. The records of clinical experience will therefore be full, and for this department the archives of other scientific bodies in Europe and America will be laid under contribution. Reviews of books will, further, form a distinct feature of the publication.

The start it makes is highly creditable and the first paper alone, that on the Jaborandi drug, from the pen of the editor, would draw attention to any scientific periodical. The action of this new medicine as a sialogogue, secondarily as a sudorific, and in a third and less marked degree as a diuretic, is proved by careful experiment and a sufficient claim to its embodiment in the Pharmacopœia is made out. Next follows a series of clinico-statistical notes of cases that have come under Dr. Scalzi of the Consolazione hospital, and these too are treated in a thoroughly scientific and practical style. After this we have a "Revista Clinica," a selection of articles from European and American journals of distinctly professional interest. A "Revista Terapeutica" comes next, also taken from European and American sources, while reviews of books are promised in the next number.

The *Gazzetta* deserves to succeed, and its value will progressively increase if it attract to its pages the contributions of that rising generation of Roman physicians who have already shown that they want but the opportunity to approve themselves worthy of the traditions of Lancisi.

THE CHEMISTS AND DRUGGISTS' DIARY, 1876.

The issue for 1876 of this convenient book is now before us. The diary proper presents mainly the same admirable features that have in former years made it so particularly suited to the wants of the chemist and druggist. Besides this there is a very fair *résumé* of the legislation of the last session of Parliament which more or less directly affected chemists and druggists; and also some useful information respecting the stamp acts, excise laws, and regulations, the keeping of petroleum, and other legal points. We think however, that even at the risk of of a repetition of what has appeared in former years this section might well have included the Regulations of the Board of Examiners, as information on that subject is always in demand. There are also several formulæ and tables, and the usual almanack information. Altogether, the Diary is a very complete and handy one, and quite up to the standard of former issues.

Posological and Therapeutical Tables, containing the Doses, Actions, and Uses of the Medicines in the British Pharmacopœia; with Poisons. By Alexander Henry, M.B., Assistant to the Professor of Materia Medica in the University of Edinburgh. Edinburgh: Maclachlan and Stewart. 1875.

This is a most elegantly got up little handbook for medical and pharmaceutical students, giving a concise and accurate account of the actions and uses, together with the doses of the general Pharmacopœial preparations, arranged in a tabular form.

The preparations themselves appear in their official designations in alphabetical order, and are distinguished by an asterisk from drugs, salts, and other chemical compounds constantly prescribed in general practice, but not included in the Pharmacopœia.

An additional column, showing the formulæ of the respective preparations, in the second edition, would make the book a very complete *vade mecum*.

Burnett's Disinfecting Fluid is described simply as a "Non-volatile disinfectant." A student would like to know what it *i*

BOOKS, PAMPHLETS, ETC., RECEIVED.

Syllabus of Materia Medica for the Use of Teachers and Students. By Alexander Harvey, M.D., and Alexander Dyce Davidson, M.D. Third Edition. London: H. K. Lewis. 1876.

Uebersicht der Normalgaben der Arzneimittel, mit tabellarischer Verführung der Einzelgaben und der grössten Tagesgaben, sowie mit Berücksichtigung der Pharmacopœa Germanica, bearbeitet von Carl Philipp Falck. Marburg: N. G. Elwert. 1875.

The Introductory Lecture at the Opening of the London Hospital Medical College for the Winter Session, 1875-6. By W. Bathurst Woodman. London: Wertheimer. 1875.

Obituary.

Notice has been received of the death of the following:—

On the 25th ult., at 42, Castle Street East, Oxford Street, London, Joseph Kettle, after a long and painful illness. He had been a Member of the Pharmaceutical Society since 1853, having been in business on his own account previous to that date. He has been a valued and trustworthy assistant and manager to Mr. Bird, Pharmaceutical Chemist, for many years, by whom he was much esteemed and respected.

On the 28th November, 1875, Mr. Sharman Crawford, Chemist and Druggist, of Cheltenham. Aged 32 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Sale of Narcotic Cordials.

Sir,—I have troubled you many times with my views on different trade matters, and as the sale of poisons is one upon which my mind has long been much engaged, I beg to offer the few following remarks to the candid consideration of your readers.

About ten years since several cases of child poisoning having occurred from overdoses of cordials, etc., containing opium, we determined upon making our Godfrey's Cordial, Child's Cordial, Gripe Mixture, etc., entirely free from any poisonous ingredient whatever—merely a combination of suitable carminatives with treacle or syrup.—Now so far from this having occasioned us any inconvenience, we have had persons send to us from long distances, on account of bottles received from other shops being labelled "poison," which very properly created alarm.

It may be that the chemist is applied to by persons ignorant of the injurious effects of even small doses of opium on young children. But the chemist is not supposed to be ignorant, nor should he pander to the foolish customs in existence, but try to educate the public to wiser and more healthful methods.

The truth is, the sale of these narcotic cordials is an abominable practice, and more particularly to be condemned as not only being injurious but unnecessary, in the majority of cases in which they are given the absence of the narcotic being an advantage.

If it be said they are sometimes given to produce sleep, and that in cases where such a result appears most desirable, to this I emphatically reply that in such cases the rational plan is to seek for the disturbing cause, and if possible to remove it. In fact, most of the infantile ailments for which these remedies are given yield readily enough to very simple treatment, and the simpler all these cordials are the better.

Far be it from my desire to dictate upon this or any other subject, but those who are determined to continue the sale of these articles well deserve any inconvenience, loss, or censure they may incur.

Before closing this letter, let me just say, it appears to me very advisable that we should all make up our minds to carry out the provisions of the "Poisons Act" as strictly as possible. If all would do this, and especially in the case of Vermin Killers (containing poisons mentioned in the Act), there would be no difficulty about it. But the chief trouble arises from so many selling these preparations to almost any one without either making inquiries or registering, so that we who wish to carry out the necessary restrictions upon their sale are considered as being over particular, and are frequently told the poison can be had at other places in the town, and in other towns, without any bother being made about it.

The account in your last impression of the death of a child from Godfrey's Cordial, recommended by a chemist, seemed to urge me as to write what I have done upon the subject, which to me seems a very important one.

One who has Known the Drug Trade
More than Thirty Years.

The Examination Fees.

Sir,—Any one who has taken note of the examinations of the Society of late must have been struck with this, that in past years as a natural consequence the Major followed the Minor, that is, most, if not all, went in for the higher qualification. Now we see, the Minor being all that is required for business purposes, the few only desiring the title of Pharmaceutical Chemist. This brings me to the pith of my subject; there is no doubt of this, that in time to come the Society must be mainly supported by its fees. In years gone by ten guineas were obtained for the required qualifications, now the sum obtained is five guineas, two for the

Preliminary and three for the Minor. Is it not the time to consider whether the scale should at once be altered to this standard, viz.:—Two guineas for the Preliminary; five guineas for the Minor; three guineas for the Major. The total amount is not raised, but the Society gets the benefit of an increase in the fees for the Minor, and that the Minor man ought not to grudge, for in the eyes of the public, "Associate of the Pharmaceutical Society" is quite as good or rather better than Pharmaceutical Chemist.

PHARMACIST.

THE KEEPING OF LEECHES.

Sir,—A fact being only valuable in proportion to the extent to which it is known, I venture through the Journal to communicate a hint furnished by my own experience of storing leeches.

For more than twelve months, I have adopted the plan of storing leeches in an ordinary druggist's pot, tied over with two thicknesses of muslin, placing on them very little more than sufficient water to cover them, and renewing the same every second or third day, and setting the pot immediately beneath my cellar window, without losing any by death! Whatever good results may attend the use of salicylic acid as a preservative of leech life, it is satisfactory to know that more simple measures have succeeded.

JOSEPH H. WATSON.

30, Saltaire Road,
Shipley, Yorks.

IMPURITIES IN BISMUTH.

Sir,—I have once met with a sample of medicinal bismuth exhibiting the objectionable property described by Mr. Charles Ekin. The peculiarity is probably due to the presence of minute traces of tellurium which my friend Mr. G. Brownen tells me he has detected as an occasional contamination.

The frequency of similar contaminations in metallic ores should not be overlooked by legislators and analysts, who are sometimes in danger of pushing their zeal for purity to impracticable extremes. Such bismuth as Mr. Ekin refers to might otherwise bring an innocent pharmacist under the operation of the Adulteration Act.

Would it be considered fanciful to suggest that this constant admixture (sometimes with a metal not found in an isolated state) seems to point to the convertibility of one metal into another? It is not more incredible that silver should be a dimorphism of lead, with the ores of which it is constantly associated, than that the diamond is a crystallization of carbon with which it has no local connection.

The deduction from such hypothesis would be that matter is not so multifarious as it appears, but that the so-called elements are one and the same matter stamped with the impress of variable natural forces.

RICHARD W. GILES.

Clifton, November 23, 1875.

BISMUTH QUERIES.

Sir,—With a view of eliciting further information on the subject of bismuth and its administration, I ask for a small space to state my queries.

I agree with Mr. Ekin in wishing to have bismuth as pure as possible, but think there are other causes besides arsenic to account for the taste like garlic.

Subnitrate of bismuth may possibly be left on the tongue after taking the mixture; can it then be decomposed by the saliva aided by the acid eructations in pyrosis and gastrodynia?

"Minute quantities of sulpho-cyanide of potassium are found in the saliva." (Miller.)

"Bismuth sometimes blackens the tongue." (Ringer.)

Does this produce a garlic taste or a metallic taste that might be compared to garlic?

"Bismuth turns the stools black from the effect of the intestinal gases." (Wood and Bache.)

Mr. Mee's plan of adding creosote would act as an antiseptic, preventing decomposition and the consequent production of offensive gases in the stomach, perhaps, thereby curing the garlic taste, or even if not so the taste of creosote would predominate.

In many cases where bismuth is prescribed the patient's taste is very much disordered, and I have frequently had mixtures sent back when they were quite correctly prepared.

By all means let us help Mr. Ekin as much as we can to have bismuth as pure as possible.

I look upon Mr. Mee's "Co." as a very suspicious character.

If the arsenic is useful in neuralgia, which will be readily admitted, it is certainly advisable that medical men should have it in a separate form and use it as arsenic, of known strength and dose.

Although much yet remains to be done in explaining the action of bismuth, sufficient is known to prove that it is not dependent upon arsenic, as many medical men who use subnitrate for diarrhœa and liq. bismuthi in stomach affections could testify.

It would be very interesting to learn whether bismuth ever blackens the tongue when given in the pilular form, and also to know whether hydrocyanic acid given with bismuth may cause in some cases the taste like garlic.

GEORGE BROWN.

Sandown, I.W.,
Nov. 29, 1875.

E. M. Stapylton.—See a note in the first volume of the present series of this Journal, p. 446.

"*Southwick.*"—Apply to the Secretary at Apothecaries' Hall.

W. Stuart.—Once a month (as is the case this week) the *Pharmaceutical Journal* is not published until Saturday, and therefore cannot reach Dublin on that day as you assume it should. On other occasions it is also liable to uncertain delays in accordance with the Post Office regulations respecting newspapers.

"*Tenens*" is thanked for his communication.

"*A Sufferer.*"—*Chilblain Liniment:*—

Tincture of Aconite	ʒiss.
Glycerine	ʒij.
Compound Camphor Liniment . . .	ʒivss.

Mix. To be used night and morning, but not if the skin is broken. Several other formulæ will be found in the first volume of the present series.

"*A Chemist and Druggist.*"—An apprentice should have such facilities afforded him as to put it within his power to fit himself for passing the Minor examination at the expiry of his indentures. The Preliminary examination should be passed before the apprenticeship commences.

W. H. P.—Medical men are not exempt from the regulations respecting the sale of "poisons" according to the Pharmacy Act, 1868.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ*. A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

The following journals have been received:—The 'British Medical Journal,' Nov. 27; the 'Medical Times and Gazette,' Nov. 27; the 'Lancet,' Nov. 27; the 'London Medical Record,' Nov. 27; 'Medical Press and Circular,' Nov. 27; 'Nature,' Nov. 27; 'Chemical News,' Nov. 27; 'Gardeners' Chronicle,' Nov. 27; the 'Grocer,' Nov. 27; 'Journal of the Society of Arts,' Nov. 27; 'Grocery News,' Nov. 27; 'Produce Markets Review,' Nov. 27; 'Practical Magazine,' for December; 'Educational Times,' for December; 'British Journal of Dental Science,' for December; 'Journal of Applied Science,' for December; 'American Journal of Pharmacy,' for November; 'Moniteur Scientifique,' for November? 'Pharmaceutische Zeitung,' for Nov. 17 and 20; 'Sanitary Record,' Nov. 27.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Jackson, Dr. Frankland, Mr. Shapley, Mr. Mackay, Mr. Sheppard (Boston), Mr. Thresh, "Nemo," "Southwick," "Figitum." Mr. W. Wilkinson is thanked for his communication.

ON IODO-SULPHATE OF CHINIOIDIN AS AN EXCELLENT REAGENT FOR THE QUALITATIVE AND QUANTITATIVE DETERMINATION OF QUININE.

BY DR. J. E. DE VRIJ.

Since I applied Herapath's discovery[*] of the remarkable compound of quinine with iodine and sulphuric acid to the quantitative determination of quinine in a mixture of Cinchona alkaloids[†] it has often occurred to me that the use of an alcoholic solution of iodine has many inconveniences, for it requires a great deal of practice to add the *right* quantity. A *slight* excess of iodine is necessary to precipitate all the quinine; but if this excess is too great, a compound containing more iodine is formed, which is very soluble in alcohol. It appeared to me, therefore, desirable to abolish if possible the use of free iodine, and to obtain the same result by using a compound of iodine. For this purpose I tried the most soluble of the crystallizable iodosulphates described in Herapath's paper, viz., the iodosulphate of cinchonine. The alcoholic solution of this compound added to a solution of quinine in alcohol acidulated with sulphuric acid really produces a precipitate of iodosulphate of quinine (herapathite), but the bulk of the reagent required to precipitate all the quinine was too great to answer my purpose of applying it to the quantitative determination of quinine. After some experiments with the iodosulphate of chinioidin (wrongly called amorphous quinine), I found that this compound is perfectly adapted for the required purpose as its solubility in cold alcohol is great enough to make a concentrated alcoholic solution containing 16 per cent. or even more of it. This reagent is made as follows:—

Two parts of sulphate of chinioidine,[‡] are dissolved in 8 parts of water, containing 5 per cent. of sulphuric acid. To this *clear* solution, contained in a large capsule, a solution of one part of iodine and two parts of iodide of potassium in 100 parts of water is *slowly* added under continuous stirring so that no part of the solution of chinioidine comes into contact with an excess of iodine. By this addition an orange coloured flocculent precipitate is formed of iodosulphate of chinioidine, which either spontaneously or by a slight elevation of temperature collapses into a dark brown-red coloured resinous substance, whilst the supernatant liquor becomes clear and slightly yellow coloured. This liquor is poured off,[§] and the resinous substance is washed by heating it on a water-bath with distilled water. After washing, the resinous substance is heated on the water-bath till all the water has been evaporated. It is then soft and tenacious at the temperature of the water-bath, but becames hard and brittle after cooling. One part of this substance is now heated with 6 parts of alcohol of 92 or 94 per cent. on a water-bath, and is thus dissolved, and the solution allowed to cool. In cooling a part of the dissolved substance is separated. The clear dark coloured solution is evaporated on a water-bath, and the residue dissolved in 5 parts of cold alcohol. This second solution leaves a small part of insoluble substance. The clear dark coloured solution obtained by the separation of this insoluble matter, either by decantation or filtration, constitutes the reagent which I have now used since the beginning of this year, under the name of iodosulphate of chinioidine both for the qualitative and quantitative determination of *crystallizable* quinine.

To determine the quantity of quinine contained in the mixed alkaloids obtained from a sample of cinchona bark, 1 part of the alkaloids is dissolved in 20 parts of alcohol of 90 or 92 per cent. containing 1·6 per cent.[*] of sulphuric acid, to obtain an alcoholic solution of the acid sulphates of the alkaloids. From this solution the quinine is separated by adding carefully, by means of a pipette, the above-mentioned solution of iodosulphate of chinioidine, as long as a dark brown red precipitate of iodosulphate of quinine (herapathite) is formed. As soon as all the quinine has been precipitated and a *slight* excess of the reagent has been added the liquor acquires an intense yellow colour. The beaker containing the liquor with the precipitate is now covered by a watch-glass and heated on a water-bath till the liquid *begins* to boil.[†] After cooling, the beaker is weighed, to ascertain the amount of liquid, which is necessary in order to be able to apply later the above-mentioned correction. For although the quinine-herapathite is very little soluble in alcohol it is not insoluble,[‡] and therefore a correction must be applied for the quantity which has been dissolved both by the alcohol used for the solution of the alkaloids and the alcohol contained in the reagent. The liquor is now filtered, to collect the iodosulphate of quinine, on a small filter, where it is washed with a saturated solution of herapathite in alcohol.[§] After the washing has been completed, the weight of the funnel with the moist filter is taken and the filter allowed to dry in the funnel. As soon as it is dry the weight is taken again to ascertain the amount of solution of herapathite which remained in the filter, and which left the dissolved herapathite on the filter after the evaporation of the alcohol. This amount is subtracted from the total amount of liquid, and for the remaining the correction is calculated with reference to the temperature of the laboratory during the time of the analysis. The dry iodosulphate of quinine is taken from the filter and dried on a water-bath, in one of a couple of large watch-glasses closing tightly upon each other, so that the weight of the substance contained in the glass may be taken without the access of the air. When after repeatedly ascertaining the weight, it remains constant, this weight is noted down, and to it is added the product of the calculated correction. The sum of this addition is the total amount of iodosulphate of quinine obtained from the mixed alkaloids subjected to the operation, and from this weight the amount of *crystallizable* quinine can be calculated by the use of Hauers's formula, $2\,C_{40}H_{24}N_2O_4$, $3\,(HO, SO_3)$, $3\,I$ (old notation), which I have found to be correct. According to this formula 1 part of iodosulphate of quinine dried at 100° C. represents 0·5509 per cent. of anhydrous quinine or 0·7345 per cent. of pure commercial disulphate of quinine.*

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[*] *Pharmaceutical Journal*, [1] vol. xi. p. 448, and vol. xii. p. 6.

[†] *Ibid*, [3] vol. ii. p. 642.

[‡] Identical with "Sulphate of Amorphous Quinine, prepared according to Dr. de Vrij's process," by Messrs. Howard and Sons, Stratford.

[§] To prevent the use of an excess of iodine I have prescribed on purpose not enough iodine to precipitate *all* the chinioidine in the form of iodosulphate. Therefore this liquor contains still chinioidine which can be obtained in a very pure state, if a little sulphurous acid is added before precipitating the alkaloid by caustic soda.

[*] This quantity is quite sufficient to transform the alkaloids into acid sulphates, and ought not to be increased, for an excess of acid would increase the solubility of the herapathite in alcohol.

[†] If during the addition of the reagent to the solution of the mixed alkaloids the liquid is not continuously stirred, it may happen that, if cinchonidine is present in large proportion relatively to quinine, as in Indian red bark, an orange-coloured gelatinous precipitate is formed of an iodosulphate of cinchonidine. If this happens, the liquid must be heated till this gelatinous precipitate disappears, before adding more of the reagent to precipitate all the quinine.

[‡] Alcohol of 92 per cent., saturated with herapathite at a temperature of 24·5° C. left by evaporation 0·133 gramme of herapathite.

[§] For my bark analyses I always keep a supply of this solution, made by putting an excess of herapathite dried at 100° C. into alcohol of 92 per cent. and shaking from time to time. The temperature of the laboratory in which the analysis is made is quite indifferent, provided that it is noted and does not change during the operation. It is clear that the amount of herapathite dissolved at that temperature in the alcohol must be ascertained, as this quantity varies with the temperature.

The accuracy of this determination may be proved by the following examples:—

0·294 gramme of anhydrous crystallized quinine, kindly presented to me by Dr. O. Hesse in October, 1873, gave 0·541 gramme of herapathite dried at 100° C.=0·298 gramme of quinine.

According to Hauers's formula I ought to have obtained 0·5336 gramme of herapathite=0·294 gramme of quinine.

1·048 gramme of bitartrate of quinine gave 1·224 gramme of herapathite=0·674 gramme of quinine.

According to the formula of the bitartrate $C_{20}H_{24}N_2O_2$, $C_4H_6O_6+Aq=492$; 1·048 of bitartrate represent 0·69 of quinine, so that I ought to have obtained 1·255 gramme of herapathite.

Notwithstanding the different circumstances in which the reagent was applied, the results seem to me satisfactory.

The two following experiments were made with pure quinine, dried at 100° C., at which temperature it still retains water, under identical circumstances:

1·0664 gramme of hydrated quinine gave 1·7266 gramme of herapathite=164·5 per cent.

1·055 gramme of the *same* hydrated quinine gave 1·7343 gramme of herapathite=164·3 per cent.

Although I feel convinced that this process of estimating the amount of quinine in a mixture of Cinchona alkaloids is not one which, *even in the hands of inexperienced persons shall give accurate results in a short time,* I have some hope that in the hands of experienced analysts it may prove a satisfactory one, if, before applying it, they study, as I have done, the action of the reagent upon solution of 1 gramme of quinine, quinidine, cinchonine and of cinchonidine, each of them separately in 20 grammes of the above-mentioned acidulated alcohol. If they do so they will find that the iodosulphates of quinine and of quinidine thus obtained have an analogous composition, and are identical with the compounds described by Herapath,† whilst the iodosulphates of cinchonine and cinchonidine have a different composition from the former, and both require more iodine to be transformed into the optical iodosulphates described by Herapath. In the meantime they will find that of all these iodosulphates, that of quinine is the most insoluble in alcohol, as has been stated already by Herapath in the paper above quoted, and is therefore precipitated the first of all and *alone* by a *judicious* addition of the iodosulphate of chinioidin.

I do not in the least pretend to have exhausted the subject, but on the contrary, I hope that my paper may lead to a still better process. Thus, for instance, I feel some hope that it may be possible to apply the alcoholic solution of iodosulphate of chinioidin to volumetric analysis, and therefore I presented a specimen of it to Mr. Sutton, the author of the valuable work 'On Volumetric Analysis,' when he was so kind as to call upon me at the Hague last summer.

The Hague, November 9, 1875.

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* Although, as Mr. Umney stated at the Pharmaceutical meeting on Wednesday, November 3, 1875, "manufacturers only believed in the crystallizable sulphate of quinine which they could see and weigh," I suppose they will equally be satisfied by seeing and weighing the quinine herapathite obtained by the analyst from a certain amount of bark; for not only can this compound be easily distinguished from the similar compounds of the other Cinchona alkaloids, but by dissolving it in sulphurous acid and precipitating the solution by caustic soda, quinine is obtained which may be easily transformed into crystallized sulphate.

† 'Proceedings of the Royal Society,' vol. ix, p. 10.

NOTES ON SOME MEDICINAL PLANTS OF THE COMPOSITÆ.

BY JOHN R. JACKSON, A.L.S.

No natural order has such distinct botanical characters as have the Compositæ, and no other order perhaps with the exception of Leguminosæ has so wide a distribution over the surface of the globe. The properties of the order also vary considerably, for while some species abound in a bitter aromatic principle, others are tonic and stimulant, while others again abound in a milky poisonous juice. The aromatic principle is notably present in the common Chamomile (*Anthemis nobilis*) and the Wormwood (*Artemisia Absinthium*) both of which are used as stimulant tonics. It is not so much to these and other plants that are well known for their medicinal properties and which are used occasionally in European practice, as to those that have properties imputed to them, but are nevertheless but little known, that we wish now to draw attention. Amongst officinal Compositæ included in the Pharmacopœias either of Britain or India are the Chamomile (*Anthemis nobilis*), Santonica (*Artemisia* sp., probably a variety of *A. maritima*), Elecampane (*Inula Helenium*), Arnica (*Arnica montana)*, Dandelion (*Taraxacum officinale*), Pellitory of Spain (*Anacyclus Pyrethrum*) and Prickly Lettuce (*Lactuca virosa*). Amongst other plants having medicinal properties, and which are occasionally used or have been recommended, may be mentioned the *Artemisia indica*, a plant with a strong aromatic smell and a bitter taste, occurring frequently on the mountains of India. An infusion of the leaves and tops of the plants are said to form a mild but efficient stomachic tonic and it has been administered successfully in nervous and spasmodic affections arising from debility. The common wormwood (*Artemisia Absinthium*) is too well known as the source of Absinthe, to need more than a mere mention of its use for the preparation of that beverage. At one time it was very highly esteemed as a tonic, febrifuge and anthelmintic. It is said to impart a strong bitter taste to the flesh of sheep which feed upon it; many of the species possess similar properties to the above, and are used in a like manner. The Southernwood (*Artemisia Abrotanum*) for instance, at one time so common in English gardens, and originally a native of the South of Europe, was formerly used as a tonic and vermifuge; it was also considered to be obnoxious to insects and was often placed with clothes to keep away moths, the old French name of Garde-robe having arisen from this fact. The Mugwort (*Artemisia vulgaris*), a well-known weed growing in hedgebanks in this country and distributed over Europe, North Africa, Siberia, Western Asia to the Himalayas, was at one time strongly recommended as an emmenagogue. The dried leaves bruised, rubbed between the hands and formed into small cones, were considered a good substitute for Chinese moxa, which was prepared from *Artemisia moxa.* Under the name of Wormseed the herbalists sell the flower stalks and heads of several species of *Artemisia.*

In the genus *Vernonia*, one of the largest of the Composite order, *V. anthelmintica*, common in waste places throughout India, furnishes from its seeds by pressure a green-coloured oil or fat. These seeds are seen in most of the Indian bazaars, they are of a brown colour and have a bitter nauseous taste; amongst the natives they are highly valued as an anthelmintic, being bruised and administered in honey in doses of about a drachm and half, divided equally, and taken at an interval of a few hours, followed by an aperient. Their effect is said to be to expel the worms in a lifeless state. "In Travancore, the bruised seeds ground up in a paste with lime juice are largely employed as a means of destroying pediculi." They were regarded by Dr. Gibson as a valuable tonic and stomachic, and besides this they are also said to possess diuretic properties. From the evidence in favour of their use as an anthelmintic, they would seem to warrant further and more careful trials.

Another Indian plant, *Notonia grandiflora*, has been advocated as a remedy for hydrophobia. The manner of preparation and administration, as given in the Indian Pharmacopœia is as follows:—"About four ounces of the freshly gathered stems, infused in a pint of water for a night, yield in the morning, when subjected to pressure, a quantity of viscid greenish juice, which, being mixed with the water, is taken as a draught. In the evening a further quantity of the juice, made up into boluses with flour, is taken. These medicines are directed to be repeated for three successive days." The flowers of *Chrysanthemum Roxburghii*, also an Indian plant, have been used as a substitute for chamomiles in India. The root when chewed imparts a sharp tingling sensation to the tongue, and it has been suggested that it might be used as a substitute for pellitory.

The genus *Eupatorium*, though at the present time furnishing no plants of really acknowledged medicinal value, was formerly considered of some importance, the common hemp agrimony (*Eupatorium cannabinum*) being used for coughs, intermittent fevers, dropsy, etc. Externally it was applied in the form of a cataplasm to tumours, ulcers, etc., and the expressed juice mixed with vinegar was a favourite application in some forms of cutaneous diseases. For internal application it was recommended to boil a handful of the leaves and young tops in a quart of water or whey, which should be taken in frequent doses; or the expressed juice was also recommended in doses of from two to three ounces. The dried leaves were used in the form of tea, and the root boiled in water in the proportion of an ounce of the former to half a pint of the latter was administered in dropsies. It is described by Boerhaave as being in very great use amongst the turf diggers of Holland, who used it in jaundice, scurvy, foul ulcers, and those swellings of the feet to which they are liable.

A South American species, *Eupatorium Ayapana*, is very aromatic and has a slightly bitter and astringent taste. It is generally used as an antidote for snake bites both for inward and outward application. In Mauritius an infusion is made which is used in dyspepsia and generally in affections of the bowels and lungs. In the cholera epidemics which visited the island in 1854 and 1856 this plant it is said "was extensively used for restoring the warmth of the surface and languid circulation." The plant has become naturalized in India, Ceylon, and Java. In the former country the bruised leaves have been used successfully in the case of foul ulcers; a decoction is made and used as a fomentation. Though the plant was formerly very highly extolled for its medicinal virtues, it has now to a great extent fallen into disuse; nevertheless it is probable that upon further trial it might be found useful as a tonic, stimulant, and diaphoretic.

Several species of *Eupatorium* are used medicinally in North America, foremost amongst these being the thoroughwort, or boneset (*E. perfoliatum*). It is widely diffused, growing principally in damp situations; in the form of a warm infusion it is emetic, sudorific, and diaphoretic; but if taken cold it acts as a tonic and febrifuge. The leaves and flowers reduced to a powder are purgative even in doses of from ten to twenty grains. It is said to have been frequently prescribed with advantage in rheumatism, typhoid pneumonia, catarrhs, dropsy, and influenza. Porcher, in his 'Resources of the Southern Fields and Forests,' tells us that the plant is extensively cultivated among the negroes on the plantations in South Carolina, as a tonic and diaphoretic in colds and fevers, and in the typhoid pneumonia so prevalent among them. He says "I have found this and the Senega Snakeroot (*Polygala senega*) convenient and useful prescriptions; the latter with tartar emetic solution, to promote expectoration; and the former with flax seed tea as a stimulant diaphoretic; combining them with spirit of turpentine when it has assumed the typhoid form . . . The infusion of the roots and leaves is usually preferred, of which one to three ounces may be taken several times a day; of the root in powder, the dose is thirty grains. As an emetic and cathartic a strong decoction is used, made by boiling an ounce of the herb in three half pints of water to one pint, given in doses of one or two gills or more." Thoroughwort tea is used by many physicians in South Carolina in fevers, and is considered by them as the "very best of the indigenous antiperiodics as a substitute for quinine." Other species of North American *Eupatorii* having medicinal properties are the *E. purpureum*, purple thoroughwort, or gravel root; *E. teucrifolium*, wild horehound; *E. fœniculaceum*, dog-fennel; and *E. rotundifolium.* The first possesses properties somewhat similar to *E. perfoliatum*; it is a diuretic, and one of the popular remedies for calculus. The second is tonic, diaphoretic, diuretic, and aperient, being commonly used in fevers and colds. The fresh juice of *E. fœniculaceum* is said to relieve pain caused by the bites of insects, and it is sometimes strewed on floors to keep away insects. Though it seems doubtful whether the plant really contains any tannin, it attracted a great deal of attention in South Carolina in 1861, in consequence of its reputed power of tanning leather in an incredibly short space of time. The uses of *E. rotundifolium* are similar to those species already described.

At one time it was thought that the leaves of *E. glutinosum* formed the matico of the Peruvians, but it has been proved since that the *Piper angustifolium* of Ruiz et Pav. (*Artanthe elongata*, Miq.), is the source from whence true matico is obtained; several other plants, however, produce leaves similar in appearance to those of *Artanthe*, and these leaves sometimes come to this country as matico. Two or three species of *Erigeron* are used in North America as tonic and diuretic medicines, foremost amongst these is the flea-bane (*E. canadense*). It is an annual plant, common in waste places in many parts of England, especially in the neighbourhood of London, having been originally introduced from the United States, where in many parts it is frequent in sandy soils. It is frequently used in cases of dropsy and diarrhœa as a stimulant, tonic, diuretic, and astringent. The plant is much used by the herb doctors, who administer it in the form of infusion. An infusion of the powdered flowers is considered antispasmodic, and is used in cases of hysteria and affections of the nerves; an oil is also obtained from the plant, which is said to possess remarkable styptic properties. The frost root (*Erigeron philadelphicum*)—also a North American plant, as its specific name implies—has similar properties to the *E. canadense*, and has a great reputation for the cure of calculus and dropsy. Other species of reputed medicinal value in North America are *E. strigosum* and *E. pusilum*. In the genus *Solidago*, which includes the golden rod of our thickets (*Solidago Virgaurea*), several species have reputed medicinal properties. The British species itself was formerly considered a useful medicine in diarrhœa and dysentery. The golden rod of North America (*S. odora*) is used as an aromatic stimulant and diaphoretic; it is said to lessen nausea, allay pain arising from flatulence, and to cover the taste or correct the operation of irritating or unpleasant medicines. It is said, when applied outwardly, to have the power of relieving pain arising from headache. The flowers, when dried, have been used as a wholesome and not unpleasant substitute for tea.

Other species, such as *S. sempervirens* and *S. procera*, have reputed medical properties. In the genus *Baccharis*, which includes a large number of species found principally in North and South America, many are of medicinal value; thus the Brazilians prepare from the stems of *B. trimera* an infusion which is used as a sudorific and tonic, while from *B. genistelloides* an extract is obtained used in cases of fever. In Parana portions of the stems of *B. microcephala* are put into warm baths for the relief of rheumatism; and in North America, *B. halimifolia*, under the names of sea myrtle or consumption weed, is used as a demulcent in cases of consumption, and for coughs. It is somewhat mucilaginous, and has a bitter taste.

In America, *Ambrosia artemisiæfolia*, known as the rag weed, and *Ambrosia trifida*, the great rag weed, are both used medicinally; the former as a substitute for quinine, and the second for arresting excessive salivation. *A. maritima*, a plant of Italy and the Levant, has a sweet smell and an aromatic bitter taste, and is said to be useful as a tonic.

The genus *Blumea* is remarkable for furnishing the peculiar camphor called Ngai camphor by the Chinese, so well described by the late Mr. Daniel Hanbury in the *Pharmaceutical Journal*, vol. iv., p. 709, 3rd series, and also referred to in the notes on the India Museum at p. 241 of the present vol. *B. balsamifera*, the plant which furnishes this camphor, is said to be in very general use in Java and China as an expectorant, and in Cochin China as a stomachic, antispasmodic, and emmenagogue. Other Indian species, as *B. lacera* and *B. aurita*, are said to have a strong smell of turpentine, and to be used by the natives in dyspepsia.

Eclipta prostrata, also an Indian plant, common in wet places, is described as being purgative and emetic, these properties residing particularly in the roots. *E. erecta* and *E. procumbens*, both North American species, yield a dark or black dye used for dyeing the hair. *Liatris*, or wild vanilla, and *Aplotaxis*, or costus root, we have before noticed in the *Pharmaceutical Journal*, the former at p. 322, vol. iv., 3rd series, and the latter at p. 723, vol. iii., 3rd series; it is also referred to in the notes on the India Museum before quoted.

Besides those we have enumerated, many other plants belonging to this order are used in various parts of the world for their medicinal properties. We have pointed principally to those of America and India as countries in which the properties of the plants would most likely be discovered or experimented upon by Europeans. We have far from exhausted the list of either country, nor have we introduced those of acknowledged utility, such as *Taraxacum*, *Lactuca*, and others which grow equally well in India and America as in England; neither have we included British plants, which formerly appeared in herbals, but which are now no longer used.

THE RELATION BETWEEN SPECTRAL LINES AND ATOMIC WEIGHTS.*

BY E. VOGEL.

The following facts, disclosing an intimate connection between the Fraunhofer lines of the solar spectrum and the atomic weights of the substances whose glowing vapours they represent, will, if confirmed, prove of the highest importance and interest. Being desirous, on this account, of bringing them at once to general knowledge, I publish the following condensed statement.

The Fraunhofer lines of hydrogen gas are, according to Angström's wonderfully accurate measurements (given in millimeters, a millimeter being 0·3937 of an inch):—

0·00041012mm.
0·00043400mm.
0·00048606mm.
0·00065618mm.

Their distances from the shortest wave lengths are consequently:—

43400—41012 = 0·00002388mm.
48606—41012 = 0·00007594mm.
65618—41012 = 0·00024606mm.

Referring these distances to 0·00041012, the shortest wave length, as a common standard of value, the figures obtained are:—

0·00041012 : 0·00002388 = 17·1742
0·00041012 : 0·00007594 = 5·7247 × 3 = 17·1741
0·00041012 : 0·00024606 = 1·9082 × 3 = 5·7246

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* From the *Scientific American*.

being to each other as 1—3—9. Supposing the quantity expressed by 1·0982mm. to represent 3 units of a certain measure of length, the distances of the H lines increase as the squares of 3 : 3—9—27.

The H molecules of the solar atmosphere which give rise to these lines consist of ponderable matter ; and (the mechanical force of the luminous impulses having been so recently demonstrated by Professor Stokes) the inference is that refraction, the angles of which are measured and expressed by the wave lengths, is the function of the energy proper to the different constituent particles of the luminous molecules : that these particles are held together by attraction, the common property of matter, decreasing inversely as the squares of distances.

On this supposition, the attractive forces of the H molecule proceed from a centre where they are at their maximum ; and the distances between the different constituents being known, the value of their attractive energy can be calculated from the constant relation between attraction and distance. To the distances 3—9—27 correspond the respective forces $\frac{1}{3}$—$\frac{1}{9}$—$\frac{1}{27}$; and a unit of force by which the values of attraction of all solar substances can be measured and compared is represented by the length of shortest waves. In dividing the atomic weights of the substances whose spectral lines are known by the length of their shortest waves, and converting the result into chemical weight by taking the quotient obtained for H=1, the values are as follows :—

Atomic weight.	Shortest wave length.	Divided by 2438.
H =1·00	0 00041012=	2438=1
Ca = 40	0·00039330=	101704=41·72
Fe = 56	0·00039330=	142385=58·4
Al = 27·3	0·00039428=	69240=28·4
Mn = 55	0·00039882=	137907=56·6
Ti = 48	0·00041631=	115299=47·3
Cr = 52	0·00042532=	122261=50·15
Ni = 58	0·00044020=	131758=54
Mg = 24	0·00044805=	53565=22
Ba = 137	0·00045241=	302823=124·21
Co = 59	0·00045303=	130234=53·4
Cu = 63·4	0·00046510=	136315=56
Zn = 65	0·00046790=	138919=57
Na = 23	0·00049825=	46137=18·9

Notwithstanding the differences, the figures of the last column so closely correspond to the atomic weights that the inference of a near relationship between the spectral lines and atomic weights seems irresistible. When the extreme faintness of the lines in the portion of the spectrum of the greatest refraction is taken into account, some of the difference may not unreasonably be attributed to the existence of shorter waves than those quoted. The definite proportions between differences and atomic weights point to this. Thus 18·9 is nearly $\frac{4}{5}$ of 23 ; the line corresponding to the atomic weight of 23 is 0·00040900 ; if this line, which really exists, should prove to belong to Na, the test would be decisive. The importance of the conclusions to be derived from the existence of such relations is apparent. The evidence of atomic molecules, when brought within the reach of scientific investigation, and their dependence on the general law of gravitation, would disclose the inner constitution of matter, the nature of chemical affinity and valency, and the nature of electricity and magnetism ; and it would be instrumental in the solution of many problems.

THE COMPETITION BETWEEN INDIAN AND NATIVE-GROWN OPIUM IN CHINA.

A Blue Book of Commercial Reports from Her Majesty's Consuls in China, just issued, contains evidence which shows that the native-grown opium in China is assuming an important position in the consumption of the drug in that country. As yet, however, it does not appear to have caused any diminution in the importationn of Indian opium. On the contrary the consuls at Chefoo, Taiwan, Chiankiang, and Shanghae all report a considerable increase. The consul at Chiankiang attributes this to a persistent increase in the habit of opium smoking, and says that intelligent natives now estimate the proportion of consumers at more than 30 per cent. of the population. On the other hand, the consul at Newchwang says that there is a most remarkable falling off in the import of opium, and that it can be no doubt that this is mainly due to the increased production of the native drug. There can be no doubt that the cultivation of the poppy is extending throughout the Kériu province, in the neighbourhood of Niuguta, and in that portion of Mongolia which lies nearest to it. The cultivation is still illegal, and the authorities are unable to raise revenue from the native drug, for an extra tax, which is levied on poppy-sown land, most probably goes no further than the pocket of the collector. The value of a picul of native opium is about 300 taels. The quality is said to be improving and the drug is eaten as well as smoked. In respect to a point that has lately been disputed, this consul says that he himself has been in the company of a Manchu sportsman who took nothing during the day but a pill or two of his own home-grown opium. He thinks the cultivation of the poppy is sure to spread, for the crop is most profitable in ordinary seasons, and that unless the Indian Government can promptly reduce the duty on Malwa opium so as to permit of the foreign merchant laying it down in the north of China at a cost of 300 taels a chest, it will soon totally cease to be bought by Chinese there. Only one-fifth of the opium used by the Chinaman is foreign, *i.e.*, 80 per cent. is native, and as the quality of the native drug improves, the disproportion will increase.

With respect to the increase in the growth of native opium Mr. Medhurst, consul at Shanghae, has written the following paragraphs :—

"It is evident that up to the present time the supply has not kept pace with the demand, and the extension of the cultivation of the drug has been stimulated by the high prices offered.

"There are signs that at no distant date an equalization of the two will occur, and this event must be marked either by the stoppage of the import of Indian opium, or by such a reduction in its cost as will enable it to compete on more equal terms with its Chinese rival. In Manchuria it seems likely that native opium will in a short time take its place as a regular export. As yet the increased production has not had that effect, on either the amount or the price of Indian opium taken at Newchwang, which might have been anticipated. This is to be attributed to the superior quality of the foreign drug, or possibly to the fact that it still guides the taste of the native consumer. It is probable that much of the drug imported at Newchwang is made use of to strengthen and correct the flavour of the native drug. In such a case it may occur that an export of the native drug may for years to come be coincident with a considerable import of the foreign article. It is very likely owing to this cause that the import of Indian opium at Tien-tsin, as compared with Newchwang, has been continually decreasing, the Manchurian drug, flavoured with Indian opium, being able to compete successfully with the latter in the state of purity.

"The whole of the north-west and west of China may be said to be practically independent of our trade for its supply of opium. The import at Hankow has never attained to any important position, while for years back native opium has formed to a small extent a regular export. Kiu-kiang is mainly occupied with the supply of Kiangsi, but has never been a favourite port with the Chinese, on account of the stringent restrictions which have been placed on trade by the mandarins of the province. Chinkiang, Shanghae, and the southern ports, are apparently the only markets where foreign opium will be able to hold its own against the native drug. At none of these ports, except perhaps Ningpo, does Chinese opium interfere with foreign. Its growth was for a time attempted in Kwangtung, but was not found suitable for the soil or climate, and the production has almost, if not altogether, ceased. Fuhkien does not produce opium in any great quantity, its staple of sugar probably proving equally if not more remunerative. No reports are given of opium grown in Keangse or Hunan; Keangsu and An-hui seem not to produce opium at present.

"Near Ningpo, in the Prefecture of Tan-chow, a considerable quantity of opium is now produced. The crop in 1873 was estimated at 4500 piculs; the total import of foreign opium at Ningpo for the year being about 7500 piculs. The southern ports show a good deal of fluctuation between themselves in the amount imported from year to year, but this variation depends more on the amount of irregular duties levied at the various ports than on the actual demand of the districts concerned, the import naturally gravitating towards those ports where imposts are light and means of communication easy.

"It is thus that a great proportion of the opium consumed in Kiangsi is imported, not through Kiukiang, the only port of the province open to foreign trade, but by way of Swatow and Ningpo, or directly from Hong Kong through the native custom-house at Shek-lung. Similarly, heavy taxes in Foochow force the opium import, which would naturally come to it as a large exporting mart, to be conducted at Amoy and Ningpo, or even Swatow, where the duties levied are so much lighter as to leave a considerable margin after paying the extra carriage.

"Although nominally the laws of China forbid the cultivation of opium, and although from time to time edicts are issued repeating this prohibition, yet there are signs that the cultivation of opium is likely to be formally legalized. At present, though formally forbidden, it is actually encouraged by the high tariff placed on the foreign drug. At Shanghae, Hankow, and Tientsin, again, notwithstanding the formal prohibition of the growth of native opium, lekin taxes are regularly levied on it, and these taxes are 50 per cent. lower than those charged on foreign opium, so that the native growth is actually protected against the competition of its foreign rival.

"Nor is there wanting amongst influential Chinese a strong party who, acknowledging that opium is deleterious, yet qualify this idea by the assertion that experience has proved it necessary, and who urge on the Government the advisability of making a source of revenue out of what it has proved its inability to entirely restrain. Allied more or less with this party is another, who, taking a mistaken view of political economy, would exclude all imports as tending to draw away wealth from the country. Why should foreigners, they plead, derive all this profit from opium? If we raise the lekin taxes, and throw obstacles in the way of internal carriage, so that the import of foreign drug may become unprofitable, the growth of the native will be encouraged, and the wealth which now goes to enrich the foreigner and foreign trade generally will remain amongst our own people.

"It is needless to add that the Chinese are not likely for years to come to appreciate the falsity of this course of reasoning; the argument is apparently of that simple nature that to those ignorant of the first principles of political economy it seems irrefragable.

"Looking at all these circumstances together, it seems that a critical period is in store for the opium trade, and that much discrimination on the part of buyers, and much judgment on the part of the Indian Government, will be needed to restore it to a sound footing. The regulation of the lekin taxes in China, and the admission of foreign opium to the interior markets, will shortly become a question to be seriously discussed on its merits. It is fortunate that the recent tendency of Chinese practice and Chinese opinion is to remove it from the region of sentiment to that of sober fact."

To the foregoing may be added the following interesting memorandum on the use of various descriptions of opium in China:—

"The distribution of the various classes of imported opium in China is peculiar, and does not at first sight appear from an inspection of the Customs' returns. Roughly speaking, there may be said to be three tracts, the inhabitants of which are marked by as many peculiarities of taste.

"Along the coast as far north as the Yangtsze, with the apparent exception of the districts about Ningpo, Bengal opium is almost exclusively made use of. The general taste is for Patna, but Benares is the favourite in Formosa, and in some parts of Fuhkien. Ranging west and north of this line, and including part of Kwangtung, and Kwangsi, Kiangsi, Anhwue, and the North-Eastern Provinces and Shingking, is a second belt in which Malwa is consumed, to the almost entire exclusion of Bengal, the latter, apparently, being only smoked by those who elsewhere have become accustomed to its use. To the west and north of this belt, again, native opium is mainly used, foreign drug being considered a luxury, and only purchased by the opulent or by connoisseurs in the article.

"The three classes of opium are considered by the Chinese as having peculiar characteristics.

"Bengal opium, which is prepared with greater care, though having strong narcotic properties, is free from many of the objections which the Chinese aver attach to the others.

"Malwa is of a stronger flavour, more coarse and biting to the taste; it is said to have a tendency to induce an unhealthy condition of the skin, and is altogether more pungent and stimulating. It produces heartburn in those unaccustomed to its use, and is irritating to the nervous system.

"Native opium, again possesses all these bad qualities of the Malwa drug, with others of its own. It is said to be coarser and more fiery than the Indian; its flavour is inferior, and it produces disagreeable and troublesome eruptions of the skin, and it is moreover constantly adulterated to a great extent with seaweed, oil, etc. To remedy these defects it is said that the smoker is compelled to have occasional recourse to the foreign drug.

"The difference between the foreign and native sorts is so marked that the Chinese say that no man can exchange the use of even the inferior foreign drug for that of the best quality native product. The smoker of Patna will not, unless compelled by absolute necessity, take to Malwa. So long as any of his favourite drug is to be had he will purchase it, however high the price. The smoker of Malwa does not, however, feel the same difficulty in exchanging for Patna. It is probable that the worst inconvenience he will feel from the change will be the absence of the pungent flavour to which he has been accustomed.

"Climate and bodily condition seems to have had a good deal of effect in the formation of local tastes. It will be noticed that in the more relaxing districts of the south, Bengal opium is mainly in favour, while in the colder districts of the north, inhabited by a ruder and more robust race, the more pungent Malwa is the favourite. This preference seems to be most marked where the Tartar element in the population is most developed. To use the nomenclature of the Chinese, Patna is 'mild,' Malwa 'fiery.'

"It may likewise be remarked, though possibly the coincidence is only accidental, that those districts using Patna are also those where the people have been longest in the habit of smoking the drug. This probably points to a growing refinement in the taste of the smokers.

"The true reason, then, of this preference is apparently to be found in the fact that the Bengal drug is more carefully prepared, and undergoes more perfect manipulation; while that of Bombay being left to private enterprise entirely is sent forward in a comparatively crude condition, and complaints of admixture with inferior qualities are frequent.

"It is doubtful what would be the ultimate effects of any considerable curtailments in the supply of Bengal opium. Its immediate effect would doubtless be to enhance the price very considerably, as old smokers would be bound to obtain it at any cost. This enhancement of price would inevitably result in the wholesale adulteration of that imported with the inferior qualities of native. This adulteration is already carried on in the north of China to a considerable extent. Indeed it is probable that a considerable proportion of the opium imported at Newchwang is made use of to improve the flavour of the native Manchurian drug.

"At present it may be affirmed that no native opium is grown in districts consuming the Bengal drug. The inferiority of the native to Patna and Benares is too great to admit of its cultivation when the usual sorts are procurable. As we approach the outer limits of the Malwa-consuming districts on the other hand, we find the cultivation of the native drug increasing from year to year. Any serious interference with the supply of the Bengal drug would, therefore, in all probability, have the effect of introducing the cultivation of Chinese opium into the coast provinces, where hitherto the cultivation of the poppy has been confined within the narrowest limits.

"An analogous result, in many respects, might follow upon the prohibition of the import of green tea into the United States. It is probable that before the national taste could become reconciled to using black, some other substitute for the national beverage would come into use.

"The almost certain effect of reducing the production of Bengal opium would be to seriously diminish the export of Indian opium of all descriptions and to stimulate in a proportionate degree the production of Chinese drug."

ADDITIONAL EXAMINATION OF THE THIRD ALKALOID IN HYDRASTIS CANADENSIS*

BY JOHN C. BURT.

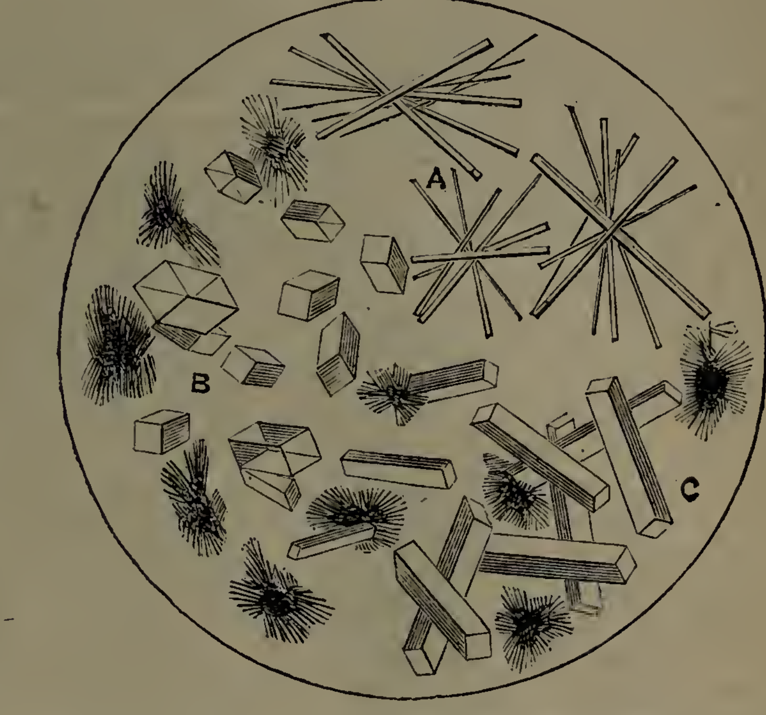
In the *American Journal of Pharmacy*, for June, 1873 (xlv. 247)† A. K. Hale reported finding an alkaloid in hydrastis, after removal of berberina and hydrastia, as follows:—The berberina was removed from the aqueous percolate as a hydrochlorate, and the hydrastia then precipitated by adding ammonia just to the neutral point, these separations both being made as usually directed by the authorities, except that in precipitation of the hydrastia the addition of ammonia is stopped short of alkaline reaction. After in this way removing both the berberina and hydrastia, Hale obtained *a precipitate of another alkaloid*, as he concluded, by adding ammonia again and again to an alkaline reaction. Of this new substance, he reported a number of reactions.

In the present examination of hydrastia, the investigator found all of Mr. Hale's results with *the new substance* to be confirmed, and obtained the following additional determinations:—

A small portion of the precipitate, washed till washings gave no reaction for ammonia, when distilled with caustic potassa and potassic permanganate, gave a distillate responding to tests for ammonia, showing the presence of *nitrogen* in the precipitate.

The hydrochorate solution of the same precipitate gave, with *platinic chloride* solution, a reddish-yellow precipitate, soluble in warm hydrochloric acid; with *stannous chloride*, a yellowish-white flocculent precipitate; with *lead acetate*, a flesh-coloured precipitate; with *cadmium iodide*, a bright yellow precipitate; with *potassio-cadmium iodide*, a reddish-yellow flocculent precipitate; with *potassio-mercuric iodide*, a straw-coloured precipitate; with *potassium acid chromate*, a brown-yellow precipitate; with *ferric chloride*, a dark brown to black solution; with *potassium ferrocyanide*, a greenish-blue solution; with *tannic acid*, a light yellow precipitate. As reported by Mr. Hale, when warmed with *nitric acid* it turns red, and with *sulphuric acid* it turns reddish-brown.

The sulphate crystallizes in clusters of prismatic needles, the clusters being imperfectly sheaf-form, approaching a radiate arrangement. This alkaloid is obtained in smaller proportion than either berberina or hydrastia.



A. Crystals of the Third Alkaloid of Hydrastis as Sulphate; crystals colourless. B. Hydrastia, from alcohol; prisms pale yellow. C. Berberina Hydrochlorate; prisms bright yellow.

NOTES ON TARTARIC ACID.*

BY R. WARINGTON, F.C.S.

(*Continued from page* 428.)

Determination of Tartaric Acid in Tartar, Argol, and Lees.—In the methods of analysis commonly employed, tartaric acid is only indirectly determined, the methods merely giving the total amount of organic acid present, which is then reckoned as tartaric. These indirect methods may be briefly described as follows:—

A. The tartaric acid existing as acid tartrate of potassium is calculated either from the amount of potassium found by platinum, or else from the acidity of the sample. The tartaric acid present as neutral tartrate of calcium is calculated from the amount of calcium found. Both potassium and calcium are determined in the calcined tartar. This method, variously modified, is the one most commonly employed in this country.

B. The tartar is calcined, and exhausted with water; the neutralizing power of the soluble potassium carbonate, and of the insoluble calcium carbonate, is each separately determined with standard acid and alkali, and the tartaric acid in combination with potassium and calcium calculated therefrom.

C. The tartaric acid present as bitartrate of potassium is determined from the acidity of the sample. Another portion of the tartar is calcined, and the neutralizing power of the ash determined. By subtracting from the neutralizing power of the burnt tartar that due to the potassium bitartrate previously determined, the amount of base corresponding to neutral tartrates is ascertained.

D. The whole of the tartaric acid present is converted into neutral tartrates by exact neutralization with soda; the whole is then evaporated to dryness, calcined, the neutralizing power of the ash determined, and the tartaric acid calculated therefrom.

In all these methods, save the last, the total tartaric acid present is found by adding together that existing as acid and as neutral tartrate. Methods C and D may be modified by determining the carbonic acid in the ash, in place of the neutralizing power of the carbonates.

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* From the *American Journal of Pharmacy*.

† *Pharm. Journ.* [3], vol. iv., p. 105.

* Abstract of a paper read before the Chemical Society (*Journ. Chem. Soc.*, vol. xiii., p 926).

With a high quality tartar, consisting entirely of clean crystals, any of the above methods will give good results; but with low quality tartars sources of error are introduced.

Tartars of low quality contain, besides bitartrate of potassium, and neutral tartrate of calcium, small quantities of carbonates, sulphates, phosphates, and silicates, with vegetable matter.

The carbonates are usually fragments of calcareous earth present as dirt, but may arise from decomposition of the tartar if the latter is damp. If carbonates are present, and the tartaric acid existing as acid tartrate is determined from the acidity of the sample after boiling with water, the result obtained will be too low, a portion of the acid tartrate being neutralized by the carbonate. Crystalline carbonate of calcium is but little attacked by a solution of bitartrate, even when the solution is concentrated and hot; chalk, and other amorphous forms of calcium carbonate are, however, readily acted on by far weaker solutions. The insoluble carbonates present in lees and tartar are, as a rule, easily dissolved by a hot solution of bitartrate. It is possible by acting on the lees or tartar with excess of alkali, to determine the amount of bitartrate without the insoluble carbonates affecting the result; the method will be described further on.

If in method A the carbonate of calcium is allowed to act on the bitartrate, the total tartaric acid found will be too low; if on the other hand it does not act, the result will be too high. In method B the presence of carbonates must make the result too high. It is clear, therefore, that if either method A or B is employed, a determination of carbonic acid must be made if accuracy is desired. With C, on the other hand, the presence of carbonates is without effect on the total tartaric acid found. If in determining the bitartrate by acidity the carbonates are allowed their full action, the tartaric acid as bitartrate is indeed estimated too low, and the tartaric acid as neutral tartrates too high, but the total tartaric acid is exactly given by this method. Employing the same precaution, the determination of total tartaric acid by method D in the presence of carbonates is also quite exact.

The presence of sulphates necessitates of course a determination of sulphuric acid if method A is adopted, the result must otherwise be too high; it must also be known with which base the sulphuric acid is combined. In method B the presence of alkali sulphates will have no ill effect, unless sulphides are produced during the ignition, but the presence of sulphate of calcium must lower both the tartaric acid calculated as bitartrate, and also the total tartaric acid found. In fact, if tartar is mixed with gypsum, and ignited, treatment with water at once causes the carbonate of potassium to react upon the sulphate of calcium, carbonate of calcium and sulphate of potassium being produced. With methods C and D the presence of sulphates is without effect on the result, provided no error is introduced by the formation of sulphides.

The phosphates in tartar are present as phosphates of iron and aluminium; they are very small in quantity and have no practical effect on the analysis. The silicates in tartar are also comparatively unimportant. The action of silicates and phosphates will be noticed presently when considering the analysis of lees.

It is evident from the above considerations, that the accurate use of methods A and B is limited to the case of pure tartars, as the errors introduced by carbonates and sulphates cannot be certainly rectified by determining the quantity of carbonic and sulphuric acid present, but require further a knowledge of the manner in which these acids are combined, information which the chemist is unable to supply. Methods C and D, on the other hand, give reliable results in the presence of carbonates and sulphates, without any alteration in the plan of the analysis. Of these two methods, C gives the most complete results, as it includes a tolerable determination of acid tartrates; it is also very speedy; a powdered sample of tartar may be analysed by this method in 1½ hour. The details of the methods are as follows.

Five grams of the finely powdered tartar are heated with a little water to dissolve any carbonates that may be present. If it is wished to guard against crystalline carbonates, 5 c.c. of standard hydrochloric acid are added in the first instance, and the heating is conducted in a covered beaker. Standard alkali is next added to the extent of about three-fourths of the amount required by a good tartar of the kind examined, plus that equivalent to the hydrochloric acid used, and the whole is brought to boiling; when nearly cold, the titration is finished. From the amount of alkali consumed, minus that required by the hydrochloric acid, the tartaric acid present as acid tartrate is calculated.

Two grams of the powdered tartar are next weighed into a platinum crucible with a well-fitting lid; the crucible is placed over an argand burner; heat is first applied very gently to dry the tartar, and then more strongly till inflammable gas ceases to be evolved. The heat should not rise above very low redness. The black ash is next removed with water to a beaker. If the tartar is known to be a good one, 20 c.c. of standard sulphuric acid are now run from a pipette into the beaker, a portion of the acid being used to rinse the crucible. The contents of the beaker are now brought to boiling, filtered, and the unneutralized acid determined with standard alkali. As the charcoal on the filter under some circumstances retains a little acid, even when well washed, it is advisable when the titration is completed to transfer the filter and its contents to the neutralized fluid, and add a further amount of alkali if necessary. From the neutralizing power of a gram of burnt tartar is subtracted the acidity of a gram of unburnt tartar, both expressed in cubic centimetres of standard alkali, the difference is the neutralizing power of the bases existing as neutral tartrates, and is then calculated into tartaric acid on this assumption.*

If the tartar is of low quality, 5 c.c. of solution of hydrogen peroxide (1 volume=10 volumes of oxygen) are added to the black ash and water, and immediately afterwards the standard sulphuric acid; the rest of the analysis proceeds as already described; the small acidity usually belonging to the peroxide solution must, however, be known and allowed for in the calculation. By the use of hydrogen peroxide the sulphides formed during ignition are reconverted into sulphides, and the error of excess which their presence would occasion is avoided. This elegant method is due to a suggestion of Mr. Valentin.

The formation of sulphides is not apparently due to the reducing action of tartrates upon sulphates. Both tartrates and citrates may be mixed with sulphates, the solutions evaporated, and the dry matter ignited so as to convert all organic salts into carbonates, without the production of sulphides, or at most of a trace only; but if any nitrogenous organic matter be present, the formation of sulphides is under these circumstances abundant. On learning this fact, it seemed possible that the sulphides were derived from the organic sulphur of albuminous bodies, and not from the reduction of sulphates, in which case it would be a mistake to employ hydrogen peroxide as directed above. A test experiment in which white of egg and pure tartar were ignited together, gave however only a trace of sulphides, and thus negatived the idea. On repeating the experiment with the addition of gypsum, the production of sulphides was abundant. Gypsum and tartar alone gave, however, no sulphides at the low temperature necessary for converting tartrates into carbonates.

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* It is obvious that the neutralizing power of the ash of an acid tartrate is exactly the same as the acidity of the same tartrate before burning. In making the calculations, it must be remembered that the value of the alkali in tartaric acid is twice as great in the calculation made from the acidity of the unburnt tartar, as in the calculation of the acid existing as neutral tartrates.

Sulphides will be formed in large quantity on ignition if the tartar or argol contained free sulphur; such sulphides cannot be oxidized into sulphates without vitiating the analysis. It is necessary therefore to remove all free sulphur before commencing the determination.

When nitrogenous organic matter is present in a tartar, cyanides as well as sulphides are produced on ignition. The hydrocyanic acid may be removed before titration by evaporating the sulphuric acid solution of the ash, till all smell has disappeared.

The method now described does not, as already mentioned, give the separate amounts of acid and neutral tartrates with exactness in the presence of carbonates, but the total amount of tartaric acid is correctly given. The total acid is also correctly expressed in cases in which free tartaric acid is present, provided the final result shows some tartaric acid as neutral tartrates. When in using this method the acidity of the unburnt substance is found to be greater than the neutralizing power of the ash, it must be abandoned and method D employed.

In method D the tartar, freed from carbonates by heating with hydrochloric acid, is exactly neutralized with soda, the whole transferred to a platinum basin, evaporated, and ignited; the neutralizing power of the ash is then ascertained as in method C. This method is the only one that will give exact results when the substance examined contains much free tartaric acid; it is also unaffected by the presence of free inorganic acids, if their salts are not altered by ignition with vegetable matter.

Methods C and D are not apparently affected by the presence of sand in the tartar, and the presence of clay has also little effect. Pure bitartrate mixed with 10 per cent. pipe clay, and ignited at the usual temperature, gave 99·44 per cent. of the tartaric acid present. On the other hand, these methods are very injuriously affected by the presence of certain silicates.

In place of the alkalimetrical determinations in C and D, determinations of carbonic acid in the burnt tartar, or in the burnt neutralized tartar, may be made. These determinations can be effected very speedily, and with tolerable accuracy, by means of Scheibler's well-known apparatus. The tartar, neutralized or not according as method C or D is employed, is ignited at a low temperature in a platinum vessel, the black ash moistened with water, reduced to a smooth paste with a small agate pestle, and removed by means of water into the generating bottle of the apparatus. The quantity of water used must be exactly 5 c.c. The water is best supplied from a burette, and if used in washings of 1 c.c. each the quantity mentioned will be quite sufficient. In the hydrochloric acid used (10 c.c. of sp. gr. 1·12) a little mercuric chloride is dissolved, to prevent the evolution of sulphuretted hydrogen. The operation is performed as described in Scheibler's pamphlet, but the contents of the generating bottle should be shaken for three minutes in every case to ensure uniformity of result. The bottle should be wrapped in paper, and a glazed screen placed between the operator and the apparatus during the agitation, as a small rise of temperature would distinctly affect the result. The volume of gas obtained is to be increased by 7 per cent., to compensate for the amount of gas retained by the fluid in the generating bottle, this amount being proportional to the quantity of gas evolved, and not a constant quantity as stated by Scheibler (see *Chemical News*, xxxi., p. 253). To reduce the volume of gas into tartaric acid, first correct the volume for pressure, and then find the weight of carbonate of calcium it is equivalent to in Scheibler's table (Table VI). If a neutral tartrate has been operated on, as in method D, the weight of tartaric acid is $1\frac{1}{2}$ times the carbonate of calcium; if an acid tartrate is the subject of experiment, the tartaric acid is three times the carbonate of calcium. If method C is used, calculate the tartaric acid as $1\frac{1}{2}$ times the carbonate of calcium, and subtract one-half the tartaric acid previously found from the acidity of the sample, the difference will be the tartaric acid existing as neutral tartrates. Two grams of tartar, or one gram if neutralized with soda, is the maximum quantity for an experiment.

As in the alkalimetrical method, no error is introduced by the presence of carbonates or sulpates, if the precautions already mentioned are employed. The presence of sand somewhat diminishes the result, and clay has a still greater effect. Pure tartar ignited with 10 per cent. of fine sand gave 98·53 and 98·43 per cent. of the tartaric acid present. With 10 per cent. of pipe-clay the product was 95·15 per cent.

The determination of tartaric acid in lees has been hitherto done by indirect methods, the same as those employed for the analysis of tartar. A long investigation of the application of these methods to lees has, however, convinced the author that the tartaric acid present cannot be accurately determined by their means.

If it were possible to ascertain exactly the total amount of organic acid existing in a sample of lees, it would certainly be open to doubt whether the whole of this acid was in fact tartaric, since wine contains several organic acids besides tartaric, and lees itself is a substance which readily undergoes putrefactive change. This doubt has little place in the case of a crystalline tartar, to which, therefore, indirect methods of analysis may safely be applied.

In each of the indirect methods already described, with the exception of D, it is essential to determine separately the amount of acid and neutral tartrate present. If the determination of acid tartrate is founded on the amount of potash ascertained by platinum, the result can hardly fail of being too high, as every potassium salt is reckoned as bitartrate. For without assuming the presence of organic potassium salts other than tartrates, it is evident that, in the case of plastered lees, some small quantity of sulphate of potassium must be present. Since lees also frequently contain a rather considerable amount of carbonates, the conclusion seems unavoidable that neutral tartrate of potassium may be present as well as acid tartrate. If, on the other hand, the determination of bitartrate is founded on the acidity of the lees, the result is still less accurate and is open to great uncertainty.

When lees are boiled with water and neutralized with standard alkali, the acidity found is of course below the truth when carbonates have been present; in some lees, in fact, the carbonates are more than sufficient to neutralize the whole acidity. This error may to a great extent be avoided by treating the finely powdered lees in the cold with a moderate excess of standard alkali, and after stirring for some minutes, neutralizing the solution by the cautious addition of standard acid. The insoluble carbonates on this plan remain untouched, and only the soluble carbonates can affect the acidity. The results are, however, by no means sharp. The vegetable matter, silicates, or phosphates of the lees, appear to have the power of appropriating caustic alkali, especially on heating, which must therefore be avoided. The addition of caustic alkali probably produces a number of basic salts not previously present; the standard acid is, therefore, best added to faint acid reaction to re-establish a normal condition. If the liquor is decanted after such a determination, the insoluble carbonates will be seen as white particles at the bottom of the beaker, which effervesce with acid.*

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* If the acidity of tartar is to be determined by treatment with excess of alkali, the tartar must be reduced to an impalpable powder. Crystalline bitartrate is very slowly attacked by cold alkali.

As a complete correction of the effect of carbonates in the determinations of acidity, the carbonic acid present in the lees may be determined, and its equivalent in acidity added to the acidity found after boiling with water or standard hydrochloric acid. By this means still higher results are obtained than by the previous method. Carbonic acid in lees is conveniently determined by placing 8—10 grams in a cask with a tube of hydrochloric acid, which is subsequently overturned. The flask is brought to boiling, and the gas passed by means of an aspirator into tubes containing baryta-water. The carbonate of barium is collected on a small filter, with careful exclusion of air, and washed till the drain-water no longer affects turmeric paper. The filter and precipitate are then treated with standard hydrochloric acid, boiled, and the excess of acid determined with alkali. The value of the carbonates in terms of alkali is thus at once obtained. A similar experiment should be made with a fragment of calc-spar containing about the same amount of carbonic acid which is determined in the case of lees; the excess of the result over theory furnishes a correction to be applied to the experiments with lees. The elements of this method were suggested by Dr. Flight.

A considerable difficulty is introduced into the determination of the acidity of lees by the fact that lees when neutralized become distinctly acid if once more boiled for a few minutes. If this new acidity be neutralized with alkali and boiling resumed, a further, though smaller amount of acidity is developed. By proceeding in this way till the production of acidity ceases, a much higher result is obtained than if the experiment was stopped after one or two boilings only. This production of acidity during repeated boilings is not observed in the analysis of tartar, and is certainly not due to any insolubility of the bitartrate present. The phenomenon could readily be explained by assuming the presence of ditartaric acid, but this is most unlikely. The author believes it is, at least in part, owing to the decomposition of the phosphates present. If precipitated phosphate of aluminium or iron is diffused in water, and made neutral to litmus paper by careful addition of caustic alkali, the mixture when boiled becomes distinctly acid. If gypsum be also present the acidification is much intensified. The solutions neutralized and boiled again develop a fresh acidity. The same phenomena occur if bitartrate of potassium is present along with the other ingredients. Phosphates of iron and aluminium with calcium salts are present in all lees; it appears likely, therefore, that a part at least of the acidification is due to this reaction. The vegetable matter which forms a large part of lees may possibly take a part in the reaction, but of its properties nothing is known.

The divergency between these four methods is illustrated by the following table, which gives the percentage of tartaric acid as bitartrate found in three lees by the methods just described:—

Method.	I. Spanish Lees.	II. Spanish Lees.	III. French Lees.
Calculation from the potash present...	7·20	6·76	5·95
Boiling (twice) with water	4·00	6·18	4·59
Treatment with excess of alkali in the cold	7·75	7·88	6·69
Boiling with hydrochloric acid, the neutralization by carbonates being corrected from a determination of carbonic acid	8·83	8·57	8·18

The amount of tartaric acid present as acid potassium tartrate cannot possibly exceed that calculated from the potash found, and, as already stated, is pretty sure to fall below it; yet the tartaric acid calculated from the acidity of the lees is seen to be in every case greater than that equivalent to the potash found, except when the neutralization effected by the carbonates is unchecked. The results calculated from the acidity of the lees become still higher if a number of boilings take place. With lees II. five boilings with water increased the tartaric acid found from 6·18 to 7·28 per cent.; with lees III. the increase was from 4·59 to 6·28 per cent. If these numbers were corrected for carbonates, as in the fourth line of figures, the results would be higher than any in the table.

The presence of free acids in lees would of course explain the higher results obtained by acidity than by calculation from potash. Grape juice, according to Dupré contains a good deal of free malic, and also some free tartaric acid; and wines, on the same authority, also contain free acid. A red and white Spanish, and an Italian lees, were extracted with strong alcohol, the solutions treated with water became turbid; evaporated on a water-bath they left in every case a green fat and a small quantity of a syrupy acid. In the case of lees I. in the preceding table, the amount of the free acid extracted by alcohol was determined; it was equivalent to only 30 per cent. of tartaric acid, a quantity quite insufficient to account for the difference between the acidity of the lees and the potash present. As all the ingredients of lees have been formed and precipitated from an acid solution, it seems very likely that many of these ingredients are capable to some extent of neutralizing caustic alkali, and that the acidity of a lees will consequently always be in excess of the quantity of bitartrate really present.

In some cases lees appear to increase in acidity by keeping. Lees also which have been long kept in powder are frequently found caked together, apparently from the growth of fungus.

It has been supposed by Patterson (*Chem. News*, xxv., 149) that tartaric acid in alkaline solutions gradually splits up into simpler acids of greater neutralizing power; such a decomposition would at once explain the increase in acidity of lees just mentioned. Solutions of bitartrate of potassium, and of Rochelle salt, both with and without the presence of gypsum, were set aside to ascertain the effect of fungoid growth upon their composition. A drop of phosphoric acid being added to each solution, an active growth of mould was started in a few days. The bitartrate solutions at once began to diminish in acidity, and at the end of six months (chiefly winter) had become neutral, and, indeed, when boiled, slightly alkaline. The solution containing gypsum changed somewhat more speedily than the other. The solutions of Rochelle salt became slowly slightly alkaline, but this alkalinity did not appear to increase; it would seem, indeed, that the presence of alkali checks the action of the fungus. It appears, then, that as far as the action of fungus is concerned, a diminution rather than an increase of acidity is to be expected.

If the acidity of lees is in excess of the acid tartrates and free acid present, it is evident that methods C and D must give results that are too high. These methods are, however, open to a still greater error on the side of excess, owing to the presence of silicates in the lees.

In seeking for a direct estimation of tartaric acid, the author desired, if possible, to obtain the acid in the form of bitartrate of potassium, this form being the most characteristic of tartaric acid. The first plan tried was the decomposition of lees by boiling with carbonate of potassium. By this method the tartrate and sulphate of calicium are decomposed, and all the tartaric acid passes into solution, while all the lime, except a trace, remains with the residue of the lees. The residue was washed on a vacuum filter, the solution neutralized with hydrochloric acid, concentrated on a water-bath to a small bulk, and the tartaric acid precipitated as bitartrate of potassium by the addition of citric acid. This method has the disadvantage that large quanties of colouring and other matters are dissolved out of the lees by digestion with carbonate of potassium, and as soon as the solution is neutralized they are precipitated, and considerable trouble must be taken to separate them, or the precipitate of bitartrate will be very impure and difficult to filter.

(*To be continued.*)

The Pharmaceutical Journal.

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SATURDAY, DECEMBER 11, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

GRANTS IN AID OF PHARMACEUTICAL RESEARCH.

WE have much pleasure in calling attention to a report published at p. 473, which serves to show that useful work is being done directly and indirectly by the British Pharmaceutical Conference. Within the last few years the number of members has increased very largely, and as the work of the Association is chiefly done by officials holding an honorary position, the revenue arising from subscriptions and donations has not only sufficed to defray the expenses of the 'Year-Book,' but has also left some surplus applicable for promoting in other ways the objects which the Conference aims at.

As an offshoot of the British Association, it is naturally to be expected that the proceedings of the Conference should be in a great measure a reflection of those which have been found to work well by the older and larger body, and accordingly there have been in previous years grants in aid of the expenses incident to particular inquiries connected with pharmacy, as, for instance, to Mr. GERRARD, in connection with his report on the official plasters, and to Mr. GROVES and Dr. WRIGHT in aid of their investigations of aconite alkaloids.

This year the action of the Conference in this direction has been considerably extended, and as a result of the applications for grants from the Bell and Hills Fund sent in to the Executive Committee it has been resolved to appropriate £75 in this manner. The subjects of the projected investigations are of a nature to justify the expectation that much useful information may be acquired. The further examination of pilocarpine, the elucidation of the distracting complication in which the chemistry of the aconite alkaloids is now involved, and the study of the alteration of essential oils by oxidation, are fields of inquiry that, if properly dealt with, cannot fail to yield results specially valuable to pharmaceutists and to medical practitioners, and possibly also serviceable as additions to our store of general chemistry.

We are disposed to think the Executive Committee of the Conference is much to be commended for adopting this mode of disposing of its surplus funds with the object of promoting original inquiry, and the only regret that suggests itself in reading over the list of grants is caused by finding only one out of the eight grants awarded to a practical pharmacist. It is true that some of the other grants have been placed in the hands of persons in some degree connected with pharmacy, either at some past time or at the present, and we do not doubt that the work they may carry out will justify the promise of their previous performances. Neither do we doubt that the chemists, properly speaking, who have undertaken to investigate several subjects under the auspices of the British Pharmaceutical Conference will fully repay to the pharmaceutical community the grants in aid of their researches awarded from the funds of the Conference. In so far we must acknowledge our obligation, both to the Executive Committee and to those gentlemen who have undertaken to serve under its flag; but at the same time we should have been glad to see the bands of explorers more largely recruited from the ranks of working pharmacists.

In saying this much it must not be supposed that we desire to advocate any feeling of exclusiveness or self-sufficiency, for which there is indeed but little room. Our motive is rather to impress on the minds of our readers the fact that, in respect to the intelligent cultivation of those branches of science with which a competent pharmacist is bound to be well conversant, we are in this country at a great disadvantage as compared with any other country enjoying like opportunities. Nor is this a fact that has not been pointed out before, or one that it is desirable to conceal; on the contrary, we believe that it is only by its constant reiteration that any such attention will be paid to it as would produce a a change, and bring about a state of things of the kind aimed at by the Pharmaceutical Conference.

However, though we are strongly impressed with the opinion that the investigation of subjects ultimately relating to pharmaceutical practice should be conducted by pharmacists practically engaged in the art which would be benefited by such work, we must, on the ground of expediency, admit that a beginning must be made somehow. If we have no pharmacists at once able and willing to study such questions as have been from time to time propounded by the Pharmaceutical Conference with but very meagre response from among the general body, then we must look beyond the general limits of our own special calling. If we can enlist as workers on our behalf those whose pursuits are somewhat apart from our own there will be at least room for rejoicing that the ground does not lie fallow altogether; there will be reason for hoping that example may have a wholesome influence, and that, at least, our eminently practical intincts may lead to the recognition of the fact that a sound scientific acquaintance with the sciences bearing on pharmacy has its beneficial influence from a utilitarian point of view. When it comes to be felt that this kind of qualification is not only a fitting thing but also a useful one, we may expect to see research more generally conducted in this country by the pharmacist, with the same ability, success, and advantage, as it has been done already in some few instances even among ourselves, and as it is every day being done by our continental and transatlantic compeers.

While speaking of the work done by the Pharmaceutical Conference, it is impossible to omit mention of the good service that has been rendered by the publication of the 'Year Book,' and we are glad to see that the Executive Committee has manifested its appreciation of the Editor's labours in preparing this useful volume by voting him an increase of salary.

INCAUTIOUS USE OF DRUGS.

Within the last few weeks we have had to report several cases in which the imprudent use of chloral, chloroform, and narcotics has been productive of fatal effects; and as there is reason to believe such a practice is very prevalent, we consider it desirable to call attention to any incident which may illustrate the danger attending the use of drugs with which the public are too familiar to suspect their possible potency. Besides chloral, chloroform, and certain preparations containing narcotics, camphor is a notable instance of this kind, and the poisonous effects of that drug were pointed out in this Journal last March[*] as having a special interest for druggists as well as for medical men.

In the last number of the *Lancet* another case of poisoning by camphor is reported, in which a camphor liniment was administered to a child by mistake in place of the proper medicine. The symptoms were exactly the same as those which have followed from an overdose of what is termed homœopathic solution of camphor—viz., convulsions and profound unconsciousness. Although camphor and its preparations are not comprised among the poisons of the Pharmacy Act schedule, it is evidently advisable that in supplying them pharmacists should give a caution as to their proper use.

The same remark also applies to the sale of chloroform more especially since it is likely to be used for the purpose of alleviating acute pain, and under such conditions it is easily conceivable that most lamentable results may ensue if any considerable quantity is handled for this purpose. The case of Mrs. Childers sufficiently illustrates the gravity of the risk incurred in this way, and it should, we think, instigate every one selling chloroform to impress upon his customers the necessity for the greatest care in using it.

RUSSIAN PHARMACEUTICAL STATISTICS.

Some statistics quoted in the *Pharmaceutische Zeitung für Russland* enable us to supplement M. Mehu's article on Pharmacy in Russia (before, p. 195) with some further particulars as to the practice of pharmacy in St. Petersburg. According to the latest data, there were last year in that city 52 "free" pharmacies, having in connection with them 3 "filial" or branch establishments, two of which are carried on all the year round, and one in the summer only. Besides these medicines are supplied from the pharmacy of the "findelhause." The "free" pharmacies give employment to 4 "magisters," 74 dispensers, 934 assistants, and 77 pupils. The total number of prescriptions prepared at all the pharmacies during the year 1874 was 1,528,247, being an increase of 13,399 upon the total in 1873. The largest number of prescriptions was made up in the pharmacy of Herr Jurgens—namely, 92,964. Then came Borgmann, with 66,028; Pohl, with 57,377; Martinson, with 55,360; Wulff, with 48,155; A. Bergholz, with 47,202; Friedlander, with 44,150, and Kahn, with 40,151 prescriptions. In each of the remaining pharmacies under 40,000 prescriptions were dispensed; eighteen pharmacies had under 20,000; and the lowest number in one pharmacy was 6791. During the year an inspection was made of all the pharmacies, but in reference to only one proprietor was any remark made by the inspection department. Finally, only one breach of the regulations for the supply of drugs was reported during the same period.

FATAL EXPLOSION IN A CHEMICAL MANUFACTORY.

An accident, resulting in loss of life, is reported as having taken place on the 15th ult., in the manufactory of Messrs. Gehe and Co., at Dresden. It originated in an excess of pressure being applied to a steam-jacketed copper vessel, containing about four hundredweight of a macerate of nutmegs, from which the essential and fatty oils were being separated. The pressure caused the copper vessel to burst, and the liberated vapours coming into contact with the fire, exploded with a force that destroyed the greater part of the wing of the building in which it took place. Two workmen were buried in the ruins, and when extricated were quite dead. The chemical manager had a very narrow escape. He was occupied in the counting house when suddenly the floor of the library was driven in upon it; a bookcase fell upon him, so that he was completely buried under the books. To this circumstance he probably owed his life; for upon the removal of some of the rubbish he was found unhurt. The fire resulting from the explosion was extinguished in about an hour.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The Annual Soirée of the above Association is to be held in the Town Hall, Birmingham, on Thursday evening next, December 16. There will be an exhibition of microscopic and other scientific apparatus, new pharmaceutical preparations, rare drugs and chemicals, precious metals, gems, and stones, graphoscopes, stereoscopes, etc. Processes will also be shown in operation, illustrating the manufacture of various chemical and pharmaceutical preparations. A quadrille band will be in attendance, and dancing is to commence at 9·15.

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[*] See *Pharm. Journ.*, March 20, 1875.

Proceedings of Scientific Societies.

BRITISH PHARMACEUTICAL CONFERENCE.

Meetings of the Executive Committee, chiefly to entertain applications for grants of money in aid of chemical and pharmaceutical research, have been held on the first Wednesdays in November and December, in the rooms of the Pharmaceutical Society of Great Britain (by the kind permission of the Council of that Society), at 17, Bloomsbury Square, London. Present—Professors Redwood and Attfield, Messrs. Frazer, Groves, Hills, Schacht, and Williams.

After the confirmation of the minutes of the previous meeting, which included a resolution raising the salary of the editor of the Conference 'Year-Book' from £100 to £150, the following applications from members for grants were read, several being sent in response to requests or suggestions from the Committee:—

1. From Mr. A. W. Gerrard, £10 to cover cost of extraction of pilocarpine from jaborandi, with a view to its further chemical and pharmaceutical investigation.

2. From Dr. C. R. A. Wright, £20 to defray expenses in connection with the extended researches on the aconitines. Respecting this application Messrs. Hopkin and Williams had stated that they would gladly furnish Dr. Wright with concentrated extracts of the raw material for the mere cost.

3. From Mr. M. M. Pattison Muir, £5, with which to purchase the required quantity of essential oil of sage for a research.

4. From Mr. C. T. Kingzett, £10 to pay a portion of the cost of materials necessary for continued researches on the oxidation of essential oils.

5. From Mr. E. L. Cleaver, £10, with which to purchase opium for a thorough examination of the methods of ascertaining the proportion of morphia in the drug, and a report on a trustworthy mode of assaying opium.

6. From Mr. R. H. Davies, £5 to defray part of the cost of an investigation of the definite proximate principles of ivy berries.

7. From Dr. H. E. Armstrong, £10 for the purchase of strychnine with which to conduct a research on the oxidation products and bromo-derivatives of that alkaloid.

8. From Dr. W. A. Tilden, £5 to be expended in carrying on further investigations of the aloins.

Total number of applications, 8; total amount of grants, £75.

On the motion of the President, it was resolved unanimously, to grant to the gentlemen named the sums mentioned, to thank them for undertaking the several researches, and to request them to communicate results to the next general meeting of the Conference at Glasgow, on Tuesday and Wednesday the 5th and 6th September, 1876.

The Honorary Secretary reported that since the meetings of the Committee in August he had received nearly 500 subscriptions of 7*s.* 6*d.* each from that number of members, all of which sums had been duly acknowledged and placed to the credit of the respective members. The number of members up to December was about 2800.

The Treasurer was ordered to invest in consols £200 of the balance in his hands, pending the consideration of the best mode of dealing with surplus income.

The Secretaries announced that the 'Year-book' for 1875 was in type, that it would extend to six hundred and fifty pages, that it would be published on or about the 15th of December, and that a copy would be sent, post-free, to every member who had paid his annual subscription (7*s.* 6*d.*, by P.O.O. payable at the High Holborn Office to Professor John Attfield, Hon. Gen. Sec., 17, Bloomsbury Square, London, W.C.). The deliveries would be at the rate of about one hundred daily.

A letter was read from a member suggesting that the Conference should nominate, in connection with the Cambridge University Extension Scheme, a travelling Professor of Pharmacy, who should lecture in the provinces at different centres, and that the Conference should contribute towards his remuneration £150 per annum. After thoroughly discussing the proposal, the Committee were unanimous in the opinion that at present it would be unwise to include the great subject of education among the objects of the Conference. The Conference had been for the thirteen years of its life recognized as a body devoting its whole strength and resources to the prosecution of original research in connection with pharmacy, by issuing lists of subjects for investigation, publishing a 'Year-book' of researches made at home and abroad, and granting money in aid of research; and secondarily, by holding annual gatherings of members for friendly intercourse, as well as for the reading and discussion of the original papers. Support could not be accorded to any particular scheme of education without full consideration of the whole subject, and the latter could not be entertained with the probability of the Conference taking any important action in the matter without enlarging the organization of the Conference and extending its work to areas already occupied by other societies. The Committee concluded that they were only anticipating the wishes of the members in declining to entertain the consideration of any plan of direct pharmaceutical education.

CHEMICAL SOCIETY.

Thursday, December 2, 1875. Professor Abel, F.R.S., President, in the chair. After the usual business of the Society, Dr. J. H. Gladstone read a paper by himself and Mr. A. Tribe, on "The Decomposition of Alcohol and its Homologues by the Joint Action of Aluminium and its Halogen Compounds." The action on alcohol gave rise to hydrogen and aluminic ethylate, a greenish-white fusible substance. The second communication, a "Note on Incense Resin," by Dr. J. Stenhouse and Mr. C. E. Groves, was read by the latter. The authors have succeeded in obtaining a crystalline substance and a liquid hydrocarbon from it. Mr. J. Spiller gave a notice of "The Occurrence of Native Calcium Chloride at Guy's Cliff, Warwickshire"; after which Mr. G. S. Johnson described "Certain Sources of Error in the Ultimate Analysis of Organic Substances containing Nitrogen," upon which an interesting discussion took place. The other papers were "On Certain Bismuth Compounds," by Mr. M. M. P. Muir, and "On Bismuthiferous Tesseral Pyrites," by Dr. W. Ramsay. The meeting finally adjourned until Thursday, December 16.

Parliamentary and Law Proceedings.

PAPERS PRESENTED TO PARLIAMENT.

LABORATORIES IN THE PUBLIC SCHOOLS.

A short time since an opportunity was taken (p. 148) to present a *résumé* of the Sixth, Seventh, and Eighth Reports of the Royal Commission on Scientific Instruction and the Advancement of Science, which were issued almost simultaneously. The length of the abstract, however, prevented more than a passing allusion to the Appendices on that occasion. Nevertheless, these contain a large amount of valuable information respecting the state of scientific teaching in this country. An appendix to the Sixth Report gives the following description of laboratories in public schools, and also a scheme for a laboratory for twenty students, and another for fifty students:—

Rugby.

The chemical laboratory at Rugby (there is no physical laboratory), and the chemical and physical class rooms and the natural science schools are part of an extensive block of new buildings containing several classical and other schools. The laboratory is 35 ft. by 22, and can accommodate thirty boys. It was formerly the only natural science lecture room; but it has been entirely refitted, in order to convert it into a laboratory, to replace the room formerly used for this purpose.

The working tables are divided into compartments, seven on each side of the centre table, and ten and six in those along the sides of the room. Each compartment comprises a cupboard and two drawers, two shelves for bottles containing the ordinary reagents used in analysis, two gas taps, waste basin with water supply, and a working space of 3 ft. 6 in. by 1 ft. 9 in. As there are often between forty and fifty boys using the laboratory in a term, the same compartment is frequently assigned to two boys, who share the drawers and cupboards, etc., between them; it being arranged that the boys shall not have their laboratory lessons at the same hour. Each cupboard contains one retort stand with wire gauze and sand bath, one flask, two funnels and funnel stand, two evaporating basins, nest of small beakers, test tubes and rack, wash bottle, and two blocks of wood for supports.

In the drawers are a blow-pipe, iron tongs, two watch glasses, test tube holder, glass rods, and tubes.

All other apparatus, such as retorts, deflagrating jars and spoons, gas bottles, etc., is used in common, and is given out to each boy as he requires it. The water taps and basins in the central table are placed so as to serve for boys working on either side, and thus much space is gained. The water taps have a small orifice, and are specially adapted for filling test tubes. A water pipe is also carried along the highest shelf, and there are taps at intervals for filling tall vessels, for working with Liebig's condenser, etc.

The sink, with arrangements for washing and drying bottles, is near the door.

At one end of the room is an open fireplace, with shelves and nests of drawers on either side. The drawers contain the various articles that are in general use in the laboratory, such as corks, cork-borers, elastic tubing, holders of different kinds, glass tubes and rods, etc.

The lower shelves above the drawers contain all the dry chemicals required in Harcourt and Madan's 'Practical Chemistry' (the book chiefly used in the laboratory), together with the more costly re-agents, and others that are in less frequent use. Each boy, as before stated, has a complete set of all the ordinary acids and test solutions on the shelves of his compartment.

The contents of the drawers and shelves on either side of the fireplace are arranged in duplicate—a complete set on each side. In this way all chance of confusion and crowding is avoided, as no boy can have occasion to cross over from the side of the room on which he is working to the opposite side, everything being ready to his hand.

A common balance with sets of gramme weights is placed on the table above each nest of drawers. Here also are kept the various measuring flasks and cylinders. At the other end of the room is an ordinary six-feet kitchen range, which has been slightly modified so as to serve for a furnace. It has sand-bath, boiler, and drying-oven. On one side of the furnace is a cupboard to contain a stock of glass and porcelain apparatus. On the other side are two spacious evaporating closets with sliding glass doors. These are supplied with hoods and jets for creating a powerful draught. The draught can be still further increased, when necessary, by lighting a large ring of jets in the flue communicating with the closets.

A small cupboard for tools and a glass blower's table complete the furniture of the laboratory.

The room formerly used as a laboratory was built some years ago, at the same time as the natural science lecture-room, and, though small, was exceedingly well arranged. It is now converted into a private laboratory for the use of the chemical lecturer. It contains a large evaporating closet, also a sand-bath and distilling apparatus, both of which are worked by the fire in the school laboratory by means of appropriate dampers. Here also is the flue for obtaining a down-draught at the lecture-table in the adjoining chemical lecture theatre. As several pipes open into this flue, it was found necessary to place the large ring of gas-jets for creating the draught at a considerable elevation above the floor. To light this ring an artifice was employed that it may be worth while to mention. A supplementary gas-pipe was carried alongside of the supply-pipe from a few feet above the floor to the ring of jets. This was pierced with small jets at short intervals all the way to the top. A separate tap turns on the gas in this pipe, and upon applying a light to the lowest jet the flame runs rapidly up the pipe and lights the ring at the top. The gas is then turned off from the supplementary pipe and the ring alone left burning.

From the private laboratory a door opens into the chemical lecture room. This is provided with seats for fifty boys, the forms and desks rising tier above tier, so that experiments at the lecture table are well seen by all. The down draught at the lecture table, already alluded to, is most useful. Experiments with chlorine may be performed with hardly any smell escaping.

The theatre is well supplied with shelves, cupboards, apparatus cases, diagram-screens, and black-board. There is also a capital cellar for stock chemicals, batteries, and empty cases.

The laboratory instruction is given by the senior natural science master and a qualified assistant. As the boys are allowed to come to the laboratory at such times as fall in best with their other work, there are few hours in the day when there are not at least two or three there; occasionally as many as fourteen or fifteen are at work at the same time; but as boys require much individual attention, a larger number than this is not thought desirable.

Under ordinary circumstances each boy has two lessons a week, of rather over an hour's duration.

The laboratory is used by three classes of boys:—

(1) By those whose parents wish them to obtain a knowledge of practical chemistry in addition to all their other work. These boys become the private pupils of the senior natural science master, and pay an extra ten guineas per annum. The number is at present limited to thirty.

(2) By boys who have been so long in the school that they have gone through all the ordinary natural science courses of lessons. Such boys, instead of recommencing a subject, are allowed, if they wish to attend the laboratory at the times when they would otherwise be at a natural science lesson. In some cases, however, they have preferred to go through one of the courses a second time, often with very satisfactory results.

(3) By boys who have been allowed to join the laboratory as a reward for special industry and success in one of the regular natural science courses.

The plan of practical work pursued is as follows:—A boy at first begins with Harcourt and Madan's 'Practical Chemistry.' He performs all the experiments himself, constructing and building up his own apparatus with such assistance as he may require. After the ordinary elementary manipulation with gases, distilling, etc., he studies the properties of the different classes of salts, metals, and acid radicles, and so is prepared for the converse process, in actual analysis, of determining a substance from observing the properties which he finds it to possess. Then, after working out some forty or fifty simple salts as exercises in easy qualitative analysis, he proceeds to mixtures more or less complicated, using Fresenius or Galloway.

Very few boys at Rugby have gone beyond this and attempted quantitative analysis. In every case a boy is required to write out a complete account of every step he has taken in each analysis.

Lately the system has been introduced of allowing quite young boys from the middle school, who have expressed a strong desire to learn practical chemistry and have a real taste for the subject, to work in the laboratory. Probably their answers, if pressed too closely as to the precise nature of the chemical changes going on in their experiments, might not be very satisfactory. But, for all this, the senior natural science master is clearly of opinion that *they are beginning in the right way.* He states, "They are getting acquainted with facts and real things, they see with their own eyes the effects of different classes of bodies upon each other; and acids, bases, and salts, become with them something more than mere terms. Such boys, when, later on, they join a chemical "set" in the upper school, generally take the lead, and prove by the greater readiness with which they follow the lecturer in his theoretical explanations, the advantage they have gained by commencing chemistry from the practical side."

In addition to the laboratories, there is a chemical lecture theatre, a physical science theatre, and an apparatus room.

Eton.

The chemical laboratory at Eton (as at Rugby, there is no physical laboratory) is most efficiently arranged, and has table accommodation for sets of twenty-eight students.

The walls of the building are of local red brick, with Bath stone dressings; the roofs are covered with brindle-coloured Staffordshire tiles, those of the laboratory and lecture-room being open-timbered. Special attention has been paid to the arrangement and general detail of the fittings, in order to make them as suitable and convenient as possible.

The building is heated by a boiler apparatus in the vault, and hot water pipes in connection; the ventilation of both laboratory and lecture-room has been well provided for, and provision is also made, by means of pipes, acted upon by gas jets, for effectually carrying off the noxious fumes and gases.

The cost of the building, inclusive of the fittings, has been about 4000*l.*

Harrow.

The erection of chemical and physical laboratories and class-rooms at Harrow is of quite a recent date. The following are the proposed arrangements:—

Below the chemical lecture room there will be a room of the same size (35 × 24 ft.; height, 12 ft.), which will be used as a room for holding physiological and natural history specimens.

Below the chemical laboratory, there will be two small rooms, which will be used, it is hoped, as work rooms for physiology, etc.

The rooms below the physical department will be only 10 ft. high:— one of these will be used as a balance room; another as a small workshop; a third, as the room for supplying hot air to all the buildings; the remainder as store rooms.

The shell of the buildings will cost about 4800*l.*

Dulwich.

At Dulwich there are two laboratories—the lower (or chemical) laboratory and the upper or small laboratory.

The lower laboratory is 36 feet long by 21 feet wide and 16 feet high. At one end is a platform raised 1 foot 7 inches above the floor of the room. On this is placed the teacher's or demonstrator's table. The table is provided with a sink and a leaden cistern (which serves as a pneumatic trough), with several Bunsen burners and the various appliances necessary for chemical demonstrations. On the wall behind is a large sliding blackboard, so placed as to be in view of all the pupils at the working tables. Three steps at either end of the platform bring the teacher to the floor of the room to inspect the work of the pupils from table to table.

The working tables are arranged parallel to each other, and are so placed that all the pupils face the teacher. Each table is adapted for six pupils. There are a sink and a water tap between each two, and a Bunsen burner for each separately. In front is a shelf for bottles containing the re-agents ordinarily in use, etc.

In the spaces below the tables—which are divided into compartments, but not closed with doors—each boy keeps the various pieces of his apparatus, retort stands, filter stands, etc.; and also a box with divisions to hold his store of test tubes, elastic tubing, glass rods, etc.

These last are provided at his own expense, and are kept by him under lock and key. Except for apparatus of this kind, which is necessarily treated as personal property, there is no additional expense incurred by a boy joining the science classes. The re-agents (as well as the use of all the more expensive apparatus required) are supplied by the college, without special fee or extra charge.

There are, at present, in the chemical laboratory three working tables, as above described, supplying accommodation for 18 boys, Two more pupils are similarly accommodated at the end of the teacher's table on the raised platform. Additional accommodation for 18 boys can at any time be provided by the erection of three more tables. These were, in fact, included in the original design, and gas, water, and drain pipes are already laid for them. It is doubtful, however, whether more than 20 boys can be efficiently taught at one time. The existing accommodation is, at any rate, found sufficient at present, if used by different classes in succession.

The laboratory is lighted by five large windows on the left of the pupils, and warmed by hot-water pipes. At the further end of the room is an aperture in the wall, connected with a flue, and supplied with a powerful Bunsen burner, to carry off noxious vapours and assist in ventilating the room.

The upper laboratory, 21 feet long by 18 feet wide, is fitted with cases and cupboards for keeping the apparatus for physics and chemistry. It is also used as a physical laboratory, and occasionally as a science class room for special instruction. It is provided with a working-table for chemical purposes similarly fitted to those in the large laboratory, and giving accommodation to four pupils, and has, in one corner, a large glazed closet for weighing.

A small room at present occupied by the boy's school library, is intended to be used, when required, as a room for apparatus, and, probably, at the same time, as a private room for the science master or masters.

The covered shed or lobby, built out into the open yard, is fitted with a slate slab and sink for the galvanic battery. Wires are carried from it to the lecturer's table in the theatre, and to the science master's table in the lower laboratory.

Below the upper laboratory and the adjoining corridor is a basement laboratory fitted with a furnace for the study of metallurgy, etc.

In the basement is also a workshop with a lathe for wood and metal turning. A skilled artizan (who acts also as engineer and mechanist at the college) is in charge of this workshop, and is able to construct and repair a large part of the less delicate apparatus used in the science department.

A separate room, not included in the plans, is used as a class room for instruction in geology (or botany). It is one of the ordinary class rooms of the college, well lighted and ventilated, and with ample wall space for diagrams. It will contain from 30 to 36 boys.

The lecture theatre is 43 feet wide by 35 feet deep. It is fitted with 10 parallel rows of seats, and is capable of accommodating 250 or 260 people. There are narrow desks to each row of seats, adapted for the purpose of taking notes. These desks will accommodate about 220 students. They are supported by strong iron rods, dropping into sockets, and can, therefore, be easily removed when not required.

The lecturer's table is well supplied with gas burners of various shapes and apertures. It has a sink and a large sunken cistern to serve as a pneumatic trough. Immediately behind the table is a glazed closet, with sliding sash, to carry on noxious and offensive gases.

The theatre is lighted by a "sunlight" burner, which also serves to assist in ventilation, and it is warmed by hot-water pipes. A glass cupboard is provided for the storing of apparatus, and the space beneath the lecture table is occupied by drawers for the various necessaries of a lecture room

The theatre is used (1) for oral instruction and demonstration to the science classes, and (2) for courses of evening lectures, on science or art, given in each term generally by some lecturer not belonging to the college staff. These evening lectures are open to all boys in the college, whether members of the science classes or not, but attendance at them is quite voluntary.

University College School.

At this school there is a good chemical laboratory recently constructed on a plan suggested by Mr. Temple Orme, who has furnished the following account of it. It is at once a laboratory and a class room.

There are three concentric arrangements of benches and desks within the the hemicycle. Breadth of benches 9 inches, of desks, 12 inches. A space of about 1 foot between each desk and next interior bench, each bench being raised at least 1 foot above the next interior bench.

The lecture table is 8 feet long, parallel to the diameter of the semicircle, with two returns of 2 feet each, at an angle of 150° with the main body of the table. Breadth of table 2 feet 3 inches, height 2 feet 8 inches. The top of the table projects about an inch over the face of the cupboards beneath ; but there is also a groove along the surface all the way round, $\frac{1}{2}$ an inch from the edge, this is about $\frac{1}{2}$ an inch broad and about $\frac{3}{8}$ of an inch deep.

In the centre of the table there are at least four drawers ; if possible, two rows of three each. Each drawer to be about 2 feet long, 1 foot broad, and 3 inches deep.

The cupboards occupy the remainder of the space available for that purpose. They are provided with one shelf about 1 foot above bottom of cupboard and coming to within $\frac{1}{2}$ an inch of door ; also with two sliding trays, 4 and 8 inches respectively from the top of the cupboard.

In the right-hand return, and at the front of the table is a pneumatic trough constructed of slate ; dimensions, 1 foot broad, 1 foot and a half long, 1 foot deep. The interior is quite plain, except that there is a hole with plug at the bottom connected with waste-pipe. There should be a grating just below the plug to prevent stoppage, and a joint within easy reach.

The top edge of the trough (which will be about 1 inch thick) should be a little below the level of the table ; and a wooden lid should be provided, which, when placed over the trough, will completely cover it and be flush with the table.

There are two taps for water supply, and a sink in glazed stoneware, 1 foot in diameter, placed behind the trough.

The down-draughts of glazed stoneware, come out at the right hand of the furnace, where, on a level with the floor, a small air-tight door is provided, within which is a ring of gas-jets ; thence passing into the flue of furnace.

There is one pair of gas-pipes in the left-hand return, and three pairs along the central portion. All these being as close as possible to the back edge of the table.

The specimen table is placed in front of the lecture table. Length 6 feet, breadth 1 foot, height 2 feet. The upper surface will be used solely for the display of specimens.

The blow-pipe table is placed near the back wall on the left of the still. There is also a slate on an easel.

The work tables (26 in number) are 3 feet long, 1 foot 9 inches broad, 3 feet high. The upper surface of the wood is quite plain, neither painted, paraffined, nor stained ; groove as with the lecture table, and projecting 3 inches over the cupboards beneath ; there is no partition between any two contiguous desks, since the sinks will be quite sufficient to indicate the limits of each.

Beneath each table, a cupboard similar to those before mentioned, except that there is only one sliding tray 4 inches from top, and there are two shelves, one of which is 1 foot from bottom and the other midway between this and the tray, both coming to within an inch of the door.

The sinks are 1 foot in diameter, of glazed stoneware ; water pipes of same, with plug, beneath which is a grating ; joints within easy reach. One sink for every two tables. There is one tap for water supply for each sink.

One gas pipe dividing into two smaller ones (one for each table) is placed alternately with the sinks. Also near each sink one fish-tail burner for lighting purposes. The shelves are four in number above each table, strongly fixed to the wall, about 4 inches deep. The first shelf is 1 foot above table, the others are 6 inches apart. The shelves of one table are continuous with those of the adjacent tables, but separated from them by a narrow upright placed against the wall; these uprights may, but need not, come to the front.

The teacher's work table is on the right hand side, 5 feet long, 1 foot 9 inches broad, and 3 feet high ; cupboards beneath with revolving doors and two drawers about 4 inches deep. Desk grooved. Separate sink, tap, and gas supply (two gas pipes in middle, close to the wall). Shelves above, the same as with the other tables. This table will be used for the preparation of class experiments.

Shelves for large apparatus, etc., are arranged against the wall and extend as far as the structure will permit ; all round the room, there are two firmly fixed shelves. The lower one is about 1 foot above the top shelf of the work-tables, and the other not less than 1 foot 3 inches higher. Depth about 8 inches.

Cupboards for specimens, with glass doors, are fixed against the wall at a convenient height over the desks. These cupboards should be very broad, and neither too high nor too deep, so that as many specimens as possible within them may be visible from outside.

The furnace, with plate and sand bath is in the centre of the back wall. Facing the furnace, there is, on the right of it, the flue from the down draught of the lecture table. Still further on the right is the draught cupboard as long as possible, 2 feet deep and 3 feet high. Gas jet in flue. The flue opens ultimately into the furnace flue from the lecture table.

A still on a separate fire is placed on the left of the furnace.

Manchester.

There are, in the Manchester Grammar School, two distinct chemical laboratories : the old one, in which the laboratory and lecture room are conjoined ; and the new one, in which they are separated. Both these laboratories are comprised in one large building, occupying the site of the original grammar school built by Hugh Oldham. The arrangements of the two laboratories are thus described by Mr. Francis Jones :

The Old Laboratory and Lecture Room.—This laboratory was fitted up in 1868, and was previously one of the ordinary school-rooms. The lecture table separates the laboratory from the lecture seats and desks. Cupboards on either side, and others fixed to the wall, contain the apparatus used during lectures, as well as the solutions and solid substances given to the boys for analysis. Above the lecture table, a glass cupboard, connected with a good draught, serves to contain any apparatus evolving unpleasant or poisonous odours. The remaining portion of the room is fitted up as a laboratory. It is arranged to accommodate 30 boys, each of whom is provided with a cupboard for apparatus, and with a set of re-agents, which are placed on shelves fixed to the top of the table. Gas and water taps are fixed at convenient distances along the table, and there are sinks for waste water. A draught cupboard for general use is placed at the end of the double table in the middle of the room, and behind it is a stove which is used for warming the room as well as for heating crucibles, etc. Ventilation is provided for by means of small windows, and also by a flue above the large gas burners used for lighting the room. The cost of this laboratory and lecture room was £350.

The New Laboratory and Lecture Room.—When the increasing size of the Grammar School required the erection of new buildings the old school (a building 93 feet long by 28 broad) was converted into the present laboratory; the alterations were completed in 1871. The laboratory consists of four rooms: the lecture room, the laboratory, the balance room, and the sulphuretted hydrogen room.

The lecture room is 32 feet long by 24 feet broad, and has seats and desks constructed for 76 boys, but capable of accommodating 90 without inconvenience. These seats rise tier above tier so as to command a good view of the experiments performed at the table. The lecture table is well supplied with gas and water taps, and has likewise binding screws fixed in it, connected with wires which pass along the floor to the galvanic battery, which is placed in the draught cupboard behind the table. By this means space is saved on the table and the fumes arising from the battery are kept out of the room. The draught cupboard, which is well seen from the seats, is constructed as far as possible of glass, and is used for all experiments which give rise to unpleasant odours. The apparatus used for the lectures is contained in seven cupboards, two of which are close to the lecture table, and the remaining five are in the gallery. The windows are all provided with sliding shutters which can be very rapidly closed; they are made of blackened wood and exclude daylight completely. By this means the room can be perfectly darkened in one minute for the performance of experiments which require the absence of daylight.

The laboratory is 48 feet long by 24 feet broad, and is provided with four working tables, the centre one being double. These tables are provided with eighty-four cupboards and drawers, which contain the apparatus belonging to the boys. The drawer is so connected with the cupboard that one key suffices to lock both.

The common re-agents are placed in shelves at the back of each table, and special re-agents are placed in suitable parts of the laboratory for general use. There are nineteen water-taps and basins, and near them, at convenient distances, are the gas taps, of which there are forty. The cupboards at the end of the laboratory contain the substances given to the boys for analysis, and also the stock of re agents for filling the smaller bottles on the shelves. A draught cupboard similar to the one already described is placed beside the re-agent cupboards. In the gallery are five more cupboards containing various chemicals and apparatus.

Although the laboratory contains cupboards for eighty-four boys, the number working at one time never exceeds forty, each of whom is provided with a Bunsen lamp, a retort stand, and set of chemical re-agents. With these exceptions, each boy provides his own apparatus.

The balances are contained in a small well-lighted room at the end of the laboratory. It contains two fine Oertling's balances, and a smaller one for less exact weighings. The library of the Philosophical Society connected with the school is also kept in this room.

The corresponding room to the balance room, on the opposite side of the laboratory, is fitted up with three large draught cupboards for the use of the boys. In this room all experiments with sulphuretted hydrogen, chlorine, and other injurious gases are performed.

The laboratory is used chiefly by the three science forms, the highest two of which work in it six hours weekly, and attend besides two lectures on chemistry. The boys of the lowest science form attend one lecture weekly, and work in the laboratory for two hours. The boys of the highest mathematical form in the school work one hour weekly at practical chemistry; and two of the modern language forms devote three hours weekly to chemistry, the time being equally divided between lecture and laboratory work.

The cost of the two laboratories, with the fittings, has been £990.

The following suggestions as to the amount of space requisite and the arrangements for chemical laboratories have been made by the Science and Art Department, and published in the 'Science Directory,' for the information of committees of schools who propose to erect buildings or to convert existing buildings to school use. It is expressly stated that they are to be considered merely as suggestions, and not as absolute rules to be followed implicitly under all circumstances; still, as suggestions merely, they have been considered so valuable that they are appended with the accompanying plans:—

1. *Laboratory for 20 Students.*

"A room about 35 ft. by 19 ft., 16 ft. high to ceiling (or collar beam), lighted by windows on both sides and, if possible, a skylight, and fitted up with working benches. The method of arranging these benches must depend upon the special circumstances of the case, but, when possible, a very convenient way is to arrange them in groups of four along the side walls. Each working space should be 3 ft. by 6 in., which would make each group 7 ft. by 5 ft., and in a room of the above dimensions a passage of 5 ft. (which might, however, be reduced to 4 ft.) would be left down the middle of the room between the ends of the benches, and about 6 ft. would be left in the clear between the benches. Five groups of benches would accommodate the twenty students. Three groups would be on one side of the room, and the benches of the third group might be made a little longer to give more room to advanced students. On the other side of the room would be two groups of benches, and opposite the third group of the first side would be a space for sand bath, steam apparatus, gas furnaces, etc.

"In each wall space between the benches should be a closet about 16 in. by 9 in. and 2 ft. high for sulphuretted hydrogen. The closet should have a flue which may be made of 2 in. drain pipe carried up in the wall, and the draught maintained in it by a small gas jet, or if there be a good upcast shaft from furnaces in the basement these flues may be led into it.

"Another way of arranging these closets, which has been found to answer where there is a good upcast shaft, is to construct them of wood and put one on each working bench, a wooden tube carried along the top of the bench to the wall, and thence along the wall forming the flue from it to the shaft. In this case it would probably be found better to arrange the benches together, and have the passage down one side of the room instead of the centre.

"Each worker should have gas laid on to his space; one sink and water tap between two is sufficient, or one sink with two taps, in the centre of each group of benches, except for the advanced students, for each of whom it will be well to provide a sink and a double tap.

"A room about 14 by 12 ft. should be provided for balances and other delicate apparatus. This might also serve as an office for the professor.

"There would, doubtless, in the same school be other classes, in which case a lecture theatre would be provided for general use. In close proximity to this should be a preparation room fitted with working table, gas furnaces, steam apparatus, etc., to enable the professor to prepare for his lectures. A good flue will here be necessary to remove noxious gases, etc., and it might serve also for the lecture room.

"The laboratory would be best placed either under a separate roof from the other class rooms, or in the top storey of a building, of which the ground floor would give space for the other class rooms, and the basement would contain the heating apparatus, washing and cloak rooms, metallurgical furnaces, and space for any other work which from its nature could not be carried on in the general laboratory."

2. *Laboratory for 50 Students.*

"A laboratory about 50ft by 19ft should be provided for 30 elementary students. This should be fitted with working benches, etc., as the laboratory described above.

"A second laboratory about 36ft by 22ft 6in, or 43ft by 19, should be provided for 20 advanced students.

"Each advanced student should have a space 4ft 6in by 2ft 6in, with a sink, double water tap, two gas jets, and if possible a sulphuretted hydrogen closet to himself.

"There should be a steam closet, sand bath, gas furnaces, etc., as in the other laboratory.

"A balance room should be provided in close proximity to the advanced laboratory.

"An operation room should be provided. This may be with the furnaces, etc., in the basement.

"In a school of this size it would probably be found advisable to provide a private laboratory for the professor. A room about 12ft by 16 would be sufficient. It should be fitted with working table, steam closet, gas furnaces, etc.

"A chemical library would also be very desirable. This might be kept in the same room as the balances.

"To save space, one of these laboratories might be constructed above the other, ; but it is better to have nothing over a laboratory, so that there may be skylights and ample means of clearing out noxious gases."

In every case the verbal description of the laboratory is amply illustrated by plans.

Conviction under the Sale of Food and Drugs Act for Refusing to Sell.

T. Sheppard, cheesemonger, of High Street, Borough, has been summoned by an inspector of St. Saviour's District Board of Works, under the new Food Act, sec. 17, which sets forth, "That if any officer or constable, employed by any vestry, or any legal authority, shall apply to purchase any article of food, or any drug exposed for sale, or on sale by retail on any premises, or in any shop or stores, and shall tender the price for the quantity which he shall require for the purpose of analysis, not being more than shall be reasonably requisite, and the person exposing the same for sale shall refuse to sell the same to such officer, he shall be liable to a penalty not exceeding 20*l*."

The inspector said that on November 5 he sent one of his men into defendant's shop to purchase half a pound of butter and a half a pound of lard. As he was a long time in the shop witness went in to see the cause of his delay, when he saw Barker supplied with the butter. Witness told him to make haste with the lard, when the shopman took a bladder of lard, and as he was about to cut it the foreman came and spoke to him, when he put that bladder on one side and fetched another. Witness demanded to be supplied from the first bladder, which had been cut into, and tendered a florin in payment for half a pound. The foreman refused to let him have it saying, "He's a new shopman, and does not know you so well as I do." Witness asked if he knew him, when the foreman replied "Yes; you are Errington, the inspector under the Adulteration Act." Witness then told him he should summon him for refusing to serve him.

The magistrate (Mr. Benson) fined the defendant 5*l*. and costs.—*Sanitary Record.*

Review.

Medicinal Plants: being Descriptions, with Original Figures of the Principal Plants employed in Medicine and an Account of their Properties and Uses. By Robert Bentley, F.L.S., and Henry Trimen, M.B., F.L.S. London: J. and A. Churchill. 1875.

It is now forty-three years since the publication in this country of the last illustrated work on medical plants; and a work which should represent the present state of medical botany has for some years past been felt to be a desideratum.

Numerous changes in materia medica have taken place since 1832; many new drugs have been added to the Pharmacopœia, and others have been expunged from it. Some of the plants yielding drugs introduced since that date have not been figured either in Stephenson and Churchill's or Woodville's 'Medical Botany,' which have until now been the standard works on the subject in this country.

The present work on medicinal plants has consequently been anticipated with a great degree of interest. It is now being issued in parts, each containing eight plates, or seven only when one of the plates is of double size, and is intended to illustrate the medicinal plants of the British, Indian, and United States Pharmacopœias, many of the medicinal plants employed in different parts of Europe, and others in common use, although not official in this country. These materials will be sufficient for a work of reference of considerable value and extent.

Each plate is accompanied by a full botanical description of the plant and its natural habitat, in plain scientific language, and also remarks upon the part used in medicine, and upon its properties and uses. To these descriptions are appended numerous references to standard works on botany and materia medica.

Each plate, with its accompanying description, is complete in itself, and is separately numbered, so that although the parts are issued without any apparent regularity, yet when the work is complete, and the numbers are placed in their natural sequence, the plants will be found to follow one another in exactly the same order as they are usually arranged in works on systematic botany. This arrangement will be a very great convenience. Hitherto the plates in most works on medicinal plants have been arranged without any regularity whatever, and it has been a matter of considerable difficulty to find the figure of the plant of which one might happen to be in search. In the present work this annoyance will be entirely obviated, and reference to any plant will be greatly facilitated.

At present three numbers of the work have been issued, containing in all 26 plates, two of these being of double size. Seven out of this number have not been figured in the latest standard works on this subject published in this country; and one (*Stillingia sylvatica*), an American medicinal plant, has never been figured before.

The colouring of the plates, although in some cases scarcely what might be considered absolute perfection, will bear very favourable comparison with that of the other two works above alluded so. The glaring brightness of colour now so much in vogue in paintings of flowers has been avoided, and a somewhat nearer approximation to nature has been the result. But, considering the strides that have been made in pictorial art during the last forty years, there is still, we think, room for the exercise of greater artistic skill in the colouring of the plates in future numbers. With regard to the drawings, however, we cannot too highly praise their accuracy and fidelity to nature. Any one previously unacquainted with the plants, could not fail, with the aid of the figures in this work, to recognize them when seen in the fresh state, and those who have not had the advantage of the help of a practical botanist will find the magnified representations of the more minute parts of the plants of great assistance, both when examining the plants, and when studying the structure of various seeds and fruits used in materia medica. Each figure has been drawn, when possible, from living specimens, and when it has been impossible to procure the plant in the fresh state, recourse has been had to authentic specimens in the British Museum.

The particular source of the specimen from which the drawing has been taken is mentioned in every case, and the scientific value of the drawings is consequently much enhanced.

The portion devoted to materia medica does not appear to have been so carefully revised as the botanical part. Thus the melting point of cacao butter is mentioned as 122° F., and the information concerning the medicinal uses of the American drugs, such as Sanguinaria and Stillingia, scarcely represents the way in which they are commonly used in that country. This is doubtless the result of oversight; the high reputation of the authors in their own particular branches of botanical science is a sufficient guarantee that the work will be carried out with the greatest possible care and accuracy.

The work might perhaps be rendered more useful if figures of the leaves, etc., used to adulterate various drugs, such as Digitalis or Senna, were given and their distinguishing characters pointed out in the text, and we think also that the section of the root of the plant when the root is the official part is just as worthy of illustration as a section of the seed, while such figures would greatly increase the value of the work to all students of materia medica.

The fact that Indian and American medicinal plants are also figured in this work will render it of considerable value to medical men residing in those countries; and so far as it is possible to judge from the three parts at present issued, we unhesitatingly state that the work promises to take a high position, and in fact to become the standard work on the subject in all English speaking countries.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Dyeing and Calico Printing: including an Account of the most recent Improvements in the Manufacture and Use of Aniline Colours. By the late Dr. F. Crace-Calvert, F.R.S., F.C.S. Edited by John Stenhouse, LL.D., F.R.S., and Charles Edward Groves, F.C.S. Manchester: Palmer and Howe; London: Simpkin and Marshall. 1876.

Obituary.

Notice has been received of the death of the following:—

On the 5th of December, 1875, Mr. William Lewin, Pharmaceutical Chemist, of Whimple Street, Plymouth. Aged 75 years. Mr. Lewin was one of the founders of the Pharmaceutical Society.

On the 6th of December, 1875, Mr. William Fingland, Chemist and Druggist, of Thornhill, Dumfriesshire. Aged 55 years.

The following journals have been received:—The 'British Medical Journal,' Dec. 4; the 'Medical Times and Gazette,' Dec. 4; the 'Lancet,' Dec. 4; the 'London Medical Record,' Dec. 4; 'Medical Press and Circular, Dec. 4; 'Nature,' Dec. 4; 'Chemical News,' Dec. 4; 'Gardeners' Chronicle,' Dec. 4; the 'Grocer,' Dec. 4; 'Journal of the Society of Arts,' Dec. 4; 'Grocery News,' Dec. 4; 'Produce Markets Review,' Dec. 4; 'Pharmaceutische Zeitung,' for Dec. 1 and 4, ; 'Sanitary Record,' Dec. 4.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Title of Pharmaceutical Chemist.

Sir,—In the last number of the *Chemist and Druggist* appears what purports to be the scheme of examination proposed by the new Dublin board for the qualification of "Pharmaceutical Chemist." Probably the regulations contained in it formed the basis of the discussion at the last Council meeting, and of the letter which the Secretary had most properly addressed to the Secretary of the Irish Society, and I can only account for the fact that they have been partially before the public for two or three weeks without awakening a storm of indignant protest to their not having as yet been officially promulgated. Their non-appearance in our Journal until last week is probably due to the same reason. But it was not to be supposed that the editor of the *Chemist and Druggist* would print details so circumstantial without good grounds; and it is not only possible, but probable, that after official publication it may be too late to obtain any substantial amendment.

Some months ago Mr. Reynolds, of Leeds, criticized the conduct of the Council in allowing the title of "Pharmaceutical Chemist"—the birthright of our Society—to be surrendered without any adequate steps being taken to retain it as the possession of those whose labours had given it its value, and his letter had the sympathy of every member of the Society outside the Council itself.

But was there not a distinct engagement on the part of Sir Michael Hicks-Beach that nothing should be done in connection with the Irish Act that would lower the educational significance of the title "Pharmaceutical Chemist," or render it of less value than as hitherto secured by the English examinations? Whether there be in Ireland one grade in pharmacy or two is a matter of small consequence to us, but it is of vital importance—Mr. Hampson's views of reciprocity notwithstanding—that the title in one part of the kingdom should not mean less than the same title in the other, and this is what it was supposed by outsiders had been secured.

One did not expect much from the unseemly Hibernian anomaly of a Pharmaceutical board composed of non-pharmaceutical persons, but those who were present at the Conference at Bristol in August last, and heard the fervid assurances of their representative, as to the high scientific standard that was to form their minimum requirement, could hardly be prepared for a programme that English students would be only too glad to accept for their Minor Examination.

Henry B. Brady.

Newcastle-on-Tyne, Dec. 6, 1875.

Sir,—I have read the discussion of the Council at their last meeting on the Irish pharmacy question, and think that the main point has been entirely overlooked.

The question for us to consider is, has the Chief Secretary fulfilled what he promised to the deputation of the British Society?

When the deputation waited on him after the introduction of the Bill he made it distinctly understood that the examination in Ireland for the title Pharmaceutical Chemist would be at least equal to that in Great Britain, and that it was mere supposition on the part of the deputation that it would be less; and it was on that understanding chiefly that the Society withdrew its opposition.

When the examination regulations are officially printed in the *Dublin Gazette* the Council should carefully consider if the promise has been faithfully kept.

I think that every Pharmaceutical Chemist will consider it "an act of glaring injustice and spoliation" if another society is empowered to give the title by so easy an examination as that published in your last number, and at half the cost.

Mr. Hampson looks at the question as if reciprocity was never entertained, whereas the Chief Secretary says that the principal reason for one title is to ensure reciprocity. The latter is fatal in the opinion of most of the British members.

I trust that the Society will zealously look after what has been its "honorary" title for nearly a quarter of a century, and what was denied the chemists and druggists of Great Britain, by modified examination in the compulsory examination act of 1868.

PHARMACEUTICAL CHEMIST.

CANVASSING FOR THE BENEVOLENT FUND ELECTION.

Sir,—I have great pleasure in acknowledging the very accurate report of my remarks in reference to canvassing in connection with our Benevolent Fund in last week's Journal.

It was asserted by some members of the Council that if canvassing of voters by the candidates were discountenanced and as a consequence discontinued it would be prejudicial to the interests of the fund, or in the language of the speakers it would be "suicidal," and "would take all the heart out of the Benevolent Fund." In reply to this (such a result, however, I cannot think possible) I believe I suggested that a more copious list of deserving cases might be prepared and sent to the members and subscribers, so that their sympathies and contributions would be more likely to be evoked by evidence of the existence of an amount of destitution of which they were unaware.

The Council does from time to time appeal to the members of our trade in behalf of the Benevolent Fund by means of circulars and advertisements, and surely this should be sufficient, rather than expecting the destitute and friendless candidates to keep up the interest in the fund by means of canvassing cards, etc.

In selecting the candidates to be placed on the list for annuities the number would be limited only by the funds available for granting pensions, and such list would, as hitherto, be formed of the most deserving cases, with a moderate excess over and above the number of pensioners to be elected, so that the voters might exercise their judgment as to the relative merits of the candidates.

Before closing this communication may I be allowed very respectfully to take exception to a remark in your leader in last week's publication? You say, "subscribers naturally desire to be asked for the votes they are entitled to give." Now, sir, I feel it very difficult to believe that either the subscribers, members, or associates, do entertain such a desire, and it seems to me so thoroughly foreign to the meaning of the word charity in its popular sense that I hope the quotation was simply a *lapsus pennæ*. Subscribers to our charity do not, so far as my knowledge extends, demand or expect a *quid pro quo* to such an extent as is above indicated, and I feel assured that if such a motive were ascribed to them individually the great majority would without a moment's hesitation repudiate the imputation.

The exercise of the voting privilege I desire to maintain, as it is quite consistent with the interest in and augmentation of the fund and also with its important and effective administration, and as you are aware, the Council at its last meeting sanctioned an extension of the voting power, believing that this action would be conducive to an increase in our resources.

The canvassing, however, which entails such an amount of anxiety, labour, and wasteful expenditure on the part of the poor candidates will, I hope, sooner or later be numbered with the things of the past.

JOHN SHAW.

Liverpool, December 7, 1875.

THE PROPOSED ALTERATION IN THE EXAMINATION FEES.

Sir,—Will you allow me to make a few remarks relative to the letter of "Pharmacist," and Mr. Williams's proposition for an alteration of the examination fees?

The reason "Pharmacist" affirms which renders the proposed course advisable is, that it is necessary for the future pecuniary support of the Pharmaceutical Society; but the interests of those most concerned, viz., those who have the examinations yet to pass, seem to be entirely ignored or overlooked. As the scale of examination fees now stands there is no just cause for complaint; but to increase the fee for the "Minor" from three guineas to five, lays the burden of removing any impecuniosity into which "Pharmacist" fears the Pharmaceutical Society may fall upon those the majority of whom do not and will not as yet receive any direct benefit from the Society; these are for the most part young men occupying the position of junior assistants, and out of a junior assistant's salary have to pay their examination expenses which do not commence with the examination fee.

With regard to the proposition, the course it proposes certainly seems unusual and undignified: unusual, for as far as I know it is not the usual practice of examining bodies to charge a higher fee for an examination of the second class than that of the first class; and undignified if the Pharmaceutical Society should adopt such a plan to support their funds, and that because they cannot offer sufficient advantages to induce all or any considerable proportion of those who have passed the "Minor," because compelled, to be voluntarily at the further expense and exertion of obtaining the increased qualification of the "Major." At the root of this the Pharmaceutical Society are striking by their stated policy of "raising the status of the trade," which cannot be said yet to have reached its correct status so long as in the eyes of the public "Associate of the Pharmaceutical Society is quite as good as or rather better than Pharmaceutical Chemist."

ADOLESCENS.

FEES FOR ANALYSES AT SOMERSET HOUSE.

Sir,—I am requested by the Committee of the National Chamber of Trade to forward you a copy of the reply which has been received from the Board of Inland Revenue in answer to an application for the scale of charges for analysing samples referred to them; and at the same time to say that they gladly observe that the statement recently made at the Wandsworth police court that the expense of a reference to the chemical authorities at Somerset House "was likely to be heavy" is without foundation.

They further gather from the reply that it is the desire of the Government to give all reasonable facilities for the examination of samples referred to the Inland Revenue authorities, as it appears that the less difficult analyses, such as milk, cocoa, mustard, etc., may be obtained at a small cost.

FRED. MORRISON, *Secretary.*

The National Chamber of Trade,
446, Strand, W.C., December 4, 1874.

[Copy].

"Inland Revenue, Somerset House, London, W.C.,
"30th November, 1875.

"Sir,—I have laid your letter of the 8th instant before the Board, and in reply I am desired to say that the charge to be made by this department for the examination of samples of food, etc., would depend upon the nature of the article to be analysed, but it would in no case exceed 21*s*.

"I am, sir, your obedient Servant,
"ADAM YOUNG, *Secretary.*

"The Secretary,
"The National Chamber of Trade."

J. C. Thresh.—The description sent is too incomplete to enable us to make even a guess as to what "supposed alkaloid" is meant, and a reference to the blue list throws no light upon the matter. Please supply further information, including the name of the material from which the doubtful alkaloid is alleged to have been isolated.

"An Inquirer."—Follow the directions given in Attfield's 'Manual,' or any elementary work on analytical chemistry.

E. K. George.—As the preparation is recommended for the relief or cure of disease a stamp would be required.

F. P. B.—Section 27 of the Pharmacy Act, 1868, provides that it shall not extend to Ireland.

J. Higgins.—*Cheap Hair Oil Scent.*—Try the following.—

Ol. Lavandulæ	16 parts.
Ol. Rosmarini	16 ,,
Ol. Cassiæ	2 ,,
Ol. Caryophylli	4 ,,

Figitum.—Although sherry wine might undoubtedly be replaced by proof spirit in making vin. ipecac. and vin. colchici, and water in making vin. antim. pot. tart., the products would not be so generally acceptable to the public, by whom two at least of them are used as domestic remedies. Sherry is a good vehicle in these cases, and water in the one in which it is suggested is not. If such new formulæ were adopted the probability is that the old and approved preparations would still be demanded and used.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. D. B. Sharp, Mr. Howie, Mr. Burt, H. R., "Oxycinchonia," "Jalapina," "Master."

GELSEMIUM SEMPERVIRENS.

BY E. M. HOLMES,

Curator of the Museum of the Pharmaceutical Society.

Since the issue of the last United States' Pharmacopœia this drug has been gradually coming into use in this country. It is one which is undoubtedly possessed of powerful medicinal properties, and which in large doses occasionally proves fatal. It is, therefore, one which merits attention. The literature of the drug is rather extensive, but is scattered throughout numerous journals, chiefly in America. In this country comparatively little has been published concerning it; hence, a *résumé* of what has been done in this subject and a comparison of the various published formulæ for preparations of the drug may be found useful.

History.—*Gelsemium sempervirens* was first brought into notice by the Eclectic practitioners. Its properties were discovered by an accident which is thus narrated in the 'Eclectic Dispensatory':—"A planter of Mississippi having suffered much from an attack of bilious fever which resisted the usual medicines employed in such cases, requested one of his servants to obtain from the garden a certain root, from which he intended to make an infusion for drinking. By mistake the person collected a different root and administered the tea to his master, who soon after taking it was seized with a complete loss of muscular power, being, in fact, so far prostrated that he was unable to move a limb or to raise the eyelids, yet he could hear and could appreciate what was occurring around him. After some hours, during which his friends were watching him with much anxiety and little hope, he gradually recovered his muscular control, and was astonished to find that the fever had left him. Having ascertained from his servant what plant he had collected, he subsequently employed it on his own plantation as well as amongst his neighbours. The history becoming known to a quack physician, he prepared from the plant a 'patent medicine' called the 'Electrical Febrifuge,' in which it was disguised by oil of wintergreen."[*]

It was first brought into notice in the *American Journal of Pharmacy*, in 1852, by Professor W. Procter, but does not appear to have been sufficiently well known or esteemed in 1855 for introduction into the United States' Pharmacopœia published in that year. In the subsequent edition of that work, published in 1864, it appeared in the secondary list, and in 1873 it was considered of sufficient importance to be placed in the primary list of materia medica.

Gelsemium is, therefore, a medicine of comparatively recent introduction, which has gradually but surely won its way into public favour.

Botanical description, etc.—This plant has received several scientific names, and is at the present day placed in different natural orders by different authorities on systematic botany. Its synonyms are here placed in their historical order:—

Anonymus sempervirens, Walt.
Bignonia sempervirens, Linn.
Lisianthus sempervirens, Mill.
Gelsemium nitidum, Mich, 1803.
Gelsemium sempervirens, Pers.
Gelseminum sempervirens, Ait.
Gelsemium lucidum, Poir.

By De Candolle it is placed among the *Loganiaceæ*; by Decaisne, in the *Apocynaceæ*; by Chapman in the *Rubiaceæ*. Other authors formerly placed it in the *Scrophulariaceæ*, *Bignoniaceæ* and *Gentianaceæ*. It will readily be understood from this that it has affinity with several natural orders. De Candolle, in his 'Prodromus,' ix., p. 24, makes the following remarks:—"Gelsemium appears to differ from the *Apocynaceæ* as well as from the *Gentianaceæ* in its quincuncial æstivation, 4 lobed stigma, and the hilum at the edge of the seed; from the *Bignoniaceæ* in the presence of albumen, indistinct endopleura, elongated and inferior radicle, and in the short cotyledons slightly emarginate at the apex; from the *Fraxineæ* in the pentamerous flowers, numerous ovules and other points."

In the United States' Pharmacopœia the name *Gelsemium sempervirens* is adopted, and Gray's 'Manual of Botany' is the authority referred to. Hence the description of the plant by Gray is here quoted:—

Gelsemium sempervirens, Pers.: *Calyx* 5-parted; *corolla* funnel shaped, 5-lobed, somewhat oblique, the lobes almost equal, the posterior being outermost in bud; *stamens* 5; *anthers* oblong, sagittate; *style* long and slender; *stigmas* 2, each 2-parted, the divisions being linear; *fruit* elliptical, flattened contrary to the narrow partition, 2-celled, septicidally 2-valved, the valves keeled; *seeds* 5—6 in each cell, large, flat and winged, embryo straight in fleshy albumen, the ovate flat cotyledons much shorter than the slender radicle; *stem* smooth, twining and shrubby; *leaves* opposite, entire, ovate or lanceolate, shining, on short petioles, nearly persistent; *flowers* large, showy, very fragrant, yellow, 1—5 together in the axils of the leaves.

The plant is commonly known in America as the yellow, wild, or Carolina jessamine, and also as woodbine. It grows wild on rich clay soil near small streams along the sea coast from Virginia to the South of Florida. In Florida it flowers in March, but further north not until May or June. The pedicels underneath the flowers are covered with a number of small imbricated bracts.

The generic names Gelsemium and Gelseminum are often used indiscriminately, and thus confusion and doubt as to the plant spoken of are caused. The name Gelseminum was formerly used for the white jessamine (*Jasminum officinale*, L.), a plant belonging to a different natural order.

The name Gelsemium is preferable for this reason, and also because it is the name adopted in the United States' Pharmacopœia. It is, also, the one generally accepted by botanists in this country.

The plant is not a true jessamine, and it is rather unfortunate that it should be often called the yellow jessamine in America, since there is a true jessamine with yellow flowers which is often found in cultivation. The danger of using the same English name for different plants is exemplified in the fact that in the *American Journal of Pharmacy*, 1855, p. 198, a description of the true yellow jessamine (*Jasminum fruticans*, L.) is quoted from Jay's 'Botany,' as referring to the *Gelsemium sempervirens*. If the name jessamine be applied to *Gelsemium sempervirens* at all, it should be carefully distinguished as the Carolina jessamine. The flowers have much more the shape of those of a convolvulus, being distinctly funnel-shaped, not hypocrateriform, as in the *Jasminum officinale*. A small wood cut of the plant is given in the *American Journal of Pharmacy*, 1855, p. 197, and I understand it will be figured in the work by Bentley and Trimen on 'Medicinal Plants,' which is now being issued in monthly parts.

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[*] 'Eclectic Dispensatory,' p. 186.

The following account of the habit and manner of growth of the plant, by Dr. Hiram H. Hill, of Cincinnati, is extracted from the 'American Dispensatory,' and will serve to throw some light upon the drug as it occurs in commerce:—

> "The length of the Gelsemium root, as met with in clay soil, is from three to ten feet, and on the Magnolia ridges and along small streams I have traced some roots to the extent of thirty feet, although the average length is about fifteen. Like the roots of many other vines [*i.e.*, climbing shrubs] it is branching, with scattered fibres, and *runs horizontally near the surface of the ground*, sometimes merely under the leaves, *for several feet*. When first pulled up it is very yellow, and has a peculiar odour like that of the tincture, with a bitter, rather pleasant taste. The vine is of a green colour, and always runs to the top of the tree or bush on which it fastens, and then branches out, covering the topmost branches with its thick foliage. I have seen it on trees that were fifty feet in height, and the size of the vine was the same near the top as at the ground; its general length is from twenty to thirty feet. *The bark of the vine is full of a silk-like fibre*, which is not found in other vines that I have seen. On old vines the leaves are about 1½ inches in length, of a dark green colour, lance-shaped, and on short foot-stalks; on young vines or shoots they are longer, and four or five inches apart, while on the old ones they are very close, and always opposite."

Dr. Hill also speaks of a vine, the root of which is sometimes gathered by mistake for that of Gelsemium. This plant, which is known as the white poison vine, or white jessamine, he thus distinguishes:—

> "The bark of the stem is covered with white specks or marks, similar to those on young cherry or peach limbs, and is also more brittle; the lower parts of the stem become rough, and have small tendrils that fasten upon the bark of trees, which are never seen in the gelsemium; the leaves are on *long* footstalks, which are opposite, at the end of which are two opposite leaves, very similar in appearance to those of *Aristolochia serpentaria*. The flowers, which I have never seen, are said to be dirty white, resembling the others in shape, and have a slight unpleasant odour, by no means like that of Gelsemium. The root is almost white, straight, very tough, brittle when dry, not so fibrous as the true root, and has a slightly bitter, disagreeable, nauseating taste."

In the next portion of this paper I propose to describe the characters of the part of the plant official in the United States' Pharmacopœia, and to illustrate it with engravings.

(*To be continued.*)

ESTIMATION OF FERROUS CARBONATE IN FERRI CARBONAS SACCHARATA.

BY W. L. HOWIE.

The B.P. process for estimating dyad iron in ferri carbonas saccharata, in which hydrochloric acid is ordered for effecting the solution, seems open to the objection that it misleads by over indicating the amount; this being caused by the presence of the sugar, which seems not to have been taken into account in the calculations of some writers on the subject.

Having found in another connection that sugar in presence of phosphoric acid at ordinary temperatures (under 15° C.) has not the same power of reducing the bichromate, and therefore does not then exert the usual disturbing influence in the estimation of dyad iron, I would suggest the substitution of phosphoric acid for hydrochloric in such estimations.

Two grammes of ferri carbonas saccharata dissolved with hydrochloric acid required 18 c.c. of volumetric bichromate for conversion. The same quantity dissolved in phosphoric acid sp. gr. 1·5 and diluted with water took only 16 c.c. As a parallel test, two grammes ferri phosphas, B.P., dissolved with hydrochloric acid, took 27 c.c. of the bichromate solution. The same plus two grammes of sugar took 29 c.c., showing an increase of 2 c.c. on account of the sugar; the readings, however, were not quite constant in different experiments, temperature and rapidity of manipulation influencing the result to the extent of 5 c.c. By substituting phosphoric acid, sp. gr. 1·5, for hydrochloric in a repetition of these experiments, the burette reading was in each case 27 c.c.

The percentage of ferrous carbonate equivalent to 22 c.c.[*] of volumetric bichromate is 38·28; the British Pharmacopœia states that it should form "at least 37[*] per cent. of the mixture," while as shown by this process the true percentage of $FeCO_3$ in ferri carbonas saccharata indicated by 22 c.c. of the bichromate solution cannot exceed 34·8.

Phosphoric acid is more suitable than hydrochloric for estimations of this nature, because of the comparative slowness with which it inverts sugar at ordinary temperatures.

Edinburgh.

QUINICINE AND CINCHONICINE.[†]

BY O. HESSE.

It is generally known that the crystallizable alkaloids in genuine cinchona barks are accompanied by amorphous basic substances, concerning the nature of which great uncertainty exists. Whilst D. Howard has stated[‡] that this basic mass is an individual substance isomeric with quinicine, and De Vrij has referred[§] to the difference which exists between the neutral oxalates of these two bases in their behaviour to chloroform, the author has not only found indications that lead to the conclusion that the basic substance is not homogeneous,[||] but is also unable to hold the opinion that it may contain quinicine, and under conditions cinchonicine, which cannot be recognized in consequence of mixture with other substances. Although a close examination of quinicine and cinchonicine was made by D. Howard, the author did not think it sufficiently exhaustive, and therefore undertook a fresh investigation, the results of which are given in the paper from which the following details are taken.

1. PREPARATION AND CHEMICAL RELATION OF QUINICINE AND CINCHONICINE.

Quinicine.

Quinine bisulphate is especially suited to the preparation of this alkaloid. It gives up at 100° C. its water of crystallization without melting. If then the finely powdered anhydrous salt be heated to melting, which occurs at about 135° C., it is converted without any change in weight into its isomer quinicine bisulphate. Precisely the same product of melting results under similar conditions from quinidine* bisulphate. In either case, if only about 5 grams, finely divided, be spread upon a flat dish, the conversion is effected in a few minutes.

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[*] The B.P. figures corrected.

[†] From the *Annalen der Chemie*, vol. clxxviii. p. 244.

[‡] *Pharm. Journ.* [3], vol. ii. p. 765.

[§] *Pharm. Journ.* [3], vol. iv. p. 589.

[||] *Annalen*, vol. clxvi. p. 274.

The quinicine may be purified by dissolving the brownish yellow fused mass in a little water, heating it and afterwards neutralizing with ammonia. After two or three days, or less, the neutral quinicine sulphate crystallizes from the concentrated solution, forming almost a solid mass. After removal of the mother liquid by pressure, it is recrystallized from chloroform containing alcohol. But it is preferable to precipitate the alkaloid from the aqueous solution of the fusion by ammonia, then to dissolve it in ether, and combine it with oxalic acid. When the solution of this compound is neutralized with ammonia, or care is taken not to use too much acid at first, the neutral quinicine oxalate crystallizes from it at once. This is drained from the mother liquor, dried in the air or in an exsiccator, and then recrystallized, once from boiling chloroform and once from alcohol of 97 per cent. by volume.

The salt is then precipitated with caustic soda, the alkaloid taken up with ether, and the colourless solution washed and evaporated in an exsiccator; the alkaloid remains behind as a faintly yellowish amorphous mass. It retains ether and some water very persistently, but the greater portion of these substances may be removed in the exsiccator by stirring frequently with a glass tube, so as to continually expose a fresh surface.

As soon as the weight remained constant, some quinicine, so prepared, was placed in a partial vacuum (430 m.m.) at a temperature of 62° C.; 1·007 gram then lost in the course of 30 hours 0·015 of its weight. As the substance had now acquired a faint red colour in some places, a portion of it was heated in the air to 140° C., without loss of weight, although it became brown coloured; therefore the alkaloid dried at 62° C., contained no more water.

It was of especial importance to ascertain the percentage composition of this substance; for, on the one hand, Herapath† has maintained that quinicine probably originated from quinine and quinidine by the removal of water, whilst on the other hand, Howard considers it, after drying in vacuo, to be a hydrate ($C_{20}H_{24}N_2O_2 + H_2O$). 0·275 gram of the substance dried at 62° C. gave 0·7475 CO_2, and 0·1835 H_2O. This result shows that the above assertions are groundless, as it agrees very closely with the formula $C_{20}H_{24}N_2O_2$, which

	Requires		Obtained
C_{20} . . .	240	74·07	74·12
H_{24} . . .	24	7·41	7·41
N_2 . . .	28	8·64	—
O_2 . . .	32	9·88	—
	324	100·00	

At low temperatures quinicine becomes gradually hard; at the ordinary temperature it softens into a dense mass; at 62° C. it melts and gradually takes a red brown colour. This latter reaction occurs very rapidly at 100° C., without any perceptible change of weight. At 130° to 140° C., quinicine is changed to a quinoidine like substance, and then partly to a red substance that in many respects no longer presents the properties of quinicine; for instance, it is more difficult to obtain from it the crystallized quinicine oxalate.

Quinicine has a bitter taste and basic reaction in alcoholic solution, and readily takes carbonic acid from the air. The alcoholic solution is coloured green upon the addition of chlorine water and excess of ammonia, less intensely so, however, than a solution of quinine or conchinine under similar conditions. But it especially differs from these two bases by giving when dissolved in weak hydrochloric acid, a white amorphous precipitate upon the addition of Labarraque's liquor, or solution of chloride of lime. If the quinicine solution used be very acid, the precipitate is not formed until after the neutralization of a certain portion of the acid by the reagent added. Ammonia colours the precipitate yellowish-green. This reaction also occurs in a nitric acid solution, if the solution be not warmed. If it is, red vapour is evolved, and the solution after cooling, gives with chloride of lime solution a precipitate that is coloured brown by ammonia. The solution of quinicine in dilute sulphuric acid is yellow, and, as noticed by Howard, is not fluorescent.

Quinicine is readily soluble in alcohol, chloroform, or ether, less so in water. If, therefore, an aqueous solution of one of its salts be mixed with an excess of ammonia or caustic soda, the alkaloid is thrown as an oily mass to the bottom of the vessel. But the action of ammonia is extremely imperfect, the simultaneously formed ammonia salt exercising a solvent action upon the precipitated alkaloid. In every case ether removes the alkaloid from the basic solution.

This reaction of quinicine can be utilized in order to separate it from quinoidine and its compounds; for instance, the so-called amorphous quinine sulphate and hydrochlorate. But a not inconsiderable portion of the quinicine is carried down with the resinous precipitate caused by ammonia, of the large quantity of other amorphous substances which the varieties of quinoidine contain.

Quinicine forms with acids generally well crystallizable salts which are very light-yellow or reddish coloured. Of these compounds the following were examined by the author:—

Acid sulphate of quinicine is obtained immediately by heating quinine or quinidine bisulphate. If the fused mass be dissolved in a little water, the bisulphate gradually crystallizes out in long yellow stellate-grouped prisms, which are extremely soluble in water or alcohol.

Neutral sulphate of quinicine crystallizes from 97 per cent. alcohol in slender reddish-white prisms, which on drying in the air shrink up into a shapeless mass that by trituration yields a faintly reddish coloured powder. It dissolves very easily in water and in boiling alcohol, and crystallizes from the latter on cooling. Pure chloroform dissolves very little even when boiling, but chloroform containing alcohol is a good solvent for the salt. Its aqueous solution gives no precipitate with Rochelle salt. Analysis of the salt, crystallized from alcohol and air dried (probably effloresced), gave figures corresponding to the formula, $2\,C_{20}H_{24}N_2O_2,SH_2O_4 + 3\,H_2O$.

The sulphate obtained from a mixture of chloroform and alcohol, contained a considerable quantity of water of crystallization, of which it quickly gave up a part to the air. A very slightly effloresced preparation gave 15·33 per cent. of water at 100°C. The author is therefore of opinion that the entirely uneffloresced salt may be represented by $2\,C_{20}H_{24}N_2O_2,SH_2O_4 + 8\,H_2O$, which requires 16·18 per cent of water.

Neutral oxalate of quinicine forms small white slender prisms if crystallized from hot chloroform, or long scarcely yellow-coloured very thin needles if obtained from a hot saturated alcoholic solution. From water it is obtained in yellowish prisms. It dissolves freely in boiling, and slightly in cold water (at 16° C., 1 in 257 parts). Pure boiling chloroform dissolves it, as already noticed by De Vrij, very readily, and deposits it again almost entirely upon cooling. A mixture of chloroform and alcohol (2 vols. of chloroform and 1 of 97 per cent. alcohol) takes it up freely in the cold. It enters into no combination with chloroform. At about 95° C. it cakes together, and gives up its water of crystallization; it then becomes solid, and melts at 149° C. to a yellow brown liquid, which soon becomes dark brown. Whether crystallized from water, alcohol, or chloroform, it always has the same composition, corresponding to the formula, $2\,C_{20}H_{24}N_2O_2, C_2H_2O_4 + 9\,H_2O$. In the author's experiments, seven molecules of this water appear to have been given off in the exsiccator, and the other two at 100°C. These results agree with those obtained by Howard.

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* This is the alkaloid to which the author gives the name of "Conchinin."—ED. PHARM. JOURN.

† *Journ. f. prakt. Chemie*, vol. lxxiv, p. 415.

Hydriodate of Quinicine is obtained in handsome crystals from a hot aqueous solution of quinicine oxalate and potassium iodide, and may be purified by recrystallization from water. It forms slender yellowish needles, which are easily soluble in water, alcohol, and chloroform. If potassium iodide be added to an aqueous solution, it is precipitated at first as an oily mass, which afterwards becomes solid if much iodide be added at one time, or in crystals if the addition be made gradually. It melts below 100° C. to a yellowish brown mass. Analysis of this salt gave results corresponding to the formula $C_{20}H_{24}N_2O_2,HI+H_2O$. If the oxalate used be imperfectly purified, the hydriodate is obtained as a semi-crystalline mass.

Sulphocyanate of Quinicine is obtained by mixing a warm aqueous solution of quinicine oxalate with a solution of potassium sulphocyanate. It crystallizes in long, almost white, prisms, which are easily soluble in chloroform and alcohol, and fairly soluble in water also, but insoluble in a solution of potassium sulphocyanate. So complete is the precipitation of quinicine from its aqueous solution by excess of potassium sulphocyanate that no more can be detected in the supernatant liquor with soda. By the use of a large excess of potassium sulphocyanate the salt is first precipitated as an oily mass, which after some time solidifies. Analysis of the salt indicated the formula $C_{20}H_{24}N_2O_2, HCNS+\frac{1}{2}H_2O$.

Hydrochlorate of Quinicine and Mercury.—The hydrochloric acid solution of quinicine gives upon the addition of solution of mercuric chloride a yellowish white flocculent precipitate. This dissolves easily in hydrochloric acid, partially in cold, readily in hot water, and crystallizes from the latter solution upon cooling in small pale yellow needles, which form wart-like groups.

Hydrochlorate of Quinicine and Gold.—Solution of gold produces in an aqueous solution of quinicine hydrochlorate a beautiful yellow flocculent precipitate, which upon warming the solution partially runs together and partially dissolves. Upon cooling the solution the dissolved salt is again precipitated in flocks.

Hydrochlorate of Quinicine and Platinum.—A strongly acidified and slightly warmed aqueous solution of quinicine hydrochlorate acquires a milky turbidity on the addition of platinum solution, and eventually deposits the platinum double salt in small dark orange yellow needles forming wart-like groups. If the precipitation be effected in a slightly acid solution, and in the cold, the precipitate is at first pale yellow and flocculent, but afterwards changes partly to darker groups of crystals.

Analysis of the air-dried salt, obtained from the strongly acid solution, gave results corresponding with the formula $C_{20}H_{24}N_2O_2, 2\,HCl+PtCl_4+2\,H_2O$. The salt obtained from a feebly acid solution gave less platinum and less water, owing apparently to its admixture with a small quantity of a yellow flocculent substance, probably a basic platinum salt. Howard describes the salt of platinum and quinicine as anhydrous—evidently, the author thinks, because the water of the salt escaped him, the greater portion of it being very readily given off.

Cinchonicine.

Cinchonicine was prepared by the author in the same way as quinicine. At the starting point of the investigation cinchonidine bisulphate, which had been rendered anhydrous in the exsiccator, was selected. This melted at 130° C., and was by this means changed to cinchonicine bisulphate without the least change in its weight.

Cinchonine was comparatively more difficult to deal with, inasmuch as the bisulphate was difficult to crystallize. The author therefore took a weighed quantity of cinchonine and decomposed it with a molecule of sulphuric acid, evaporated the solution to dryness, and finally heated the residue to 100° C., until the weight was constant. The substance was somewhat coloured but remained essentially cinchonine salt. The temperature was raised to 130° C., and continued (about one hour) until no more cinchonine was present. The mass became rather brown coloured, but was nevertheless mainly cinchonicine salt.

When 5 to 10 grams of cinchonidine salt were used, the conversion into cinchonicine salt took place in a few minutes.

In both cases the fused mass was dissolved in water, the solution supersaturated with ammonia and shaken with ether, the ether evaporated in the exsiccator, and from the residue the neutral oxalate prepared, which crystallized after a time. The crystals were drained, dried and recrystallized from pure boiling chloroform, and then again from water.

From the neutral oxalate the cinchonicine was obtained by mixing it with caustic lime or soda and taking up the precipitated alkaloid with absolute ether. Upon evaporation of the colourless ethereal solution the cinchonicine remained as a faintly yellowish coloured amorphous body. This was dried in a similar way to the quinicine. After drying in the exsiccator until the weight remained constant, it was heated in a partial vacuum to 62° C., which caused a small loss consisting essentially of some remaining ether. A sample heated to 110° C., suffered no further loss of weight.

With respect to the composition of cinchonicine, similar doubts have been expressed by Herapath and Howard as with quinicine. The analytical results obtained by the author, however, do not, he considers, confirm these doubts, 0·253 gram dried in a partial vacuum at 62° C. gave 0·7225 CO_2 and 0·176 H_2O.

	$C_{20}H_{24}N_2O$ requires		Found.
C_{20}	240	77·92	77·88
H_{24} . . .	24	7.79	7·73
N_2	28	9·09	—
O	16	5·20	—
	308	100·00	

This result shows that cinchonicine has the same composition as cinchonidine and cinchonine, and in the free state forms no hydrate.

Cinchonicine appears as a faintly yellowish viscous substance, which can be drawn out into colourless threads. It readily liquefies at about 50° C.; at 80° C. it is coloured brown, and finally forms a dark brown substance, similar in colour to quinoidine, especially if the temperature be raised to 100° C., or higher. Upon cooling it remains soft. It dissolves easily in alcohol, ether, chloroform, acetone, and benzol. Its solution in alcohol has a bitter taste and a strong basic reaction, perfectly neutralizing acids. Nevertheless, solutions in acids prepared with the free alkaloid are generally yellowish, or even brown, if the alkaloid be heated in the air. On the other hand the purified oxalate forms a perfectly colourless solution in acids.

Chlorine and ammonia give no colour with cinchonicine. If the hydrochloric acid solution of cinchonicine be mixed with solution of chloride of lime, or Labarraque's solution, a white flocculent resinous precipitate is formed, which is not coloured by ammonia. Neither cinchonine nor cinchonidine in a weak acid solution gives a precipitate with Labarraque's solution; in this they are distinguished from cinchonicine. If cinchonicine be heated with concentrated nitric acid, red vapour is immediately evolved in considerable quantity, the alkaloid being decomposed. In sulphuric acid solution, cinchonicine reduces solution of potassium permanganate, at least as quickly as cinchonine; no cinchotenin, however, is thus formed, but a resinous substance which is soluble in acids. This is probably identical with Marchand's cinchonetin. Cinchonicine is not essentially changed by long continued boiling in dilute sulphuric acid (1 to 4 of water).

Cinchonicine dissolves more freely than quinicine in water. Caustic soda mixed with an aqueous solution of its salts, causes a milky turbidity, and eventually the precipitation of the alkaloid. Ammonia behaves with it similarly, the alkaloid, however, being incompletely precipitated. Ammonia salts promote the solubility of cinchonicine in water; in this respect it completely resembles quinicine.

The following cinchonicine salts were prepared by the author:—

Neutral Oxalate of Cinchonicine.—When crystallized from chloroform or water, this salt forms small slender white prisms, often interlacing one another, and much resembling fungoid thread (mycelium). It dissolves very readily in alcohol, boiling chloroform, and boiling water, less freely in cold chloroform, and in about 80 parts of water at 16° C. The hot aqueous solution on cooling remains supersaturated. This salt also dissolves very easily in a mixture of chloroform and alcohol. The oxalate lost some of its water of crystallization at the ordinary temperature in the exsiccator, and the remainder at 100°, without colouring or melting, no more water being given off at a higher temperature. Analysis gave results corresponding with the formula $2\ C_{20}H_{24}N_2O, C_2H_2O_4+4\ H_2O$. Howard attributed to this salt $7\ H_2O$; but the above experiments made with some oxalate prepared by Howard, and supplied by De Vrij for comparison, have convinced the author that Howard's salt also crystallized with 4 molecules of water of crystallization.

Hydriodate of Cinchonicine.—If a little potassium iodide solution be mixed with an aqueous solution of cinchonicine oxalate, the hydriodate crystallizes out immediately. The hydriodate of cinchonicine is a crystalline powder, at first white and afterwards yellow, consisting of short thick prisms. It is moderately soluble in cold and freely soluble in hot water. Boiling alcohol takes it up very readily, and upon cooling deposits a great portion of it in handsome prisms. It is extremely difficultly soluble in potassium iodide solution. The author thinks that it has sometimes been confounded with quinidine hydriodate. The cinchonicine hydriodate is anhydrous, and is represented by $C_{20}H_{24}N_2O,HI$.

Sulphocyanate of Cinchonicine.—The aqueous solution of cinchonicine oxalate gives with solution of potassium sulphocyanate a milky turbidity, which upon the addition of more potassium salt again disappears. The latter reaction appears to be due to the water added with the solution of potassium sulphocyanate. Cinchonicine sulphocyanate cannot therefore be precipitated by excess of potassium sulphocyanate solution.

Mercuric chloride salt.—Cinchonicine dissolved in hydrochloric acid gives upon the addition of solution of mercuric chloride a milky turbidity, and eventually an oily precipitate. The salt dissolves easily in hydrochloric acid and water, especially by heating, and appears not to be capable of crystallization.

Hydrochlorate of Cinchonicine and Gold is obtained as a yellow oily precipitate by a mixture of hydrochlorate of cinchonicine with gold chloride, after at first causing a milky turbidity of the solution. The gold salt dissolves slightly in hot water from which it is again deposited on cooling as an oily substance. After some time the oily drops become opaque, and appear to solidify. No reduction of the metallic chloride is caused by heating.

Hydrochlorate of Cinchonicine and Platinum.—Hydrochlorate of cinchonicine in slightly acidified solution gives in the cold upon the addition of platinic chloride a yellowish white precipitate, which changes into a light yellow crystalline powder. If the solution be warmed, at first a milky turbidity is caused by the addition of the platinum solution, followed afterwards by a flocculent precipitation of the platinum salt. Analysis of the air-dried substance gave results which the author considers to correspond with the formula $3(C_{20}H_{24}N_2O, HCl)+2\ PtCl_4+4H_2O$.

	Required	Found.	
Pt . . .	22·09	22·03	22·87
$4H_2O$ . .	40·4	4·53	4·04

From the platinum salt of amorphous cinchonine, *i.e.*, unpurified cinchonicine, Winckler obtained 22·5 to 23·5 per cent. of platinum; it appears, therefore, that this compound is easily obtained. Howard does not mention this, but states that the cinchonicine platinum salt corresponds in composition with the formula $C_{20}H_{24}N_2O, 2\ HCl+PtCl_4$.

If, however, the precipitation is effected in a strongly acid solution this compound is obtained with one molecule of water, corresponding to the formula $C_{20}H_{24}N_2O, 2\ HCl+PtCl_4+H_2O$. At first it forms an amorphous light yellow flocculent precipitate, but is soon changed into a heavy deep orange red crystalline powder.

II. THE BEHAVIOUR OF SOLUTIONS OF QUINICINE AND CINCHONICINE TO POLARIZED LIGHT.

Quinicine, like Cinchonicine, rotates a ray of polarized light to the right, but less strongly relatively than quinidine as compared with cinchonine. Pasteur is of opinion, that in quinidine and cinchonidine two optically active atom groups exist, one of which deviates the light faintly and the other strongly towards the right, and that in quinine and cinchonidine the latter group is substituted by a corresponding one rotating strongly to the left. He further considers that by the action of heat these strongly active groups through rearrangement become optically inactive, the newly formed molecule being then only able to rotate the polarized ray slightly to the right. Howard has since pointed out that the rotatory power of these changed products probably agrees with the mean of the rotatory power of the respective original substances. For the testing of these views the author made the following experiments, the temperature in all cases being 15°C.

Quinicine.

The substance obtained from quinine and quinidine was dissolved in chloroform. Then $p=2$, $l=220$, and α was found $=+1·194°$, which gave for $\alpha_D=+44·1°$. The arithmetical mean for a chloroform solution and an equal quantity of both original substances amounted to $+56°$; the difference being 11·9°

With the oxalate $(2\ C_{20}H_{24}N_2O_2,C_2H_2O_4+9\ H_2O)$ the following results were obtained:—

Origin of Substance.	Solvent	p.	l.	$\alpha=+$	$\alpha_D=+$
Quinidine .	Chloroform mixture. .	1	220	0·43	19·54
Quinidine .	Chloroform mixture. .	2	200	0·74	18·54
Quinine .	Chloroform mixture. .	2	220	0·80	18·18
Quinidine .	Chloroform mixture. .	3	200	1·03	17·17
Quinidine .	Water . . .	2	220	0·42	9·54
Quinine .	Water . . .	2	220	0·42	9·54
Quinine and Quinidine	Water and 2 mol. H_2SO_4	2	200	0·62	15·54

The rotatory power of this salt dissolved in a mixture of chloroform and alcohol may be represented by the formula—

$$\alpha_D \quad = \quad + \quad 20·68 \quad - \quad 1·14\,p.$$

Former experiments, under the same conditions, with quinine oxalate $(C_{20}H_{24}N_2O_2, C_2H_2O_4+6\ H_2O)$ led to the formula—

$$\alpha_D \quad = \quad (141·58-0·58\,p);$$

and for quinidine oxalate $(2\ C_{20}H_{24}N_2O_2, C_2H_2O_4+H_2O)$—

$$\alpha_D \quad = \quad + \quad 189 \quad - \quad 2·18\,p.$$

From which may be calculated, when the alkaloids are combined with oxalic acid, for

I. Quinine . . α_D = — $(184\cdot84 - 0\cdot76\,p)$.
II. Quinidine . α_D = + $220\cdot34 - 2\cdot54\,p)$.
III. Quinicine . α_D = + $28\cdot99 - 1\cdot60\,p)$.

If now $p=2$, the arithmetical mean of I. and II. is $+15\cdot97°$, whilst III. gives $\alpha_D = +25\cdot79°$, the difference being 9·82.

This difference, however, is diminished by the use of an acid solution, and can under certain conditions disappear. This occurs for instance with the oxalates in aqueous solution containing 2 molecules of sulphuric acid, arranged so that one contained 2 *p*. of quinicine, whilst the others contained equivalent quantities of the oxalates compared with it. Under these conditions the experiment gave for—

Quinicine . . α_D = + 21·83°
Quinine . . α_D = — 278·81° } Mean = + 21·88°.
Quinidine . . α_D = + 322·58° }

Cinchonicine.

The free alkaloid was obtained partly from cinchonidine and partly from cinchonine. It gave for the solution in 95 per cent. alcohol, $p=1$, $l=100$, $\alpha_D = +0\cdot48°$ or $\alpha_D = +48°$; for the chloroform solution, $p=2$, $l=200$, $\alpha = +1\cdot86°$, or $\alpha_D = +46\cdot6°$.

The respective original substances in 95 per cent. alcohol give a mean of + 56°. Unfortunately a solution cannot be obtained containing 2 *p* of cinchonine. Oudemans obtained with a chloroform solution of cinchonine at 17° C., containing 0·4 to 0·5 *p*, $\alpha_D + 212°$. If it be assumed that the diminution in the rotatory power of cinchonine for 1 *p* of substance is about 1·3° (as is the case with the chloroform and alcohol mixtures) the rotatory power of cinchonine in chloroform may be estimated in round numbers at 210°. Upon the basis of this figure the mean of the rotatory power of cinchonine and cinchonidine in chloroform would be + 63·57. The difference here then would be 18·07°.

With the cinchonicine oxalate ($C_{20}H_{24}N_2O,C_2H_2O_4 + 3\,H_2O$) the following results were obtained:—

Origin of substance.	Solvent.	*p*.	l.	$\alpha = +$	$\alpha_D = +$
Cinchonidine.	Chloroform mixture.	1	220	0·51	23·18
Cinchonidine.	Chloroform mixture.	2	200	0·92	23·00
Cinchonine .	Chloroform mixture.	2	200	0·94	23·50
Cinchonidine.	Chloroform mixture.	3	200	1·36	22·67
Cinchonidine.	Water . .	2	200	0·90	22·50
Cinchonine .	Water . .	2	200	0·91	22·75
Cinchonine & Cinchonidine	97 per cent. alcohol	2	200	0·94	23·50
Cinchonine & Cinchonidine	Water and 2 mol. H_2SO_4	2	200	1·03	25·75

The cinchonicine oxalate consequently under these conditions exhibits very little difference in rotatory power. The average of the four experiments with the chloroform mixture can, therefore, probably be accepted as α_D. This would give for cinchonicine $\alpha_D = +29\cdot11°$.

But under similar conditions, with 2 *p* of alkaloid, the result with—

Cinchonine . . . α_D = + 197·47°
Cinchonidine . . α_D = – 130·39°

$$\text{Mean} \;.\;.\;.\;.\;.\; \frac{67\cdot08}{2} = +33\cdot54°$$

In the experiments with acidified aqueous solutions, equal quantities of cinchonine and cinchonidine were used in the form of oxalate to correspond with 2 *p* of cinchonicine oxalate, the results with a solution containing 2 molecules of sulphuric acid were—

Cinchonicine . . $\alpha_D = +521\cdot52°$
Cinchonine. . . $\alpha_D = +258\cdot78°$ } Mean = + 41·7°
Cinchonidine . . $\alpha_D = +175\cdot38°$ }

Important differences are therefore met with in nearly all the experiments between the rotatory power of the product and the mean of those of the original substances. Under these considerations the author considers that Howard's hypothesis is not to be accepted.

III. CONCLUDING REMARKS.

So far as relates to the formulæ of the two substances quinicine and cinchonicine, the author's experiments point respectively to $C_{20}H_{24}N_2O_2$ and $C_{20}H_{24}N_2O$. He finds no obstacle to the conclusion that these bases are polymers of the respective original substances. Such polymerizations have been assumed with some opium bases, without, he believes, adequate grounds. In his opinion these different isomeric products, both from the opium bases and the cinchona alkaloids, may result from the fact that in the complex atoms yielded by Nature there exist several groups of atoms, which under diverse influences, either of Nature herself or in the laboratoıy, undergo a rearrangement.

In the present case the author considers the experiments make it very probable that the crystallizable cinchona bases in question contain two atom groups, one of which, the optically strongly active group, under the influence of moderate heat and in certain combinations, easily undergoes a re-arrangement. The change is of such a kind that this atom-group in its new form is either, according to Pasteur, optically inactive, or that, as the author believes he may conclude from his experiments, it rotates faintly to the right. He considers it possible that under the further influence of heat or other conditions the other atom-group also may undergo a change, and thus originate the isomer which is met with in quinoidine; though it is quite conceivable that in the life process of the plant an arrangement of the molecule takes place other than that we can effect artificially.

It is noteworthy that the changed molecules, as they occur in quinicine and cinchonicine, are more active with re-agents than the original substances. This appears in some measure to arise from an unloosing of the atoms.

The author has no doubt that the decomposition products obtained by Weidel[*] from cinchonine were partly, if not all, derivatives of cinchonicine, and that accordingly the structural formula which that author inferred from his interesting results, was not suited for that which it set forth. That cinchonicine has a different structure to cinchonine is especially evident from the fact that the former treated in sulphuric acid solution with solution of potassium permanganate gives an amorphous substance, but the latter under the same treatment gives the easily crystallizing cinchotenin. Upon this ground the author has, on another occasion, spoken of cinchotenin as a primary decomposition product of cinchonine, because it originates from cinchonine without a previous change of the latter into cinchonicine; whilst at least the majority of Weidel's decomposition products are to be considered as secondary products, in so far as proof cannot be produced that they are originate directly cinchonine.

The author promises a further communication upon the amorphous alkaloids of cinchona barks.

THE INFLUENCE OF DIATOMACEOUS GROWTHS ON WATER.

In the course of an address delivered last month before the Botanical Society of Edinburgh, Sir Robert Christison mentioned that he had been making an experiment to test the correctness of a former suggestion of his own' that diatomaceous growths exercise a purifying action upon water. The following is the account he gave, as reported in the *Gardeners' Chronicle*:—"Considering the slight peaty impregnation of the water of Loch Earn, it follows that the lake ought to support the life and growth of the green, slimy, confervoid, vegetable-looking matter which is met with in peaty water, attached to immersed stones near the edge, and which in some lakes, such as the now notorious St. Mary's Loch, constitutes, in the dried up, withered, bleached condition after long drought, what poets recognize as the "silver strand." At Loch Earn there are few stony beaches which are left dry in long droughts. But near Ardvorlich there is a suitable one, and there, accordingly, we have the green, slimy, confervoid growths on the stones within the water's edge, and fringing it outside a silvery band of stones thickly covered with the same matter, dried and blanched by long exposure to sun and air and occasional sprinkling with spray or scanty rain. While in the water the matter is seen to stream away from the stone in dark green branching tufts, which one would at once pronounce to be vegetable in nature. But on examining a portion microscopically, it is clearly seen to consist of nothing else than a few delicate cylinders, round which are interlaced numberless diatoms, consisting chiefly of spicular *Synedra splendida* with a good many ladder-like specimens of a *Tabellaria*, *Achnanthes*, and *Gomphonema*. The withered specimens present the same composition.

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[*] *Pharm. Journ.* [3], vol. iv., p. 957.

"Having these rather repulsive-looking, but really most curious and interesting, bodies at command in their living state, I was anxious to test by actual experiment the truth of a suggestion thrown out in my account of the waters of St. Mary's Loch and its effluent stream the Yarrow, given to the Royal Society three years ago—that the diatomaceous growths live upon the peaty matter in the water, and consequently abstract from it organic colouring matter and purify it. The length of time required for making a good experimental trial is so great that I could make only one; and it was not in all respects exactly comparative. But the result so far was that the fresh diatomaceous mass did not thrive in spring water, and was gradually broken off in small fragrants from the stone to which it was attached; while in the loch water, supplied from time to time with a little colourless spring water as it lost volume by evaporation, as also in a much stronger peaty water, the growing material throve better and did not break off nearly in such quantities, and the colour appeared less in five weeks. I cannot pledge myself, however, to the accuracy of this my first and only experiment."

JAPANESE LACQUER.

The following information respecting Japanese lacquer varnish and lacquer ware is taken from the last report of Mr. Robertson, Her Majesty's Consul at Kanagawa:—

"The groundwork of lacquer consists in the sap of the 'urushi' tree, the fruit of which produces the vegetable wax.* The Japanese distinguish between the male and the female tree, the former bearing no fruit. The trees attain to a height of from 36 to 42 feet. In those parts of the country where the trade in lacquer (I refer to the crude varnish, and not to the manufactured ware) is of any importance, the varnish is taken from the tree when it has attained to an age of from four to eight years. On attaining the latter full age the tree is cut down. Where the tree is cultivated for the sake of the wax, the sap is not extracted; and in Aidgu and Yonegawa, where the trees are specially reserved for wax, they will be seen to attain to no inconsiderable height.

"The urushi (lacquer varnish tree) is cultivated in two ways: either by sowing or by cuttings. In following the former the fruit of the tree is lightly pounded in a mortar, so as to remove the rind from the seed. These are then mixed with wood ashes, moistened with water, afterwards put into straw bags, over which liquid manure is poured, and the bags are then left to soak in water until the close of winter. Just before the commencement of spring, on a day duly noted in the Japanese farmers' almanac, the seed is sown broadcast over the ground, and slightly covered with earth. In respect to slips or cuttings, they are planted out in rows, and thinned as soon as a leaf or two appears. Sowings are, however, preferred, as it is found very difficult to rear from cuttings.

"The amount of varnish obtainable from any one tree depends on the vigour of the tree and the quality of the soil. A good vigorous 'urushi' will, after four or five years' growth, have a stem of about six inches in diameter. The sap is generally drawn off on the tree attaining its fifth or sixth year of growth, and this is done in the following manner:—A lateral incision is made with a knife in the trunk of the tree, and four days later the incision so made is punctured. The sap that exudes is then carefully removed with a small spatula, and put into a wooden jar. One incision is made at a time, commencing from the root upwards, and the trees are taken in turn. This is continued until each tree exhibits a series of cuts all up the trunk. The tree is afterwards felled. The drawing off of the sap is begun in the middle of summer, and continues to about the month of November. The very first and last sap drawn is not considered of good quality. The best is that which is drawn off late in the summer. From spring to summer the sap ascends the tree and afterwards descends. The expert is therefore guided by this fact as to where the incisions should be made. When the sap is descending in the trunk it is considered inferior. The bark of the larger trees being somewhat thick, the ordinary instrument in use sometimes fails to make the proper incision, in which case the bark is first removed prior to making the incision.

"The 'yamo urushi,' or wild varnish, grows plentifully, and in leaf and flower resembles closely the 'urushi,' but it meets with little attention, as its yield of sap is very small. There is also a species know as the 'tsuta urushi,' or ivy lacquer tree, which attaches itself to trees after the fashion of ivy, but yields even less sap than the wild lacquer tree. Lacquer is obtained largely in the eastern portion of the empire, but to no great extent in the western provinces. The provinces of Echizen, Yoshinô in Yamato, Aidgu, Yonegawa in Dewa, Saijô in Dewa, Yamagala, Namba, and Fukuoka in Oshiu, all send lacquer of excellent quality, but Echizen has always held, and continues to hold, the foremost rank for this product as a staple, although the choicest quality comes from Yoshinô in Yamato, and in any part of the empire where lacquer is obtainable, the labour of Echizen men is said to be at a premium, owing to their skill in extracting the sap. The market price of lacquer varnish is in Yokohama about 100 dollars per picul (133¾ lbs.). The wood of the urushi tree being exceptionally good, is applied to many uses, and notably to the making of floats for fishing nets.

"Japanese give the year A.D. 724 as the date when the art of lacquering was first discovered, but those amongst Japanese who have given attention to the subject fix the date at the year A.D. 889 or 900. It would appear to have attained to some perfection in the year 1290, for the name of a distinguished painter in lacquer who lived at that time is still handed down as the founder of a particular school of art in lacquer painting. From that time it developed until it attained its present perfection.

"The first thing is to trace out on the thinnest of paper the required pattern or design, and the tracing is then gone over with a composition of lacquer varnish and vermilion, afterwards laid on whatever it is proposed to impart the design to, such as the facing of a cabinet, or other piece of work, and well rubbed over with a bamboo spatula. On the removal of the paper the material below will be seen to have received the outline. This is now gone over with a particular kind of soft lacquer varnish. When this industry is pursued in hot weather the varnish speedily dries, and consequently, where the pattern is a good deal involved, such as one representing bunches of flowers or flocks of birds, a small portion only of the pattern is executed at one time, and the gold powder which enters largely into most of the lacquer ware for the foreign market is applied to each part as it is being executed. For this a large and very soft brush is used, and by its aid the gold powder is well rubbed in with the lacquer or varnish. The work is then left to dry for the space of about twenty-four hours, after which the pattern is lightly rubbed over with charcoal made from a particular wood, this process securing evenness of surface. The work is then rubbed with polishing powder, and afterwards carefully wiped. The above description simply applies to the mere outlining on any given surface or groundwork of figures of men, women, birds, flowers, etc. There still remains a good deal of finishing work, such as the tracing of leaves on trees, the petals of flowers, the wings of birds, etc., according to the particular subject in hand. Into all of these gold powder largely enters, the working in of which requires a light brush and skilful hand, so as to insure an even mixture of the powder and varnish. After this has well dried, a particular kind of lacquer varnish, known as 'yoshino urushi,' is well rubbed in, and the whole then polished with horn dust. The polishing process is done with the finger, and is continued until the gold glitter shows out well. A beautiful polish is said to be thus obtained. Briefly, then, the designing on lacquer ware is done thus: Supposing the subject to be a flower, it is traced out on the paper and imparted to the groundwork of wood. Gold powder is then sprinkled over the work from out of a bamboo tube, well rubbed in with a brush, and then allowed to dry, afterwards polished and a coating of varnish applied. This is repeated several times, until the work assumes a rust colour. The veins or tracery of the leaves are now marked out with lacquer varnish. Before this dries gold powder is again sprinkled over, and then well rubbed in with a brush. When the surface has dried, it is dubbed over with a piece of charcoal, so as to tone down any irregularities. After this it is polished, when the flower will appear in due form."

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* See vol. v., p. 584.

NOTES ON TARTARIC ACID.[*]

BY R. WARINGTON, F.C.S.

(*Continued from page 470.*)

The next plan tried in seeking for a direct estimation of tartaric acid was the exhaustion of the lees with hydrochloric acid. By this process solutions far purer were obtained than those yielded by carbonate of potassium. If, however, the lees are rich in bitartrate, strong hydrochloric acid must be employed, if it is wished to dissolve the salt in a small volume of fluid. The difficulty of washing bitartrate completely out of the residue is also much greater than the difficulty of washing out a neutral tartrate. The hydrochloric solution, when obtained, is also not available for the immediate determination of the tartaric acid in the form of bitartrate, but the lime present must be first removed with carbonate or oxalate of potassium. Though, therefore, the bitartrate finally obtained was very white and clean, the method was not satisfactory.

The method finally adopted was the decomposition of the lees with neutral oxalate of potassium. The details of the operation are as follows :—

A preliminary analysis by the alkalimetrical method C, reveals the character of the lees, if not already known, and enables the chemist to calculate approximately the amount of oxalate of potassium required to decompose the calcium salts. In this calculation the neutral tartrates found are reckoned as tartrate of calcium, and if the lees be Spanish, or otherwise from its low proportion of acid to neutral tartrate yields evidence of being plastered, 13 per cent. of gypsum is also assumed to be present.[*] Over and above the quantity of oxalic acid required by the calcium, a further amount of 1 gram should be added to insure the necessary excess. The oxalate of potassium is conveniently made by dissolving 40 grams of crystallized oxalic acid in hot water, neutralizing with carbonate of potassium, and diluting to 280 c.c. ; 7 c.c. then equal 1 gram of oxalic acid. The quantity of ground lees taken is such as will contain 2—2·5 grams of tartaric acid. The lees is placed in a small beaker, covered with water, and heated in a water-bath till thoroughly softened. The calculated volume of oxalate of potassium solution is next added, and the heating continued with frequent stirring for a quarter of an hour. The solution, which will, except in rare cases, be strongly acid, is now carefully treated with solution of caustic potash till almost neutral. If the lees or tartar operated on contains crystalline bitartrate it must be finely powdered before analysis, else the neutralization will be tedious, bitartrate being very little soluble in a solution containing potassium salts. After a short further heating the whole is ready for filtration : the bulk of the liquid at this point should not exceed 40 c.c. The lees residue is collected in a small vacuum-filter. The main filtrate is transferred to a small beaker, marked at 50 c.c. ; the residue is washed six times by means of the vacuum, and the washings after concentration on the water-bath are added to the main filtrate, which is then brought to 50 c.c.[†] Citric acid, about twice the quantity required to precipitate the tartaric acid (2 grams is sufficient in the case here assumed), is now added, either as strong solution or as crystal, and the solution stirred till precipitation is completed. After standing for 12 hours the precipitate of bitarate is collected on a small filter, and washed twice with a 5 per cent. solution of chloride of potassium, then twice with 50 per cent. spirit, and finally with strong spirit till the washings are no longer acid to tincture of litmus. The washing is best conducted on a vacuum-filter. The filter and precipitate are then removed to a beaker, and the amount of bitartrate present determined with standard alkali. The whole operation as here described occupies one day and a half.

If a strong solution of neutral oxalate of potassium is treated with excess of acid, a crystalline precipitate of acid oxalate of potassium is thrown down ; this precipitation does not occur in dilute solutions, or in the presence of sufficient citrate or acetate of potassium. As the test experiments show, no such precipitation occurs when the method is pursued as here described ; the use of a great excess of the oxalate must, however, be avoided.

If good tartar is analysed by this method, it is unnecessary to filter the neutral tartrate of potassium from the residue, but after the digestion with oxalate of potassium and neutralization, citric acid may at once be added to the cold solution. The precipitated bitartrate contains in this case a little vegetable matter, sand, and oxalate of calcium, but these will not affect the titration with standard alkali.

In all the test experiments made with pure bitartrate, or with tartrate of calcium, the whole of the tartaric acid was never absolutely recovered, owing chiefly to the partial solubility of the bitartrate of potassium finally obtained ; it is necessary therefore always to precipitate the bitartrate from the same bulk of liquor, and to wash it always in a uniform manner ; the correction derived from test experiments may then be transferred to the analysis of unknown materials. The correction to be used is best determined by each analyst for himself; the peculiarities of his mode of work are then allowed for. The correction I am in the habit of employing for lees is ·070 gram of tartaric acid; this is added to the quantity of tartaric acid found before calculating the percentage. If the quantity of lees taken is that already mentioned, this correction will represent about 3 per cent. of the tartaric acid found.

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[*] Abstract of a paper read before the Chemical Society (*Journ. Chem. Soc.*, vol. xiii., p 926).

[*] This figure is taken as being the highest percentage of gypsum I have found in Spanish lees.

[†] If the filtrate and washings were mixed and evaporated together, gelatinous matter, probably silica, would sometimes be deposited, and occasion trouble when filtering the bitartrate.

Analysis of Tartaric Acid Liquors.—The tartaric acid liquors of a factory which has been long in operation will contain far more impurity than the corresponding citric acid liquors. The mother liquors of the tartaric acid will in the case supposed contain a considerable amount of organic acid which is not tartaric, and they will hold in solution large quantities of alumina, potash, and phosphoric acid, with some oxide of iron, and of course a good deal of free sulphuric acid. As all the incombustible constituents can be readily determined in the ash by the usual methods, it is necessary to treat only of the determination of tartaric, free sulphuric, and total organic acids.

The direct determination of free tartaric acid may be effected by precipitation in the form of bitartrate of potassium; this is best done by the addition of a strong solution of acetate or citrate of potassium. It has already been seen that bitartrate of potassium is much less soluble in a solution of the chloride, sulphate, or nitrate of potassium than in the acetate or citrate, and at first sight the former salts would seem the more suitable as precipitants; but the greater insolubility of the bitartrate in these salts is more than counterbalanced by its easy solubility in their respective acids, which are set free immediately their potassium is precipitated as bitartrate. Acetate of potassium is probably the best reagent, but its use is limited to pure liquors, for when added to liquors containing phosphate of aluminium or iron, these are precipitated in a gelatinous form along with the bitartrate, and no accurate results can be obtained. Citrate of potassium is without this objection, the citric acid set free in the reaction holding the above-mentioned impurities in solution. The method which has been adopted is the following:—

A quantity of liquor containing 2—4 grams of tartaric acid, and of 30—40 c.c. in volume, is treated with a saturated solution of tripotassic citrate, added drop by drop with constant stirring. If free sulphuric acid is present, no precipitate is at first produced, but as soon as the sulphuric acid is satisfied, the bitartrate begins to appear in streaks on the sides of the vessel. When this is seen the remainder of the citrate is measured in to avoid an undue excess: 4 c.c. of a saturate solution of tripotassic citrate will be found sufficient to precipitate the maximum of 4 grams of tartaric acid supposed to be present. If the liquor contains a great deal of sulphuric acid, a fine precipitate of sulphate of potassium will precede the formation of bitartrate, but is easily distinguished from it. With liquors rich in sulphuric acid, it is advisable to stir the mixture occasionally for several hours after precipitation, to prevent the formation of large crystals. In the reaction between free tartaric acid and neutral citrate of potassium, only 1 equivalent of citric acid is set free for 2 equivalents* of tartaric acid precipitated. It may happen therefore that the free citric acid produced is insufficient to hold all the impurities in solution; if this is the case a gelatinous precipitate forms on the surface of the precipitated bitartrate. Should this occur, the experiment must be repeated with the previous addition of free citric acid. This case, however, seldom happens, as the free sulphuric acid in the tartaric liquor is generally sufficient to produce an abundance of free citric acid.

After standing for twelve hours, the precipitated bitartrate is collected on a small filter, washed two or three times with a 5 per cent. solution of potassium chloride, then with single washings of 50 per cent. and 70 per cent. alcohol, and finally with 80 – 90 per cent. alcohol till the washings are no longer acid to tincture of litmus. The gradual employment of the alcohol is to prevent the choking of the filter by the sudden precipitation of salts insoluble in that fluid. The filter with its washed precipitate is lastly transferred to a beaker, and the amount of bitartrate determined with standard alkali.

The perfect washing of the precipitate, and the sharpness of the final determination with alkali, depend on the absence of gelatinous phosphate of aluminium and iron. With tolerably pure liquors, two or three small washings with the chloride of potassium solution will suffice, but with impure liquors this washing must be continued a little longer, else the alcohol will precipitate gelatinous matter among the bitartrate. Any great use of the chloride of potassium solution should of course be avoided, as the precipitate is not entirely insoluble in this solution. The employment of a vacuum filter enables the precipitate to be thoroughly washed with a minimum of fluid.

Clean precipitates are more readily obtained when the washing is performed throughout with a cold saturate solution of bitartrate of potassium; the washing is in this case continued till the acidity of the drain-water is no greater than the acidity of the wash-water. If perfect accuracy is desired in this method, the washed filter must be weighed, and then dried and weighed again, to determine the amount of wash-water which it retains; the correction is, however, a very small one, and when ascertained once or twice may safely be assumed in similar determinations. The use of solution of bitartrate of potassium as a wash-water answers well if the precipitate contains no crystallized sulphate of potassium, but if sulphate of potassium be present the bitartrate in the wash-water is precipitated on the filter, and the results come out too high. With liquors containing much free sulphuric acid the precipitate is sure to contain a considerable amount of potassium sulphate.

A wash-water consisting of a 5 per cent. solution of chloride of potassium saturated with bitartrate possesses great advantages, and can be used when the precipitate contains sulphate of potassium; even alum may be successfully removed from precipitated bitartrate by its means.

The presence of alumina in a bitartrate precipitate is easily detected after titration, by boiling the solution with excess of phosphate of sodium and a little acetic acid; alumina if present is then thrown down as phosphate, tartrates having scarcely any power of keeping alumina in solution at a boiling heat, if excess of phosphoric acid is present. If a distinct quantity of alumina is found, a second determination of tartaric acid might be made, with the previous addition of phosphoric acid. Phosphoric acid cannot, however, be added to very bad liquors without giving rise to a gelatinous precipitate of phosphate of aluminium; in such cases the precipitate containing alum must be washed with the 5 per cent. chloride of potassium solution saturated with bitartrate, which has been already mentioned.

A rather considerable excess of citrate of potassium does not injure the result if free sulphuric acid were originally present; a very large excess will, however, diminish the precipitate, by increasing the solubility of the bitartrate. The acid citrate of potassium, thrown down by alcohol, noticed by Mr. Allen (*Chem. News*, xxxi., 278), is readily soluble in chloride of potassium solution.

Racemic acid, if present, will in this method be determined as tartaric acid. Inactive and metatartaric acid will only be partially precipitated, as their acid potassium salts are more soluble than normal bitartrate.

Oxalic acid does not apparently interfere with the results yielded by this method.

The determination of free sulphuric acid in tartaric acid liquors is not so simple as in the case of citric acid, owing to the tendency of tartaric acid to form insoluble potassium and calcium salts in presence of alcohol, and also from the occurrence of alum in some liquors. If a solution of sulphate of potassium in tartaric acid is poured into alcohol, bitartrate of potassium is at once precipitated, and the quantity of sulphuric acid in the filtrate is of course in excess of the free sulphuric acid originally present. If potash-alum is dissolved in tartaric acid and poured into alcohol, the precipitate is a mixture of bitartrate of potassium and alum, and the filtrate contains much sulphuric acid which was not originally free. If sulphate of calcium also is dissolved in tartaric acid, the addition of alcohol precipitates some tartrate of calcium along with the sulphate, occasioning the same error as above. These errors are removed as soon as the quantity of free sulphuric acid in the tartaric liquor reaches a certain point. Thus a solution of gypsum in tartaric acid, with a little free sulphuric acid, gave with alcohol a precipitate of pure sulphate of calcium. With sulphate of potassium, experiments were made with rising quantities of sulphuric acid, till the alcohol precipitate contained no bitartrate. Taking in every case 20 c.c. of liquor, containing 2 grams of tartaric acid and ·5 gram of sulphate of potassium, and dropping the solution, with constant stirring, into 100 c.c. of 90 per cent. alcohol, it was found that with ·64 gram of oil of vitriol, 46 per cent. of the potash was precipitated as bitartrate, but that when 1 gram of oil of vitriol was present, the amount of bitartrate in the precipitate was reduced to a trace, and with 1·25 gram, the precipitate after washing with alcohol was found to be perfectly neutral, and to consist entirely of sulphate of potassium.* Experiments with potash-alum gave a like result. With a small quantity of free sulphuric acid, the alcohol precipitate consisted of alum free from bitartrate, and the filtrate contained only a trace of alumina.

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* "Equivalent" is used in the sense of having the same neutralizing power, $2\overline{\mathrm{Ci}}''' = 3\overline{\mathrm{T}}''$; or by weight, 70 of crystallized citric acid equal 75 of crystallized tartaric acid.

It appears from these facts that the treatment of tartaric liquors with alcohol for the purpose of separating sulphates from free sulphuric acid, will lead to accurate results only when the free sulphuric acid reaches a certain amount, and that when this is not the case, the determination of free sulphuric acid will be too high. Practically, however, the error here described will be confined to the case of new liquors of bad quality.

The determination of free sulphuric acid is conducted as follows:—5—20 c.c. of the liquor is slowly dropped into 100 c.c. of 90 per cent. alcohol, stirring the whole time. If the liquor is concentrated, and of bad quality, it should be diluted with its own volume of water before being poured into the alcohol. The alcohol precipitate contains, besides sulphates, phosphate of aluminium, and other substances. After standing for twenty-four hours the solution is filtered, the precipitate washed with alcohol, and the filtrate and washings precipitated with an alcoholic solution of calcium chloride. If only a small excess of calcium chloride has been used, it is possible to determine the quantity of sulphate of calcium as directed in the case of citric acid liquors, but since tartaric acid is precipitated by calcium chloride in the presence of alcohol, it is safer not to do so. The sulphate of calcium-precipitate is therefore separated from the liquor by decantation or filtration, and without washing dissolved in dilute hydrochloric acid; the sulphuric acid is then precipitated from a hot, very dilute solution, with chloride of barium.

The total organic acids in tartaric acid liquors may sometimes be determined as in citric liquors, by subtracting the acidity of the free sulphuric acid from the total acidity of the liquor, but this method would generally lead to excessive results from the presence of acid phosphates, and of alum, which determine a part of the total acidity. The amount of total organic acid is better ascertained by exactly neutralizing the liquor with soda, evaporating to dryness, igniting the residue, and finally determining its neutralizing power with standard sulphuric acid and alkali. Both by this method, and by the preceding, the true weight of the organic acids present is undetermined, only their equivalence is ascertained; it is most convenient to express the result in terms of tartaric acid.

In the method last mentioned, the presence of aluminium, iron, and phosphoric acid may affect the result.

If tartaric acid is exactly neutralized with soda, and the resulting salt ignited, the amount of tartaric acid present may of course be accurately ascertained, either by the neutralizing power of the ash, or from the amount of carbonic acid it contains. If the tartaric acid contains alumina in solution, a smaller quantity of soda will be required for its neutralization than if the tartaric acid was pure; the whole of the tartaric acid will thus not be converted into disodic tartrate, and the carbonate of sodium resulting on ignition will be less than equivalent to the tartaric acid employed. If the tartaric acid contained phosphoric acid as well as alumina, the amount of soda necessary for neutralization will again be less (except, perhaps, when the phosphoric acid is in great excess) than that required by the tartaric acid and by the phosphate of aluminium if neutralized separately. In both cases the tartaric acid is either partially satisfied by the aluminium, or the later exists as a more acid salt than it would have done in the absence of tartaric acid. The deficient conversion of the tartaric acid into disodic tartaric, coupled with the decomposition of sodium carbonate during ignition with basic aluminium salts, is fatal to the determination of organic acids from the amount of carbonic acid present in the ignited sodium salt. The results of test-experiments by this method were always greatly below the truth. These facts are not, however, fatal to the alkalimetric method, if certain considerations are borne in mind.

If the ash of a neutralized solution of tartaric acid, containing alum, is entirely dissolved in sulphuric acid, the sulphate of aluminium will consume more alkali for its neutralization than it did when originally neutralized in the presence of tartaric acid, the alumina being now precipitated as a highly basic salt, while previously it was held in solution in combination with a greater quantity of acid; the tartaric acid calculated from such an analysis will consequently be below the truth. If, however, after dissolving the ash in standard sulphuric acid, we add a sufficient amount of neutral Rochelle salt to keep the alumina in solution during neutralization, we establish the same conditions as occurred in the original neutralization of the tartaric liquor; the alumina in each case consumes the same amount of alkali, and all that has been done is to replace an unknown quantity of organic acid by a known quantity of standard sulphuric acid; the equivalence of the organic acid is thus arrived at with perfect exactness.

When, as in ordinary tartaric liquors, phosphoric acid is present as well as alumina, the result by the alkalimetric method will also be too low if Rochelle salt is not employed. When, however, much phosphate of aluminium is present, it becomes impossible to neutralize the original liquor with soda without precipitating a part of the phosphate, and this is especially the case if excess of phosphoric acid be present (see the concluding section of this paper). Under these circumstances the addition of Rochelle salt to the solution of the ash equally fails to produce a permanent solution. Perfectly accurate results are obtainable only when the original liquor can be neutralized with soda without precipitation, and when, by addition of Rochelle salt, the final neutralization is also made without a precipitate. When circumstances do not admit of these conditions, the process is less accurate, though still the best the author is aware of. It is essential that the whole of the ash be dissolved in the standard acid; the ash must, therefore, be burnt nearly white that the fact of its solution may be ascertained. The standard sulphuric acid should be allowed to concentrate on the ash, it will then effect its solution in a few hours. When much phosphate is present it is well to pour off the first solution in acid, and act on the residue with a fresh portion. The Rochelle salt should be added to a cold, concentrated solution, heat and dilution diminish its solvent power.

(*To be continued.*)

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* Only neutral sulphate of potassium is precipitated when a solution of neutral sulphate and free sulphuric acid is dropped into alcohol.

The Pharmaceutical Journal.

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Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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PROSECUTION FOR THE ILLEGAL SALE OF SHEEP DIPPING COMPOSITION.

A CASE of some considerable interest to country members of the trade has just been tried at the Ludlow County Court last Wednesday, in which THOMAS TEAGUE, a beer-house keeper, was sued by the Pharmaceutical Society of Great Britain for a penalty of five pounds incurred under the Pharmacy Act, 1868, by the illegal sale of poison. From the evidence brought forward it appeared that the defendant was not on the Register of Chemists and Druggists and it was admitted that the sale complained of had been made by the defendant's daughter at his beer-shop. The article sold consisted of packets of a compound of arsenic and sulphur, each packet containing sufficient arsenic to poison over a hundred persons. It was also proved that the sale had been to a tailor who was a stranger at the place, and on asking for packets of sheep-dipping composition was supplied with them without any precaution whatever.

In reply to the charge the defendant asserted that he sold the packets as they had been supplied to him and bearing labels describing them as sheep-dipping composition; also that he had sold them in this way as an agent for the sale of sheep-dipping composition.

After a long hearing of the case, the Judge decided that the sale was contrary to the Act of Parliament, and accordingly judgment was given for the penalty sued for, with costs against the defendant.

In this case there was not even the semblance of a reason for the excuse, often made in similar instances, that the arsenical composition was really sold for agricultural purposes, and according to the evidence it was shown that no effort was made to ascertain the purpose for which it was required. Independently, therefore, of the fact that the seller was not entitled to sell poison in virtue of being on the Register of Chemists and Druggists, it is evident that the sale of such preparations in this manner affords very dangerous facilities for obtaining poisons for improper purposes. Not long ago the sale of vermin killers under similar conditions, by oilmen, grocers, and others, was found to give rise to a very large number of cases of poisoning, either by accident or with intent, and it was on this account deemed necessary not only to enforce the provisions of the Pharmacy Act as regards those illegal sales; but also to give additional stringency to the regulations for the sale of vermin killers by registered chemists and druggists. To judge from the facts of the case above mentioned, and others that have not as yet been brought into court, they would seem to indicate the necessity of similar measures in connection with the sale of arsenical sheep-dipping composition.

CAMPHOR POISONING.

A CORRESPONDENT sends us an account of a remarkable case of poisoning, the leading features of which are as follows, and they will serve to strengthen our suggestion that especial care should be exercised in the sale of camphor.

While some camphor was being weighed out, a lad of thirteen picked up two small pieces and took them away with him for the purpose of floating and burning them. Soon afterwards he began nibbling the camphor, and, as it afterwards appeared, liking the taste of it, continued to do so until he had eaten the two pieces. This was about four o'clock in the afternoon. Four hours afterwards the child was with his brother in the dispensary looking on, and was observed to do something which elicited the remark, "Are you dreaming?" No reply was given by the child, and it was noticed that something was wrong with him: his eyes were fixed in a stare, and he stood motionless and unconscious. His brother took him up to carry him into an adjoining room where his father was, when he immediately became convulsed and perfectly rigid, with his head and legs bent back, so that he could only be placed on his side upon the floor. The convulsions increased until the flesh from the head to the shoulders became purple and the pulse decreased rapidly until it could not be felt. The body then lost its rigidity and was apparently lifeless; but in about ten seconds the pulse could again be felt, the convulsions returned, and the child foamed at the mouth. Applications of cold water brought him round in about four minutes; violent vomiting then ensued; the child was for a time hysterical, but within an hour from the first attack he was so far recovered that he could be put to bed. The child afterwards described the pieces of camphor which he ate as being each half the size of his thumb, and the assistant who noticed him take one piece thought it must have been about sixty grains in weight. The effects produced in this case were more severe than in any of those previously reported, and there was the further difference that unconsciousness preceded the convulsions while in the other cases it followed them.

LEGACY TO THE BENEVOLENT FUND.

We are glad to make known that the Secretary of the Pharmaceutical Society has received a letter from the Executors of the late Mr. Barrington Garnham, pharmaceutical chemist, of Brighton, informing him of the bequest by Mr. Garnham of fifty pounds to the Benevolent Fund.

ACCIDENT IN A FRENCH PHARMACY.

L'Union Pharmaceutique reports a fatal accident in a pharmacy, which resembles very closely one recorded as occurring in France a few months since. The son of a pharmacist, who had been in the habit of taking several times a day a dose of cinchona wine, flavoured with syrup of bitter orange peel, took by mistake a dose from a bottle containing a first maceration of opium intended for the preparation of extract. Having remarked to his father that the cinchona wine was of a bad flavour, the latter was induced to examine it shortly afterwards for himself, when he recognized the odour and taste of opium. Emetics were used but unavailingly, the young man dying two hours afterwards.

AN UNEXPECTED RESULT OF ADVERTISING.

For the benefit of "impudent advertisers" of wonderful cures, the *Medical Times and Gazette* records a case which was decided a few days since in the Paris Palais de Justice. A homœopathic "doctor" who had submitted a lady suffering from an affection of the respiratory organs to a course of "Silphium Cyrenaicum," obtained results that to him were sufficient warrant for advertising them to the world. In his zeal for the public good, the "doctor" enlarged, in the advertisement, upon the gravity of the disease, intimating that it was one that might be transmitted to her children, and generally gave such full details that the identity of the lady was established sufficiently to cause numerous visits from persons desirous of satisfying themselves respecting the alleged marvellous cure. Unfortunately for the "doctor," the views of the lady's husband did not coincide with his as to the value of publicity. This difference was manifested by the husband bringing an action for damages against the "doctor," on the grounds that the publicity given to the case, by enlightening the patient as to the nature of her disease, might prove highly detrimental to her; that the future career of his children might be damaged by the public being made aware of their hereditary liabilities; and that the advertisement was a violation of the law on medical secrecy. Cruellest cut of all, it was denied that any amelioration of the disease had followed the use of the "silphium." The Court took the husband's view of the case, and condemned the "doctor" to pay a sum of 500 francs damages and costs.

IMPORTS OF DRUGS AND CHEMICALS INTO JAPAN.

Her Majesty's Consul at Kanagawa, Mr. Robertson, has recently called attention to the growing mount of drugs and chemicals imported into Japan. The trade during the year 1874 was very large, and many Japanese merchants are said to be now engaged in it. Iodide of potassium is imported to the extent of about 20,000 lbs. annually, the average price being four dollars per lb. The quinine imported amounts to about 60,000 ozs. annually; it is chiefly of French make, and is valued at two dollars per oz. Potash was imported in 1874, for use in the manufacture of soap and glass, and in dyeing and bleaching works, to the value of nearly twelve thousand dollars, being about three times the amount of the previous year. Mr. Robertson states that several preparations of mercury, extracts of various kinds, and herbs, seeds, roots, leaves, and barks in use among European nations; also such chemicals as soda, borax, ammonia, magnesia, chloride of lime and the corrosive acids, are now largely consumed by Japanese practitioners and manufacturers. On the other hand, Japan exports vegetable wax, camphor and ginseng, the latter, we presume, for the special benefit of China.

THE SPECIFIC GRAVITY OF PLATINUM AND IRIDIUM.

A note was last month presented to the French Academy by MM. Sainte-Claire Deville and H. Debray, giving the result of a research carried out by them as to the density of platinum and iridium. The investigation was one of considerable difficulty in consequence of the high temperature at which these metals melt, and the necessity for eliminating the disturbing influences of air cavities and impurities. The results of numerous experiments, however, agreed very closely in indicating a density of 21·5 for platinum and 22·4 for iridium. In reference to the author's remark, that these densities are much greater than those hitherto attributed to those metals, it may be mentioned that in Watt's Dictionary the data given for the density of platinum are 21·5 on the authority of Wollaston, and 21·15 on the authority of Deville and Debray.

ESSENTIAL OIL OF BERGAMOT.

According to a statement in the *Practical Magazine*, the authorities of Reggio, Calabria, offer a prize of 2000 lire for the best apparatus for extracting the essential oil of bergamot. The conditions are strength and cheapness in the apparatus itself, combined with capacity for obtaining the largest yield of the essential oil in a certain time, without injury to its colour, purity, or fragrance.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The next meeting of the above Association will be held at 17, Bloomsbury Square, on Tuesday, December 21, at 8 p.m., when a paper will be read by Mr. Arthur Hunt—"Notes on the Botanical Relationship of some Thalamifloral Orders and their Pharmaceutic and Economic Products."

THE YEAR-BOOK FOR 1875.

As will be seen by an announcement in another column, the 'Year-Book of Pharmacy for 1875' is now ready for issue to the members of the British Pharmaceutical Conference. It appears to give an excellent *résumé* of pharmaceutical literature for the year. We hope to notice it more fully in an early number.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

December 15th and 16th, 1875.

Present (15th) — Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Hills, Linford, Martindale, Moss, Schweitzer, Southall, Taylor and Umney.

(16th) — Messrs. Allchin, Barnes, Benger, Bottle, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Southall, Taylor and Umney.

Dr. Greenhow was present on the 16th on behalf of the Privy Council.

MAJOR EXAMINATION.

Fifteen candidates were examined. *Four* failed. The following *eleven* passed and were declared qualified to be registered as Pharmaceutical Chemists:—

Beale, James Hawkins Tizard	Camden Town.
Bumpstead, Robert George	Colchester.
Clarke, Isabella Skinner	Paddington.
Coleman, Alfred	Southampton.
Ellis, Henry	Rochdale.
Eminson, Thomas	London.
Keer, Thomas Henry	Sudbury.
Palmer, William Joseph	King's Lynn.
Perry, George Edward	Dudley.
Princep, Philip	Uppingham.
Sharpe, Leonard George	Notting Hill.

MINOR EXAMINATION.

Forty candidates were examined. *Twenty-three* failed. The following *seventeen* passed and were declared qualified to be registered as Chemists and Druggists:—

Dawson, John William	Alford.
Dimmock, Augustus Frederick	London.
Fryer, Charles Hart	Norwich.
Grimble, Albert	Boston.
Holdcroft, George	London.
Humphries, Edgar	Sutton Coldfield.
Hunter, Frederick William	Newbottle.
Laing, Richard William	Cape Town.
Loney, Thomas Slade	London.
Naish, Robert Elwell	Gosport.
Rogers, William	Bilston.
Sandell, John Tyack	Wellington.
Saville, William	Leeds.
Shepley, Frederick Thomas	Peckham.
Walker, Charles Henry	Liverpool.
Weedon, Joseph	Crawley.
Winpenny, Frank Walker	Barnard Castle.

NORTH BRITISH BRANCH.

The second scientific meeting of the present session was held on Friday evening, 10th December. The attendance was good.

The chair was occupied by Mr. Gilmour, President of the Branch, who, after a few preliminary remarks, introduced to the meeting Dr. John J. McKendrick, who gave a very interesting lecture "On the Action of the Chinoline and Pyridine Bases as illustrative of the relation between Chemical Structure and Physiological Activity.

The lecture, which was illustrated by diagrams and specimens of the preparations referred to, was frequently applauded by an attentive and appreciative audience. At the close, the Chairman proposed a vote of thanks to Dr. McKendrick, which met with a very hearty response, and was supplemented by a few remarks by Dr. F. W. Moinet. We hope to be able to publish this lecture in a future number.

The Honorary Secretary then submitted to the meeting a specimen of the new Mexican drug, "Damiana," sent for this meeting by Mr. A. McIntosh, chemist, Rothesay. The specimen corresponds in many respects to the account in the *Pharmaceutical Journal* of 27th November last, page 423. Apart from the interest which is apt to be attached to "new remedies," this sample derives an interest of another kind, from the fact that Mr. McIntosh mentions in his note that he received it some years ago from a Captain Hugo Müller, of Copenhagen, who told him that he had taken home from Lower California a large chest of damiana for the late Danial Hanbury, of London, whose interest in all new articles connected with the materia medica is so well known.

After examining Dr. McKendrick's preparations, the meeting separated.

Provincial Transactions.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION.

The ordinary monthly meeting took place at 37, Blackfriars Street, on Wednesday evening, December 8th, Mr. Geo. S. Woolley in the chair.

Mr. Alfred N. Palmer read a paper on "Water as a Solvent of the Bitter Principles of Yellow and Pale Cinchona Barks."

The author had been unable to complete his investigation of the subject, but his communication was of considerable interest, and included the analyses of eight samples of Infusum Cinchonæ Flavæ, B. P. A further contribution was promised, and the publication of Mr. Palmer's preliminary notice is therefore postponed.

After some discussion on matters suggested by the paper, Mr. Palmer also read the following—

On Some Impurities in Commercial Chemicals.

The systematic sophistication of chemicals is now, I believe, very seldom practised. The impurities that exist in many such chemicals are generally due either to carelessness in their manufacture, to the real difficulty that is often found in freeing them, at a reasonable cost, from the contaminations to which they are liable, or to the fact that many of the substances themselves are, from the moment of their manufacture, in a state of constant transformation and decomposition. Such impurities, moreover, constitute in general only a very small proportion of the substances in which they occur. Whether, in that case, they render the latter unfit for use is a question that can only be answered when we know the use to which those substances are to be put. We must not let our zeal eat us up. In many cases the presence of small quantities of impurities in the chemicals we sell does not matter at all, and may quite properly be overlooked. But there are obvious limitations to such toleration. When our citric acid contains lead, our acetic acid copper, our liq. bismuthi silver or arsenic we cannot omit to condemn these. The substances supplied for analysts' use as chemically pure will have really to be so, and even in ordinary cases we cannot tolerate foreign substances in our chemicals in any than very small percentage indeed. It would not do, for example, to let the sulphate that is sometimes found in carbonate of magnesium be present in more than an exceedingly small quantity. We expect to find the sulphites supplied to us contain sulphates too, but when in these the sulphate found almost equals the sulphite, as it sometimes does, we get, it must be allowed, more than ever we look for. I beg to call attention to a few instances which I have lately met with wherein the amount of impurities present exceeds all reasonable bounds.

Hypophosphite of magnesium, when made by double decomposition between sulphate of magnesium and hypophosphite of calcium, is liable to contain sulphate of calcium. In two samples recently examined the latter amounted to 6 and 12·6 per cent. respectively.

A sample of valerianate of zinc contained a large quantity of a sulphate, part of which at least was sulphate of sodium; if wholly expressed in this form it would amount to no less than $17\frac{1}{2}$ per cent. of *dry* sodic sulphate. The sample had evidently been made by double decomposition between sulphate of zinc and valerianate of sodium, the resultant salts then crystallizing out together.

Sulphate corresponding to 11·3 per cent. sulphuric acid has been found in phosphate of quinine.

In a batch of acetic acid a great deal of phosphate of calcium was detected. This should always be looked for in acetic acid. It owes its origin to the employment of bone charcoal for freeing the acid from the empyreumatic smell which sometimes characterizes it. There is no great harm in using bone charcoal, but the acid should be redistilled afterwards.

I have found bromide of sodium, which we expect to be anhydrous, associated with a molecule of water. The salt in this case was in grains not in cubes.

All the samples of mercuric oxide I have tried leave on ignition a residue, ranging in amount from ·2 to 1 per cent., in which ferric oxide is predominant, lime or magnesia, or both, being sometimes also present. In one case the residue so obtained, which consisted mainly of lime, reached 6 per cent.

In no one of the foregoing instances has there been, I believe, any intentional sophistication on the part of the manufacturers. But what shall we say when we find vermilion with 13 per cent. of bone ash? What shall we say when a sample of ultramarine contains a large quantity of common sugar, and another sample of ultramarine contains carbonate of sodium equal to 30 per cent. of the dry salt? I am told that in the last-named case the carbonate of sodium is added so that when the ultramarine is mixed with water it may remain a longer time suspended therein; certainly this may be so; and here we may admire the beneficence which provides that when one substance has to be improved by the addition of another, the improving substance bears always a lower exchange-value than that which is improved.

The Chairman in moving a vote of thanks to Mr. Palmer for his papers, alluded to the importance of testing the purity of almost every chemical taken into stock. Experience had shown that there were many accidental sources of impurity in chemicals supplied by firms of the highest respectability.

Mr. Siebold seconded the vote of thanks.

Mr. Benger wished to add a few words of welcome to Mr. Palmer, who had only at the last meeting been elected an associate, and who had so soon shown that he was a valuable acquisition to their Association. There had been considerable difficulty in procuring really pharmaceutical papers, and Mr. Palmer had set an example to members and to his fellow associates, in the direction in which he had worked, as well as in his readiness to communicate his results to their meetings.

Mr. Palmer having briefly replied, it was announced that Mr. John Plant, F.C.S., would read a paper "On the Natural Sources of Petroleum," at the next monthly meeting.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL ASSOCIATION.

The usual monthly meeting of the members was held at the rooms, Music Hall, Sheffield, on Wednesday evening, December 8th, when the discussion on "Patent Medicines" was resumed.

Letters from the following wholesale houses in Leeds, warmly repudiating the practice of supplying patents to grocers, were read by the secretary, viz.: Messrs. Harvey and Reynolds; Hirst, Brooke, and Hirst; William Smeeton, and Reindhart and Son. A letter was also read from another house on the same subject. It was resolved:—"That in the opinion of this meeting, any wholesale house circulating amongst grocers wholesale price lists of drugs, chemicals, pharmaceutical preparations, patent medicines and druggists' sundries, is not acting in accordance with the general usages of trade, is very likely to cause serious mischief, by inducing persons to deal in commodities they do not understand, and moreover is sure to damage the legitimate business of chemists and druggists."

A suggestion was made as to the desirability of some united action of the trade in the towns of the district, the consideration of which was left with the council. Other business, of local interest, occupied the time of the meeting to a late hour.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The third scientific meeting of the session of this Society was held on Wednesday evening, 8th inst., in the West Hall of Anderson's University. Mr. Kinninmont, Vice-President (in the unavoidable absence of the President, Mr. Greig), occupied the chair.

After the usual preliminary business, Dr. A. T. Machattie, F.C.S., delivered a lecture on "Antiseptics and Disinfectants," of which the following is an abstract:—

The lecturer began by stating that the object of the lecture was not so much to discuss the relative value of individual antiseptics or disinfectants as to point out the functions of such agents, and consider generally the subject of putrefaction. Antiseptics are used to prevent, or to a greater or less degree resist, putrefaction; disinfectants, to destroy or neutralize the effects of the products of putrefaction. In considering the use of such agents, it is necessary to know: first, what substances are susceptible of putrefaction; second, what are the chemical constituents of these substances; third, under what conditions putrefaction occurs; and fourth, what is the cause of putrefaction.

Animal and vegetable substances only are liable to putrefaction. The mineral constitutents present in them (their ash) are not affected by the process. The elements which enter into the organic or organized portions of plants and animals are carbon, hydrogen, nitrogen, oxygen, sulphur, and phosphorus. The products of putrefactive changes are therefore compounds of two or more of these elementary bodies.

The conditions under which putrefaction occurs are: first, presence of air or oxygen; second, moisture; and third, a temperature ranging between about 40° and 80°F.

The exciting cause of putrefaction is still obscure, but from much evidence, mainly obtained by the experiments of Pasteur, it would appear that the germs of living beings are necessary to begin putrefactive changes.

Under the head of antiseptics, it was stated that the prevention of putrefaction may be either negative or positive. If any of the necessary conditions are withdrawn, putrefaction cannot take place. To exclude air or oxygen completely; to dry thoroughly; to reduce the temperature, say to the freezing point; or lastly, to exclude or destroy living germs,—any one of these precautions will prevent putrefaction. These may be described as negative means. Where the ordinary conditions of putrefaction must remain unaltered, it is necessary to use some positive means of preventing the change by chemical agents. Substances which act thus are called antiseptics, and act: First, by destroying living germs. Carbolic acid, creosote, chloride of mercury (corrosive sublimate), arsenious acid, sulphate of copper and other agents, doubtless owe much of their value to the poisonous action they exert on living germs. Second, antiseptics may act by combining with putrescible bodies, or may, by altering them, render them less liable to change, and less capable of supporting living germs. Most of the above-named antiseptics, tannic acid, the mineral acids and many metallic salts act in this way. Third, antiseptics may, by their affinity for oxygen, prevent putrefaction by withdrawing that element, one of the necessary conditions. Sulphurous acid, free and combined, thus acts. Fourth, the power of combining with or dissolving in water may render bodies antiseptic. Sugar and salt doubtless act in this way.

Disinfectants have a special and a general use: a special use when they are merely required to destroy certain living germs which may convey disease; a general use in the rapid completion of putrefaction. During the decay of animal and vegetable matters with a limited supply of air or oxygen (instead of the ultimate products of oxidation, viz., carbonic acid, water, sulphuric acid, phosphoric acid, etc., all of them harmless), intermediate products are formed by the elements of organic bodies combining with one another instead of combining with oxygen. In this way such compounds as sulphuretted and phosphoretted hydrogen and similar compounds are formed, which are eventually oxidized. The question whether putrefactive products with a bad odour are always poisonous is not of much import. The deficiency of oxygen is the principal cause of the production both of poisonous and bad-smelling compounds, so that the presence of the one class is a sufficient indication of the simultaneous presence of the other. Disinfectants act specially by destroying germs, or generally, by oxidizing or facilitating oxidation. Permanganate of potash (Condy's disinfectant) is a direct oxidizer. Lime and chlorine act by indirectly facilitating oxidation.

The lecture was illustrated by several very striking experiments, and at the close, on the motion of the Chairman (who remarked that he was glad to think that the popular articles permanganate of potash and chloride of lime were those most to be depended upon as disinfectants), Dr. Machattie was awarded a very hearty vote of thanks for his lecture.

After some business relating to the assistants' section was disposed of, it was agreed by a majority that the annual festival take the form of a soiree and ball this session, and a large committee was appointed to make the necessary arrangements,—Mr. John Fennick, convenor.

The Treasurer intimated that he had received subscriptions from one hundred and eighteen members, amounting to over £30. The Chairman thought the standard of membership should be kept up to at least one hundred and fifty, and hoped that there was still a number who would yet send in their annual subscription to Mr. McKenzie. Several new members were afterwards enrolled, and the meeting separated.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A lecture was delivered on Thursday evening, December 9th, at the Association's rooms, Halford Street, by Mr. J. Young; subject, "Milk and Butter." The chair was occupied by Mr. J. M. Duncalf, President.

The lecturer proceeded primarily to show from Biblical, Roman and Greek history, that milk had been regarded as a substantial article of diet from a very early date. The erroneous notion existing, especially amongst uneducated people, that milk had been, and was at times adulterated with sheeps' brains, chalk, whiting, etc., etc., was clearly demonstrated to be a fallacy, and it was stated that if it were the desire of any trader to perform such an experiment, he would find his purpose by no means answered. The only adulteration that might be reasonably expected to be found would be the addition of water, or partial removal of cream. Milk was shown to be a natural and complete article of food, having constituents fully capable of satisfying animal life in every particular, which could not be said with regard to any other article of food. The lecturer proceeded to show milk was really a transparent fluid, but in consequence of numerous fatty corpuscles floating in it having power to reflect light, it presented an opaque appearance, though, if viewed through the microscope, it would at once be seen transparent. The constituents of milk were next treated of, namely, butter, casein, lactose, and inorganic salts, together with percentages of various milks which, the lecturer had examined, showing as a result that the above were always to be found, but never in the same proportions, owing chiefly to locality, food, or state of the animal. Hence milk containing much butter fat would not answer well for the manufacture of cheese, and in like manner when the solid ingredients were in abundance a large quantity of butter could not be produced.

A method for the examination of milk was next considered, namely—

1st. Specific gravity.
2nd. Percentage of cream by volume.
3rd. Percentage of solids by weight.
4th. Percentage of solids not fat.
5th. Percentage of fat in butter.
6th. Percentage of ash in solids.

The lecturer clearly demonstrated that the specific gravity of milk would not be a reliable and sufficient test, as might be supposed, because if the butter fat predominate, then the density would be much lighter. In like manner should casein, lactose, and inorganic salts have the ascendancy, the density would be greater, and here a popular error was referred to, namely, that many inexperienced persons considered the greater the density of milk the better; whereas, a sample of this kind would contain too much solid matter, and not sufficient butter fat or cream. Each particular was thoroughly explained and illustrated by experiments. The lecture occupied an hour and a half in delivery, and was listened to with great attention and interest.

A very hearty vote of thanks was proposed by Mr. W. Clark, seconded by Mr. Thirlby, to which Mr. Young ably responded.

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

The second meeting of the College for the present session was held on Tuesday, the 16th of November, Dr. W. H. Pile in the chair. Among the donations to the museum announced were specimens of Pine weed, (*Lechea major*, Mich.,) which it was stated had been used in the neighbourhood of Danville, Va., for chills and fevers as a tonic.

The following paper was read, entitled—

NOTE ON DILUTE PHOSPHORIC ACID.

BY W. H. PILE.

The subject of dilute phosphoric acid has been pretty thoroughly investigated of late, and much valuable information has been the result. In two particulars it has been rendered evident that the second process of the U. S. Pharmacopœia for preparing this acid is unfitted for that purpose, and should consequently be expunged from that codex. The proof of this assertion is shown by the finished production not being free from metaphosphoric or pyrophosphoric acids, and consequently precipitating a basic phosphate or pyrophosphate of iron, when mixed with tincture of chloride of iron, as frequently prescribed. A second reason why the process fails, arises from the universal contamination of the glacial acid with phosphate of sodium, in some cases amounting to 30 per cent., as shown by Professor Remington in a paper read before the meeting of the Pharmaceutical Association, held in Boston, last September.

We are thus thrown upon the first process of the Pharmacopœia, a method which, when carefully performed, always proved satisfactory, more especially when ended—but certainly annoying enough to deter any but the most persevering lover of chemical science from repeating the experiment, not to say anything of the danger constantly arising from the scintillations of burning phosphorus and suffocating vapours of nitrous acids.

To shield the conscientious pharmacist from these serious consequences, while preparing a remedy so desirable and yet so seldom met with, our esteemed friend

Professor Markoe, of Boston, after deep thought and careful investigation of the interchange of chemical reaction between such spiteful elements as phosphorus, bromine and nitric acid, and then by actual experiment with the same cautiously conducted, has arrived at certain definite results, which have led him to propose a new formula for this desirable purpose, the whole *modus operandi* of which was published in the various pharmaceutical journals; being an abstract from his interesting and valuable paper read at the last meeting of the Pharmaceutical Association, and which it is not necessary for me to repeat here.

Professor Maisch, in the *American Journal of Pharmacy*, for November,* has correctly reported the result of my first experiment in this direction, and it proved certainly a very striking one, leaving a deep impression upon me which no doubt will be permanent. The result, however (I can assure you), was not at all satisfactory, and as soon after as I recovered from my confusion I repeated the experiment, not, however, in the same way, but according to a modification suggested to me by Professor Markoe, which is likewise given in the *Journal of Pharmacy*.

The result, I am pleased to report, was very satisfactory, everything proceeding quietly and slowly as there stated, the application of heat being unnecessary. At the close of the operation and when all the phosphorus had disappeared, the evaporation was carried on by heat as directed in the Pharmacopœia.

This final part of the process here, as well as in the usual method, I have found the most disagreeable feature of the whole proceeding, requiring the temperature to be carried up to 420° F., at least, before the whole of the free nitric acid can be driven off, and the vapours of acid at this temperature prove exceedingly annoying. When entirely inodorous, the fire should be withdrawn and the syrupy concentrated solution allowed to cool, previous to being diluted with water. At the temperature of 60° the dense acid made as above was found to have the gravity of 70° B., nearly twice as heavy as water, and required about fifteen times its bulk of water to reduce it to its proper gravity of 1·056. I will only add that the final evaporation of this acid cannot be performed in enamelled iron vessels, as by experiment I found the enamel to be dissolved off when the temperature was much over 300°. Porcelain alone should be employed.

Professor Maisch inquired whether the acid thus obtained had been examined for ammonia, and how much it contained. Since 1858, a number of experiments were made by Scheurer-Kestner, Ordway, and other chemists, with the view of observing the action of metals upon nitric acid, and the results appeared to be that ammonia was invariably formed at a low temperature, and that its quantity increased as the temperature was lowered. Personne had obtained somewhat similar results by acting with nitric acid upon phosphorus, and since, in the proposed process, the action was moderated by immersing the vessel, it appeared to be probable that the finished phosphoric acid would contain notable quantities of phosphate of ammonium, to decompose which sufficient heat would be required to convert the ortho- into metaphosphoric acid. Further investigation with this process should be made, before it is used as a substitute for that of the Pharmacopœia.

Dr. Pile remarked that the temperature to which the solution is raised is sufficient to drive off nitric acid, but he could not at present state as to phosphate of ammonium being present.

Professor Maisch read a paper entitled—

Notes on some Medicinal and Dietetic Articles.

BY X. LANDERER, ATHENS, GREECE.

The Toxical Effects of Conium.—While examining a student at the University, I inadvertently chewed some fresh *Conium maculatum*, and soon experienced its toxical effects, consisting principally in giddiness, headache and symptoms of amblyopia. Returning to my room, I was forced, notwithstanding my feebleness, to walk in a circle around the centre table until I fell down. Lemonade, coffee and carbonic acid water produced, after vomiting, a long sleep, and after a day all symptoms had disappeared, except some pain and weakness.

The symptom noted above is expressed in the name of the plant *Conium*, which is derived from Κωνάω, to turn in a circle, because the intoxicated person is inclined or obliged to move in a circle. Such a symptom is not described in connection with the death of Socrates, and it is therefore probable, as has been accepted from the time of Plinius, that he was not poisoned by *conium*, but probably with a narcotic poppy, *μήκων*, perhaps opium.

In ancient times, many philosophers, generals and other celebrated persons were poisoned by *conium*, and in the island of Zea was a law compelling old men, who were useless for the State, to be poisoned with this plant, and that a convenient dose of the juice was 12 drachms $= 1\frac{1}{2}$ ounce. Among the interesting archæological relics found in this island was a clay vessel, which held exactly 12 drachms of water, and it is possible that this and other similar vessels served to measure the deadly dose of the juice of this plant.

Remedy for the bite of rabid Dogs and venomous Snakes.—Many persons are annually bitten by the animals named. The priests in the monastery of the island of Salamis possess an interesting remedy, known from the most ancient epochs. It is prepared from the bark of the root of *Cynanchum erectum* and the powder of *Mylabris variegata*, from 4 to 6 grains of the former and $\frac{1}{4}$ to $\frac{1}{2}$ grain of the latter being given pro dose, and from 40 to 60 such doses administered.

This species of *Mylabris* was the Κανθαρις in the time of Hippocrates, and contains more cantharadin than the Spanish fly. Dioscorides says: Cynanchum (derived from Κύων, a dog), *quod canes, lupos, vulpes et pantheras necat;* also of Apocynum *quod canes et omnes quadrupedes necat.*

The remedy above alluded to deserves to be investigated as a prophylactic against hydrophobia, which is here called *lyssa*.

A Sophisticated Valerianate of Quinia, imported from France, was noticed by me some time ago. Previously, I had made the interesting observation that true valerianate of quinia, when triturated in a mortar, showed in the dark a beautiful phosphorescence. The article in question, not possessing this property, was examined, and found to consist of sulphate of cinchonia, mixed with oil of valerian and valerianic acid.

Saffron grows in many parts of Greece, but is found principally in the islands of Naxos, Mycone, Simi and Tinos. It is collected by poor women and children, and sent in small lots to Smyrna. The *Crocus hellenicus* is among the best varieties of saffron.

Rhodosaccharis is the name given to a confection of rose, which is prepared not only by the confectioner, but in every family. The rose flowers are collected in the month of April, and put into a very strong syrup. This Τριανταφυλλογλυκον (triantaphyllon = rose; glyko = sweet) is very much liked; it is very agreeable to the taste, and has an evacuative effect.

Mastichglyco is an oriental confection, which is prepared by concentrating syrup in the presence of powdered mastich, and has an agreeable balsamic taste. The decoction of mastich is extensively employed in the orient as an efficient remedy against diarrhœa infantum, a cataplasm being used at the same time, which is called *krasopsomon*, wine-bread, and is made by boiling bread in wine, the powder of different aromatic herbs being afterwards added.

Crithmum maritimum is commonly preserved in vinegar, and eaten with meat like the flowers of *Capparis spinosa*. After the disappearance of most other plants, this is quite an ornament to the fields of Greece.

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* See before, p. 406.

Kaissopyta is prepared only in the island of Cyprus, and is exported to Alexandria, occasionally also to Constantinople. It is made from the pulp of *Prunus armeniaca*, the apricot, called by the Turks *kaissăă*; the pulp being spread upon marble is dried, then rolled up like cloth and preserved, to be eaten during the winter in place of fruit, pieces being cut off with shears.

Betmése is the name given to the unfermented grape-juice, which is evaporated to the consistency of syrup, ashes of the grape vine being added for the purpose of increasing the sweetness, the carbonate of potassium neutralizing the free acids. Betmése is eaten with bread by the rich and poor, and is extensively used for preparing other confections and preserves. The fruits of *Solanum melongena* and of the cedro are thus preserved, and in the island of Eubœa and in many other parts of Greece, almonds and nuts are strung upon threads and repeatedly dipped into betmése, until the kernels are sufficiently covered, when they are dried, and then called *sousukea*. Starch, *nesestc* of the Turks, is likewise mixed with this grape juice, and after boiling and refrigeration forms a jelly called *moustopyta*, which is cut into pieces, and is highly esteemed. Benne seeds, almonds and other aromatics are sometimes added to this jelly, which is then dried in ovens, and kept for use during the winter.

Arbutus Unedo is a beautiful tree, found in all the forests of Greece, and an ornament of the oriental gardens. The excellent fruit of this tree resembles a large strawberry, and is collected by the poor and sold during the winter; it has a pleasant taste, but in large quantities is apt to produce indigestion. Plinius says of it: *Unedo unum fructum edas. Arbutus sive unedo fructum fiat difficile concoctionis.*

In some parts of the country a spirituous liquor called *Paki*, is obtained from the fruit by fermentation.

Laurus nobilis was, in ancient times, consecrated to Apollo, hence it is called *Laurus Apollonis*. This handsome tree is met with in the forests of Greece, and is extensively cultivated in the gardens of cloisters. The seed of this tree resembles the seed of the olive, known here by the the name of *daphnekoukou*, after the name of the tree Δάφνη. The seeds could be utilized for obtaining the highly aromatic fixed oil, which I have often expressed and consider more aromatic than the same oil obtained from other localities. It seems as if in warmer climates the aromatic principles of plants were more profusely developed, like the bitter and astringent principles in colder regions.

Solanum lycopersicum, the tomato, is one of the most useful plants in the orient, where it is raised in every garden and the fruit eaten by rich and poor, the agreeable colour, and pleasant flavour which it imparts to other dishes being well liked. By expressing the juice and concentrating it by evaporation in the sun, it may be preserved for a year, and when dried in ovens it will keep well for several years. The fruit is frequently salted, and may then be transported. Is is also employed medicinally, the pulp, called *domata*, being considered of utility in gravel and against chronic rheumatism.

Dr. Pile exhibited a piece of a barrel head, shattered by the recent explosion, the force of which seemed to be downwards and upwards.

Mr. Allen Shryock exhibited a variety of lemon from Pueblo de los Angelos, in Southern California, the average weight of which is 8 ozs.; the yield of juice 25 per cent.; the specific gravity of the juice is 1·0014, and each fluid ounce requires 28 grains of bicarbonate of potassium for neutralization.

Parliamentary and Law Proceedings.

INFRINGEMENT OF A TRADE-MARK.

In the County Court held last week at High Wycombe, the case of Banbury *v.* Foottit, was heard by the Judge, J. Whigham, Esq. The case originated in a dispute respecting the use of a trade-mark in connection with the sale of a perfume called "The Carington Bouquet."

Mr. Greene, in opening the case for the plaintiff, read the form of plaint, containing three causes of action—the first for misrepresentation, the second for a breach of warranty, and the third for a breach of the 22nd section of the Merchant Trade Mark Act.

Mr. Banbury said: I am a chemist, by examination, at Great Marlow. I went into the service of Mr. Foottit in September, 1873, as manager of a branch shop of his at Wycombe. Before this I had invented a scent. I was paid a salary by Mr. Foottit. It was a term of our arrangement that I might succeed to the business if I wished to do so at Christmas. Before I entered his service I thought of bringing this scent out under the patronage of Lord Carington. I wrote to his lordship while staying with my brother-in-law in Wycombe, before I knew anything of the defendant. I then had some of the scent by me made with my own materials. I received a reply from Lord Carington on the 15th of February, when I was in defendant's service. I had designed a form of label, and had a drawing of it. When I received Lord Carington's letter I sent the design to my London printers, and had a proof down. I fixed these labels to the bottles. The scent I had before I entered defendant's service I sent to Lord Carington. I sold some of the bottles with the labels affixed while in defendant's service. After some time defendant came over to Wycombe, and I had a conversation with him about it. He came into the shop on Friday, 6th March, 1874. I was then wrapping up some of the bottles of scent. He took up a bottle and said, "You have your name on them;" and I said "Yes; you know it is my private property." He said "I shall not allow you to sell them in my shop." When I sent the labels to be printed I gave orders for 250, and instructed my agent to have it registered. The price came to £1 2*s.* 6*d.*, including the die, and the registration cost 6*s.* more. After the conversation with defendant I pulled out my knife and scratched off the labels and said, "There is the perfume, you can do what you like with it. The perfume is yours, but I have the recipe and you have not." He went out, and when he returned we had a conversation about the perfume. I said, "You shall have the labels and use them while I am in your service;" and at last he agreed to this. I wrote for more labels soon after with "C. M. Foottit, Wycombe and Marlow" on them. He wanted "prepared by" added, but I said "No, I shall not allow you to put that on, for I do not know how it may affect my arrangements." The fact that my labels had not been registered first came to my knowledge in June. I now produce the certificate of registration, dated June 14th, 1875. I had sent instructions to register in March, when I ordered the labels, but it was not done, as the person embezzled the money. During the month of June, 1874, I had another letter from Lord Carington, in which he gave me permission for the sole use of his name on the perfume (letter dated May 11th, 1874), while I was in Mr. Foottit's employment. I prepared a gallon on the 28th of May, and at the rate defendant wished it put up he would gain 250 per cent.—about £10. When I left Mr. Foottit, as he paid me my salary, he said, "I wish you to give me the recipe of the Carington Bouquet and the Cough Mixture." I replied, "No; after receiving such ungentlemanly treatment I cannot do so." I refused to give up the recipe, and said, "I must request you to discontinue using the labels. You remember our agreement." I also gave him a written notice by post-card a few days after, and put an advertisement in the papers, and in my trade circulars. I also sent him a letter and I have seen him and spoken to him about the use of my trade mark, and since June I have communicated with him by my solicitor. I have sold about three gallons of the perfume since I left. It costs about £4 per gallon, and the profit on it is about 100 per cent.—In answer to his Honour, witness said:

Mr. Foottit claims the right to use the labels and to sell the bouquet. I had a bottle purchased at Mr. Foottit's shop. I gave 1*s.* 6*d.* for it. I did not buy it myself. There is a great difference between the two scents, there is a difference in the colour and in the smell. The scent of cloves and cinnamon is stronger. I cannot trace any vanilla or otto of roses, but if I go on I shall divulge my secret.—Cross-examined by Mr. Rawson (for the defendant): I first applied to Lord Carington for his consent to use his name in the middle of September, 1873. I did not have an answer to that letter. I had a letter from Lord Carington on the 16th February, 1874. It was after I had entered defendant's service. The business was carried on in Mr. Foottit's name. He was a tenant of Lord Carington. He paid me a salary, and came over from Marlow from time to time to superintend. I left in May, 1874. I sent instructions to register in March, 1874. Lord Carington's letter, giving me the sole use of his name, was in May, 1874. I produce a copy of my instructions to register. I have another label; both are registered—that I now produce was registered 11th June, 1875. The last label has a monogram with C.C. on. I was not in business when I was stopping at Wycombe in 1873. I never was in business at Wycombe but with Mr. Foottit. I never was in business on my own account till I went to Marlow. The ingredients of the perfume were paid for by Mr. Foottit. I kept the proportions secret. When he came to the shop and found bottles with my name on he said it was not trade usages. Mr. Foottit agreed that if I left his service my right to these labels should revive—that was on the 6th March, 1874. I left on the 28th May, 1874. I sold bottles of the scent with Foottit's name on, and sent some over to Marlow for him to sell there. I got the label with the monogram on from London after I went up in June this year. I sell the scent now under both labels; the old ones are not used up. I discovered the defendant was selling a perfume called "Carington Bouquet" from seeing that the labels were not taken out of the window after I left, and I sent him a post-card requesting him to desist. A lawyer's clerk, a friend of mine, also wrote to Mr. Foottit about the end of June. I issued an advertisement, and I instructed Mr. Turner, solicitor, who wrote to defendant on the 28th June, 1875. (The letter and Mr. Foottit's reply were read.) Mr. Rawson also cross-examined the witness as to the amount of profit on the scent, and ascertained that the net profit on a gallon would be about £5 5*s.*, or 100 per cent. There was not much left of the gallon he made when he left Mr. Foottit.—By Mr. Greene: since I have set up in business at Marlow, I have seen Mr. Foottit in my shop more than once, and spoken to him about selling Carington Bouquet. I have not by word or letter received from defendant any intimation that he claims a right to sell it.

In reply to a question from the learned Judge, Mr. Rawson said he intended to justify the defendant's right to continue to sell the Carington Bouquet.

Mr. Rawson said in any observations he had to make he did not wish to go into any question of feeling between Foottit and Banbury as to the one having started in opposition to the other. He submitted that there was no evidence of the bottle produced having been purchased at Foottit's shop. He should also contend as a general principle, and on the authority of cases, that the registration of a trade-mark, as applied to a particular article or thing, gave no title whatever and was utterly useless. The principle on which it had been held that there was property in a trade-mark was that the person using it had acquired reputation in respect of certain articles on which it was affixed. It had always been held both in law and equity that one must show actual user before one could get property in a trade-mark. There was no proof that Banbury was in trade or made this known to the world. It was not a question whether he invented this particular scent, but whether he invented and used a trade-mark which held matters out to the world as being "I, Banbury, manufacture the Carington Bouquet." But even supposing registration would give him a right, the trade-mark was not as a matter of fact registered until the 11th June, 1875—not from the plaintiff's negligence, but from the negligence of his agents. Mr. Rawson then quoted several cases on this point. His strongest point, however, was, he said, the laches of which the plaintiff had been guilty. Having acquired the knowledge that Foottit was selling this perfume as Carington Bouquet, in June, 1874, it was not till June, 1875, that he took any proceedings.—His Honour: Is it to go on for ever, then, because he has neglected the remedy for six months?—Mr. Rawson said he contended that, and he did so upon the authority of cases, which he quoted. He contended further that his client had a right, even supposing this had been registered, to sell the Carington Bouquet if he did not hold out to the world that he was the only and sole proprietor and inventor. That was decided in the case of the Leather Cloth Company *v.* the American Cloth Company. His client was not actuated by any feeling except to see himself righted, and he was not the aggressor, though it was a question whether he had not the right to restrain Banbury.

Mr. Rawson then called the defendant, Mr. Charles Miller Foottit, who said: I am a chemist residing at Marlow. In September, 1873, being in want of a person to superintend my branch business at Wycombe, I engaged the defendant, who entered my service at the latter end of September. In January, 1874, I gave the usual directions for the making up of stock, and perfume generally was mentioned. I went over to the Wycombe shop I believe about the middle of February, and found the plaintiff's name on some of the bottles of scent. I ordered it to be removed and my own substituted. There is no pretence for saying that there was an agreement that if plaintiff left his trade-mark should revive. From May 28th, 1874, when plaintiff left me, to the present moment. I have been selling a scent called Carington Bouquet. The profit I calculate is 33½ per cent. I know the ingredients plaintiff used, from having the invoices, but I do not know the proportions.—By Mr. Greene: I wrote myself to Lord Carington; I am not prepared to say when. I received a verbal reply from Mr. Williams, that his lordship had given Mr. Banbury permission to use his name, fully understanding that he was giving his tenant permission. I was his tenant. The stock in hand when plaintiff left lasted possibly three or four months; then I began to make it for myself, using the same ingredients. I did not know the proportion. I had hardly a desire to imitate it, because I objected to some portion of the contents. I don't recollect whether Banbury said he should use the trade-mark immediately he left me; if he did, I immediately combated it.

Mr. Greene, in addressing his Honour, contended that a user had been shown on the part of Banbury; and that the cases cited by Mr. Rawson dealt only with copyrights and patents, and had nothing to do with the matter. As regarded laches, there was no doubt that where a person sought an injunction from a court of equity, that severe remedy was not given unless people came speedily; but even if Banbury had chosen to take that step, he would have been in time. Mr. Greene cited cases in support of this views

His Honour delivered judgment at some length. He found that the trade-mark was one which the defendant had no right to use. The sale of the remainder of the gallon of scent made by Banbury was reasonable and proper; but when Foottit or any one claimed the right to concoct a stuff and call it the Carington Mixture, and use the monogram, they were in error after the registration on the 11th June, 1875, though not before. With regard to damages, he thought they should be nominal.—Judgment was given for the plaintiff for 21*s.*, with the cost of the plaint and hearing-fees; each party to bear his own further expenses.

Mr. Greene applied for an injunction against the repetition of the acts complained of, which was granted.—*South Bucks Free Press.*

Notes and Queries.

[453]. GLYCERINE AND LIME CREAM.—Will some reader kindly oblige me with a formula for glycerine and lime *cream* (not glycerine and lime *juice*). Many of the wholesale houses put up a white, creamy preparation, which remains *permanently so.* All my preparations hitherto have become separated after a certain time. The permanently mixed fluid I have not yet succeeded at producing.—"NEMO."

Obituary.

Notice has been received of the death of the following:—

On the 26th of November, 1875, Mr. John Stephens, Chemist and Druggist, of Padstow, Cornwall. Aged 47 years.

On the 5th of December, 1875, Mr. James Mowld Robinson, Pharmaceutical Chemist, of Beverley, Yorkshire. Aged 76 years. Mr. Robinson was an Alderman, and had been a member of the Town Council thirty-five years, during which time he filled the office of Mayor six times. Mr. Robinson was a Member of the Pharmaceutical Society, having joined it in 1842.

On the 6th of December, 1875, Mr. William John Warrington, Chemist and Druggist, of Manchester. Aged 56 years.

On the 6th of December, 1875, Mr. Thomas Critchley, Chemist and Druggist, of Church Street, Preston. Aged 39 years.

BOOKS, PAMPHLETS, ETC., RECEIVED.

YEAR-BOOK OF PHARMACY, comprising Abstracts of Papers relating to Pharmacy, Materia Medica, and Chemistry, contributed to British and Foreign Journals, from July 1, 1874, to June 30, 1875. With the TRANSACTIONS OF THE BRITISH PHARMACEUTICAL CONFERENCE at the Twelfth Annual Meeting held in Bristol, August, 1875. London: J. and A. Churchill, 1875.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE IRISH PHARMACEUTICAL SOCIETY AND ENGLISH CRITICISM.

Sir,—It appears from the letters in your last issue there is a disposition to reopen the controversy on the Irish Pharmacy Bill, a controversy most of us considered was effectually disposed of months ago, when the Bill received the sanction of Parliament. However unsatisfactory the issue of the turmoil may be, raking the cold embers of a fire gone out will not re-kindle a fresh blaze. After the sting of reciprocity had been extracted from the Irish Pharmacy Bill by our opposition there remained not the remotest chance of our preventing the adoption by the projected new society of the title brought into use by the British Society.

Mr. Brady is of course at liberty to think differently, and also to think that sufficient means were not adopted by the Council to prevent the use of the title which some of us regarded in the light of our own private property. I can only say that had Mr. Brady been sufficiently near to view and weigh with due accuracy the elements of the controversy his judgment would most likely have been different.

There are at any rate few of us who do not feel that it is something of the nature of a calamity that two licensing bodies should exist (with the possible confusion that may ensue), when one body with ripened experience was willing to undertake, at considerable sacrifice and inconvenience, with the sanction and co-operation of our Irish friends, the onerous duty of licensing Irish pharmacists; but in deciding upon this matter Irishmen came to a contrary opinion to ourselves. And it is not difficult to understand, apart even from any feeling of national sentiment, that a new society worked entirely by Irishmen for Irishmen, may be best suited to the admitted wants of their country. Mr. Brady and some others imagine that "the birthright of the Society" was, as it were, purloined when the Irish Society was born with the licensing power of granting the title of Pharmaceutical Chemist to Irishmen. It would have been better, and more acceptable to our feelings, no doubt, if we could have persuaded our Irish friends to have used the suggested title of Dispensing Chemist instead; this suggestion was made with proper grace, but it would have been a graceless as well as fruitless task, and we should have been laughed at for our pains, had we fought a further, and, to some eyes, a ridiculous fight in the House of Commons to *compel* Irish chemists to adopt a name of our own selection instead of the one they deemed most appropriate.

I shall be told, perhaps, that British pharmacists do not so much regret the adoption of the title as the so-called degradation of its use by the Irish Society. I too, also, regret that our friends in Ireland, in their judgment, suppose it to be necessary to begin their operations with a comparatively low and defective examination. I am content, nevertheless, that Irishmen should judge for themselves, whilst I entertain the hope that they very soon will find it desirable to raise the character of their examinations as we have done from time to time. A similar moulding which has operated here, partly one of self-interest, but, to a greater degree, I trust, one of self-respect and zeal for the progress of pharmacy, will, I doubt not, operate benignly in Ireland as time passes, and the pharmacists of Ireland will eventually be able to fashion a society of honourable distinction. I must still object to the tone of criticism adopted here against the Irish Pharmaceutical Society. A more dignified course would be that of silent observation. We can surely permit our Irish friends, without a breath of clamour, to try their experiment of founding a society of their own. They have, at any rate, the very doubtful advantage of having members of the healing art on their council, so that they may be able to have a remedy promptly applied to any diseased action as it arises. I would not have ventured to have joined issue with those who differ from me on this vexed question of the Irish Pharmacy Bill, had not my name been so pointedly alluded to in your columns.

ROBERT HAMPSON.

205, St. John Street Road, E.C.

OUR TITLE.

Sir,—Twelve years ago I proudly put on a brass plate the length of my shop window the title "Pharmaceutical Chemist;" at that time I had very often to explain its meaning, and I have done my share to educate my neighbours on this point. The title now begins to have an understood value; and this designation, or its equivalent, "Pharmacist," is affectionately held and cherished by many who ply their vocation intelligently and pleasurably.

The threatened Irish aggression is so thoroughly unfair that I cannot believe it will be carried out.

Did we misunderstand, or was it a mistaken statement given to us, that the examination should be at least equal to our Major? Had this not been told us, surely we should have risen in a body to oppose the "spoliation."

A grave responsibility is thrown on our representatives, who, I trust, will now give the Irish Privy Council no rest until it is made to understand the position.

JOHN WHITFIELD.

Scarboro', December 14, 1875.

Sir,—The Irish Pharmaceutical Society having concluded to establish only one grade of dispensers, and that under the title of Pharmaceutical Chemists, it is not much to be wondered at that they should aim at a lower standard of examination than that conferring the same degree in England. Had they set their standard as high as ours they would necessarily so limit their candidates that Ireland would remain insufficiently supplied with legally qualified dispensers; and if they are satisfied with a standard no higher than our Minor or Modified examinations, which are considered enough to show that a man is qualified as a dispenser, common sense and justice are outraged by their assumption of equality with the higher grade on this side of the Irish Sea.

So beautiful a combination of the sister arts of blundering and plundering is not often met with. While they are endeavouring to rob the title of Pharmaceutical Chemist of its hard won value they are also blundering in a way that it will take a generation or more to recover from. Time will be required for them to see the folly of their ways, to retrace their steps, to obliterate as far as possible the effects of their present procedure, to cast men of sterling metal in the mould which long experience has proved to be satisfactory, and to allow the holders of Brummagem qualifications to die out before the Irish Society can look for reciprocity or meet with the approbation of honest and honourable men.

If it is not too late to prevent mischief the authorities might prevent fifty years of time being wasted, and save themselves from being disgraced, if they would consult Dr. Greenhow upon the revision of their syllabus, so that in the sister isles similar titles shall indicate similar qualifications. BARNARD PROCTOR.

Grey Street, Newcastle, Dec. 14, 1875.

CARNIVOROUS PLANTS.

Sir,—By the recent investigations of Professor Morren, of Brussels (as noticed in the *Pharmaceutical Journal* of Dec. 4), it is a satisfaction to find that at last the tables seem turned, and that in "the struggle for life" and consequent "survival of the fittest," the legion of carnivorous plants will not be allowed to have it all their own way and swallow up all animal life, as the late most exhaustive work of Sir John Lubbock and Darwin might have led us to suppose would have been the case in the process of far off development. It has appeared to me a most curious and subtle estimation of supposed pepsin compounds to account for the digestive powers supposed to exist in the secretions from the glands of *Dionæa, Drosera*, etc. In my own observations I have never met with a good case of a plant digesting an insect. During the past autumn I had two strong plants of the Venus fly-trap; I found eight or ten of the leaves had fastened on the oniscus, or wood louse, all of which were kept close prisoners, and soon died; but in every case the spoil proved the death of the spoiler, for after a fortnight every leaf which had imprisoned a wood louse began to show a suspicious black marking, which in a short time gave very unmistakable signs of decay, and at last the leaf rotted away from the effect of decomposing animal matter from the wood louse. I am aware that the commonly received view of the flesh-eating propensities of certain plants is one of the attempts of the numerous disciples of evolution to make good their case—so much so that many careful observers have settled as a dogma what the original promoters have only put forward as a theory. I cannot help thinking that too frequently improvement and cultivation have been mistaken for development; thus, the ribston pippin amongst apples, and the gloire dijon amongst roses, and fifty other instances are the result of cultivation; sow the seeds, and instead of a finer pippin or more lovely rose, in 999 cases out of a 1000 they have gone back more or less to the original briar or crab from which they have been raised by years of careful selection and cultivation. It is so through all phases of life, one generation of neglect undoes centuries of care. Why this restless desire to go backward and downward instead of upward and onward in the search after the nature of things I am at a loss to understand.

Norwich. OCTAVIUS CORDER.

THE SALE OF INFANTS' CORDIALS.

Sir,—I am very glad some one has brought under our notice the dangerous practice of giving opiates and mineral preparations to children, and it is a subject that requires the greatest consideration, because in my humble opinion the health of many children is irretrievably impaired—if not ruined—by the constant drugging during their infancy. It is a well known fact, that the majority of mothers, especially in the humbler stations of life, whenever a child is in a crying mood, or restless, or peevish, hasten to the "cordial" or "mixture" bottle and pour out, without much care, a dose of the dangerous stuff, rather than exercise a little common patience or try to ascertain the real cause, and endeavour to remove the same. I think if an infant really requires a sedative or a preparation like calomel, it requires also the attention of a medical man, and such medicines ought not to be prescribed for infants by chemists, nor sold by hucksters and others who are totally ignorant of doses and effects.

Having been a prescriber for nearly twenty years I have closely watched and often regretted the indiscriminate use of such medicines for infants, and experience has taught me that they are not so often necessary, nor do they in a great many cases (if any that ought to come under a chemist's care) answer any better purpose than vegetable or less powerful medicines.

I believe further, that a well-made carminative syrup is for all ordinary purposes quite effectual, and that a powder containing purely vegetable substances only is also sufficient for every emergency during dentition, excepting as I said before, when the advice and experience of a medical practitioner are required, and then such should be had.

It is hardly possible to estimate the baneful effects in manhood which may result from a continued course of opiates during childhood. "JALAPINA."

PRACTICAL PHARMACEUTICAL LABORATORY.

Sir,—I was exceedingly sorry to note in Saturday's Journal that Mr. Schacht's very useful motion for his "Practical Laboratory" on a small scale was rejected. The idea is good and if it had been carried would have supplied a want long felt amongst provincials. I have been on the look out for such a stove as is suggested for some time, and until the Council take the matter up and make it worth a manufacturer's while we shall never get such a stove or mill. The main objection appears to be "want of space" at the Square. I think the best plan would be for the Council to offer two premiums for first and second best stove or mill suitable for the purposes required; leave the amount of premium to be settled by a committee appointed for the purpose, only let it be of sufficient value to induce a spirited competition. I feel assured we should then get something suitable at a moderate cost.

Sunderland, December 6, 1875. D. B. SHARP.

BISMUTH.

Sir,—I have for some weeks dispensed a prescription containing liq. bismuthi and hydrocyanic acid; the tongue of the patient is blackened, but he has made no complaint of any garlic-like taste.

A few years ago I was in the habit of taking the subnitrate in ten grain doses three or four times a day, with three minim doses of hydrocyanic acid. Notwithstanding that I had to continue this for some months, I do not remember any disagreeable or peculiar taste, nor any blackening of the tongue.

Worthing, December 7, 1875. J. BURT.

A. M. Groze.—A formula is given in the University College Hospital Pharmacopœia, edited by Mr. Martindale.

"*G.*"—(1) *Crepis virens*; (2) *Carex arenaria*; (3) *Melilotus officinalis*: (4) *Phragmites communis*; (5) *Phalaris arundinacea*; (6) *Atriplex erecta*; (7, 8) *Chenopodium album.*

B. L.—Several formulæ for cochineal colouring have been given in the present series of this Journal. See vol. iv., pp. 319, 359, and 682.

A Registered Apprentice.—We know of no other pocket edition that is so complete.

H. R.—Cooley gives the following recipe for Whitworth's Doctor's Bottle, or Red Bottle:—

British Brandy	1 quart.
Cochineal (bruised)	$\frac{1}{4}$ oz.
Oil of Origanum	10 or 12 drops

Digest for twenty-four hours and then filter.

"*Chemist*" (Brighton).—A formula for a red marking-ink was given in the number for March 27 last, p. 776.

X. Z.—We cannot undertake to recommend particular works as more suitable for the Minor examination than what you now have; but would advise you to supplement the study of botanical books with the practical examination of plants.

COMMUNICATIONS, LETTERS, etc., have been received [illegible] Professor Dymock (Bombay), Mr. Vidler, Mr. Kinninmont, Mr. Martin, Mr. Stenhouse, Mr. Houlton, Mr. Groze, Mr. Cull, Chemist and Druggist, Pharmaceutical Student, W. C. W.

TELLURIUM AS A PROBABLE IMPURITY IN BISMUTH SALTS.

BY CHARLES EKIN.

In the *Pharmaceutical Journal* of Nov. 20, I called attention to the disagreeable effects occasioned by taking a particular sample of bismuth carb., and asked if any reader had ever met with a similar case. I have received several answers to my letter, and think it advisable to put on record at once the information they contain. I take this opportunity of thanking my correspondents for their letters, and beg them to accept this as an acknowledgment in those cases where I have not yet had time to send a direct reply.

First, with regard to various suggestions I have received, and to remarks which have also appeared in the Journal, I may state that I have never said that the odour complained of was due to arsenic, but on the contrary I have satisfied myself from the examination of the remains of an offending bismuth mixture that arsenic has nothing whatever to do with it.

Neither has the odour anything to do with any combination, such as with hydrocyanic acid, but is due entirely to the bismuth itself, as was proved by prescribing it alone. Carbolic acid, when prescribed with it, in no way abated the smell. In the cases, of which there were several, which occurred in this city during the last few weeks, the odour, which very much resembled that of garlic, was found to be most intense and disagreeable, making the patient unbearable even at a distance of several yards.

The following extracts are from a letter received from Dr. Maclagan, 28, Heriot Row, Edinburgh:—

"Have observed odour of fetid breath, not once nor twice, but several times. Judging from my own experience it must occur frequently, although it may be overlooked. Quite distinct in character from the foul breath produced by disorder of the *primæ viæ*. Resembles the odour of arseniuretted hydrogen, although I believe it has nothing to do with it."

Dr. Maclagan instances one case which occurred two years ago, "since which time I have known several cases. Frequently noticed it in my wards at the Royal Infirmary, and pointed it out to the clinical students. In many cases obliged to discontinue use of bismuth from the annoyance it caused. Believes the presence of tellurium to be the cause. Sir James Simpson, when making trial of the salts of cerium, experimented a little on tellurium. He records a case (*Edin. Med. Journ.*, Dec., 1854, p. 564) of a divinity student who inadvertently got a dose of tellurium, 'which was followed by the evolution of such a persistent odour that for the remainder of the session the patient had to sit apart from his fellow students.' A second ground for suspecting tellurium is that one of the sources of bismuth is an ore containing tellurium."

Extracts from a letter received from Mr. J. Stainer, Folkestone:—

"Eighteen months ago found bismuth to cause both breath and skin to smell offensively. Dr. Bowles, Folkestone, had several cases, of which a list has been kept. Procured bismuth from several sources (instances the names of four very respectable houses), and all had the same effect. Bismuth lozenges had the same effect; makers replying, effect mentioned quite new to them; looked into various treatises on bismuth and could find nothing to account for it."

Mr. George Brownen, 143, New Bond Street, "had last April a sample of bismuth subnit. brought to him on account of the fetid odour imparted to the breath—examined and found tellurium." Pressure of business forbade his continuing the subject to such completeness as to justify publication of results.

These, and various other letters I have received, all testifying to the same end, justify the conclusion that within the last eighteen months or two years the annoyance complained of has been of frequent occurrence, that it is of so marked a character as to cause serious inconvenience, and that it is probably caused by the presence in bismuth preparations of traces of tellurium. I say *probably* caused, because Mr. Brownen, to whom the credit is due of having first found this troublesome impurity, evidently considers it advisable to repeat his experiments and so "bring the subject to such completeness as to justify publication of results."

I regret that I have not yet been able to procure a sample that produces the effect described. Two that have been sent to me have quite failed, one of them having been taken to the extent of six drachms in doses frequently repeated of 15 grains each.

I will forward part of any sample that I may receive to Mr. Brownen, in order that he may have the opportunity of completing his investigation.

It would be interesting to know from what sources bismuth is now obtained for the English market. Bismuth ores are reported from Colorado (p. 429, May number of the *Chemical Society's Journal*), containing bismuth 60·49 and tellurium 34·9 per cent. These figures agree very nearly with the analyses of tellurides of bismuth from Hungary, given in Watt's 'Dictionary of Chemistry.' Tellurium is also found native in Colorado, usually finely disseminated through quartz, but also in small imperfect crystals. Notwithstanding that this element would seem to be tolerably abundant, I have not been able to procure a sample of it in London. I have been fortunate enough, however, to obtain a sample of the nitrate of tellurium at the moderate price of 4*d.* a grain.

Bath, December 16, 1874.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 422.)

The polarizing and analysing arrangements of the microscope are of course the essentials of micropolariscopy; but anything like extended work requires the use of various adjuncts that are also of very great service when the micro-polariscope is used as a means of intellectual or æsthetic recreation, since the full beauties of many objects are only revealed by their aid. Amongst these are various films of doubly refractive crystalline substances, called, very inaccurately, depolarizing films, usually of selenite but very frequently of mica. They are generally mounted between a slide and a thin glass cover, in an aperture in a brass slide, or in specially mechanical fittings, devised frequently of considerable complexity. In whatever way they are mounted, heir mode of action is the same: and our selection may be determined by consideration of special applicability to the work we have in hand, or by the relative cost of the several "mounts." This, however, may be taken as a general rule, that the common plan of mounting the selenite film as an ordinary microscopical object is the worst possible, and that, at the least, the simple revolving cell should be employed, into which the particular selenite to be used can be dropped and set t the proper position with perfect ease. The necessit for this arises out of the phenomenon before allude to, that in certain positions a selenite film is neutral to a beam of polarized light, and that the maxima of colour phenomena are only educed when the films are in certain other positions. It happens repeatedly to young workers with the micro-polariscope that when they place the selenite film between the crossed Nicols they are exceedingly chagrined to find that either no colours, or colours of the most unsatisfactory tint, are produced, and they not unfrequently lay the charge of their want of success to the account of the instrument maker, whereas the secret, of course, is that the axis of the selenite lies in the plane of polarization. This can be remedied with the ordinary selenite by slightly turning the polarizer and analyser around their mechanical axis until the maximum of colour is produced, and this is the course generally pursued. But it often happens that when matters are thus arranged the object is in the most unsuitable position, whereas it was before in the best position; and the observer has to choose whether he will compromise the question, and put up with unsatisfactory results, or go through the troublesome process of adjusting the azimuth of the object to the new position of the prisms. The whole of these troublesome processes are rendered unnecessary by the moveable cell and slide shown in Fig. 15, gaining thereby, also, the additional advantage that the effects produced by varying the azimuth position of the selenite whilst the object remains fixed under observation, may be studied, and in many cases these are very beautiful. For the purpose of scientific research the revolving cell is amply sufficient; but those who use the micro-polariscope for what may be termed purely æsthetic purposes will not be content with this, if pecuniary considerations be not paramount, because, beautiful as are the tints produced by the ordinary selenites, as they are used in succession, the operation of changing them takes time and involves the removal of the object from the stage, which in itself is frequently very objectionable. The necessity for the removal of the object may be done away with by arranging the microscope-stage in such manner as to allow the selenite plate to slide in and out beneath the object, by mounting the selenites in the diaphragm, as in Mr. Swift's condenser in its complete form, or in a very barbarous fashion by fitting the selenite into the polarizer. The stage arrangement, as shown in Fig. 14, when fully carried out, with revolving cells and fittings for the superposition of various selenites at will, is perhaps the best possible, but it is rather expensive and difficult to apply to an existing microscope, and in addition, causes the stage to become thicker than is thought desirable now-a-days. The diaphragm arrangements, either in the form of addition to a condensing and polarizing apparatus, as just mentioned, or in the form devised by Mr. Darker* and improved, or at least modified, by many others, in which different cells, revolving or not, are fitted into the sub-stage immediately above the polarizer, require much sub-stage room, and cannot be successfully applied to any but "first-class stands." By way of getting out of this difficulty Mr. Blankley has devised the apparatus shown in Figs. 16 and 17, and has, I think, very satisfactorily met the requirement of amateurs in general.

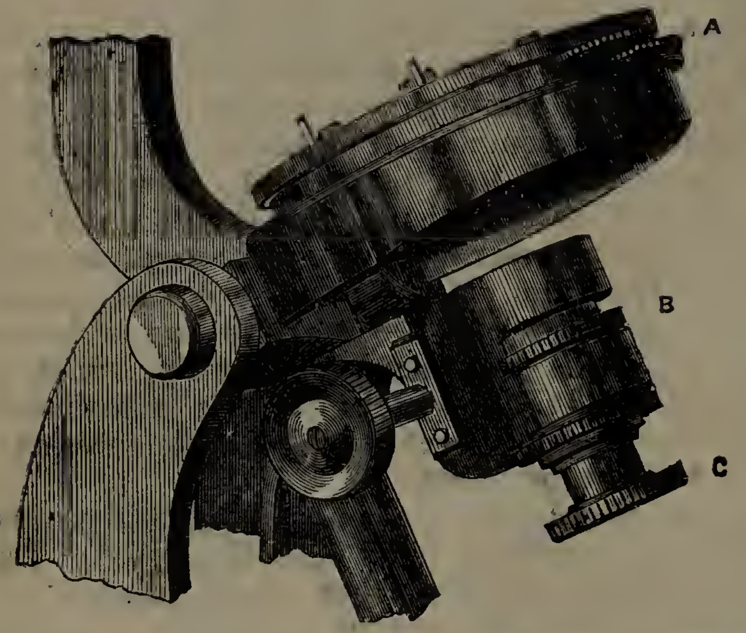

Fig. 14.—A, Milled Heads of Selenite Carriers. B, Milled Head of Selenite Carrier. C, Milled Head of Polarizer.

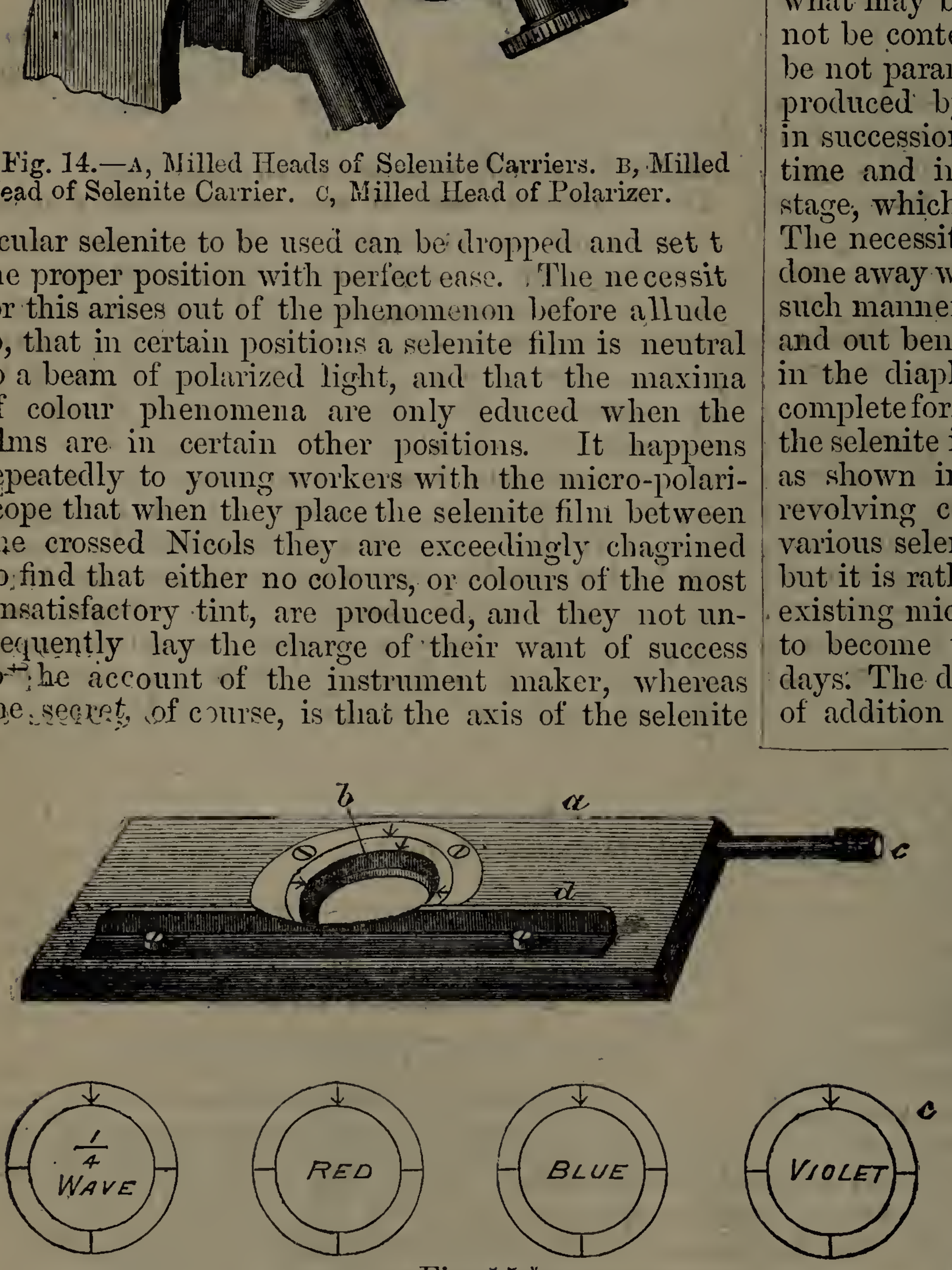

Fig. 15.*

Perhaps the only objection that can be brought against them, is one common to all stages of this kind, that they cannot be brought into or out of use without removing the object from the stage; that this is a serious objection will be gathered from what has gone before. The figures almost describe themselves. In the one shown, Fig. 16, three selenite films of different thicknesses, are mounted in a rectangular brass sliding piece, which can be passed at will beneath a wheel in which are four other selenite films, each of which is fixed in a revolving cell. The object of this arrangement is of course that the various actions of the selenite films upon each other may be modified at will. The apparatus shown in Fig. 17 is much more simple and is very inexpensive

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* (*a*) is a brass slide a little over three inches long and about one-and-a-half wide, in which a cell (*b*) is fitted in connection with a tangent screw, prolonged to (*c*) by which it can be rotated. The cells (*e*) contain selenite films, of which the following are the most useful—red and green, blue and yellow, violet and yellow, quarter wave. The latter is useful in connection with many observations and for superposition with the others; (*d*) "rest" for slide.

* Mr. J. J. Field has devised a very elaborate arrangement. See *M. Micro. Journal*, vol. 2.

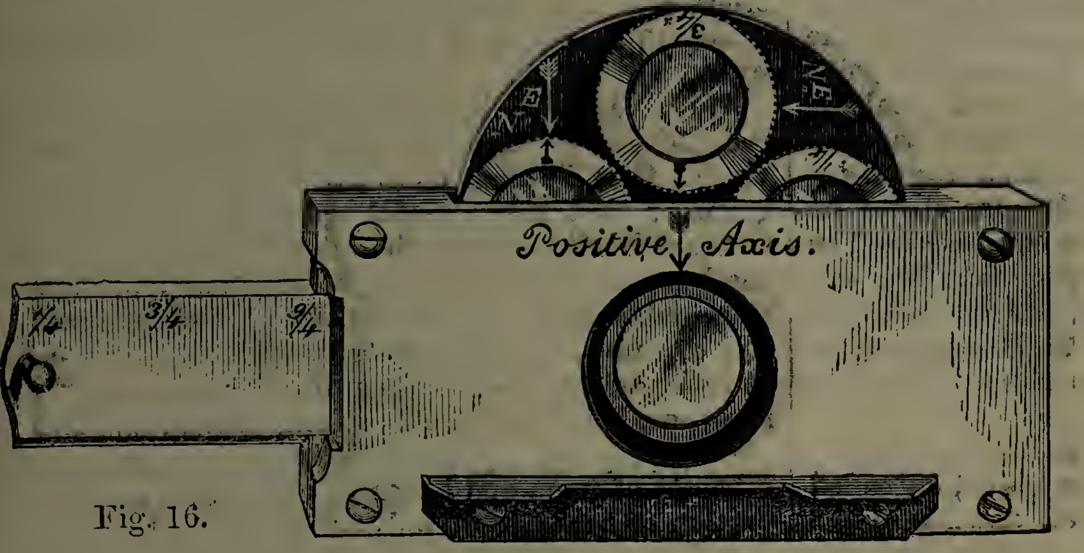

Fig. 16.

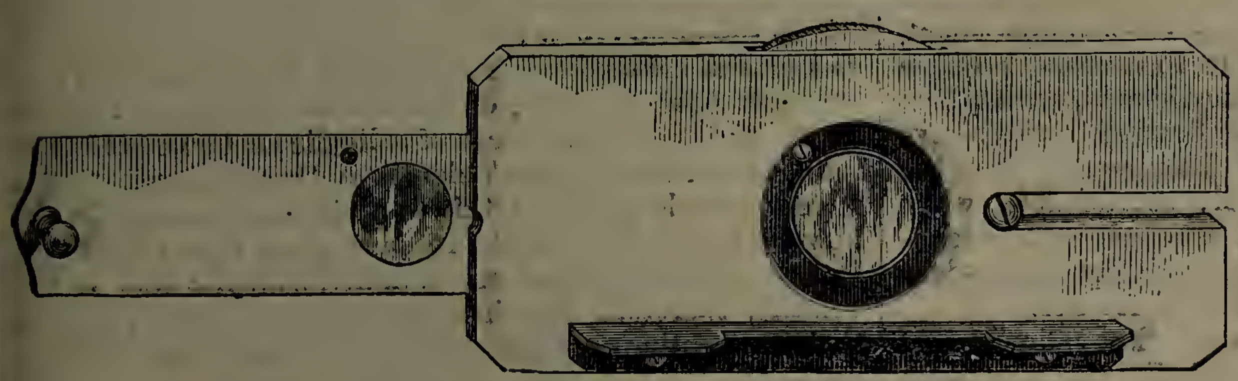

Fig. 17.—Swift's Blankley's Compound Selenite Stage.

A sliding plate similar to the last passes beneath a cell containing what is known as a quarter wave film, which is capable of being revolved, and therefore set at any desired azimuth. The number of tints procurable by the skilful use of either of these stages is considerable and will not a little astonish those who see it used for the first time, if they be unfamiliar with polariscope work. Mr. Richard Beck, in describing an optically similar arrangement (Darker's) gives the following series of tints as the result of the various combination of the films there mentioned under their conventional appellations.

No.	Prisms crossed.		Complementary tint.
1	$\frac{1}{4}$ by itself	Very light lavender	Straw colour
2	$\frac{3}{4} - \frac{1}{4}$	Darker ”	Light yellow
3	$\frac{3}{4}$ by itself	Deep blue	Light maize
4	$\frac{3}{4} + \frac{1}{4}$	Very light blue	Orange
5	$\frac{9}{4} - \frac{3}{4} - \frac{1}{4}$	Lake	Emerald green
6	$\frac{9}{4} - \frac{3}{4}$	Deep blue	Bright yellow
7	$\frac{9}{4} - \frac{3}{4} + \frac{1}{4}$	Light green	Light purple
8	$\frac{9}{4} - \frac{1}{4}$	Light plum colour	Pea green
9	$\frac{9}{4}$ by itself	Blue green	Salmon
10	$\frac{9}{4} + \frac{1}{4}$	Green yellow	Mauve
11	$\frac{9}{4} + \frac{3}{4} - \frac{1}{4}$	Light pink	Green
12	$\frac{9}{4} + \frac{3}{4}$	Light pink	Deep green
13	$\frac{9}{4} + \frac{3}{4} + \frac{1}{4}$	Very bright red	Stone green.

The signs " + " and " – " used in this table are, of course, expressive of the position of the active axis and neutral axis respectively, of the selenite. When the axes correspond the effect produced is that of the sum of their retardation; when they are opposed it is that of their differences. The mode of action of these superposed films and the nature of the colours produced will be discussed later; for the present it is enough to say that few who have not worked with them have any idea of the wonderful beauty of these chromatic phenomena when employed with suitable objects. Their practical use in technical microscopy is at present very small.

(*To be continued.*)

SALICYLIC ACID.*

BY J. C. OGILVIE WILL, M.D.,

Assistant-Surgeon to the Aberdeen Royal Infirmary.

Although salicylic acid has been much vaunted by continental surgeons, more especially by Thiersch and Kolbe, as superior as an antiseptic to carbolic acid, it has not, so far as I am aware, come into general use in this country, and the recent discussion at the Clinical Society will probably not do much to advance its cause. A pretty extended trial of it has, however, convinced me that in it we possess an agent of extreme value in a large class of cases; but I do not intend at present entering on a detailed account of the cases in which it is found useful, but simply to direct attention to its value as an antiseptic, to its advantages over other substances used for a like purpose, and to a few of the forms in which it may be employed, with brief notes of some cases as illustrative of its beneficial action.

Godeffroy, by a series of careful experiments, proved that salicylic acid is three times as powerful in its anti-fermentative action as carbolic acid. He used dough formed of yeast, flour, and water, to separate portions of which he added varying quantities of carbolic and salicylic acids, and noted the length of time that elapsed before fermentation took place. In other experiments, milk, urine, beer, mustard meal, and other substances have been employed, the results invariably proving that fermentation was either prevented or greatly retarded by the addition of salicylic acid. For example, fresh cow's milk mixed with 0·04 per cent. of salicylic acid, curdled thirty-six hours later than a similar quantity of milk to which no agent had been added; urine, to which salicylic acid had been added, remained clear and free from odour till the third day, while another specimen of the same urine, with which nothing had been mixed, was putrid. Its anti-fermentative powers are already so well recognized by chemists in this country, that many of them add small quantities of the acid to such preparations as are liable to undergo fermentative decomposition, with most satisfactory results. These experiments are undoubtedly conclusive as to the value of the agent used as a preventive of fermentation, and experience has proved that it is equally reliable as a preventive and corrective of putrefaction when applied to sores and wounds, and that it materially assists reparative action.

In proof of its powers as a corrector of putrefaction, I may briefly refer to two cases: one of amputation of the thigh, at present under Professor Pirrie's care in the Aberdeen Royal Infirmary; the other, mammary cancer.

The former patient, a girl aged nineteen, was the subject of extensive necrosis of the femur; she was much reduced, and amputation was had recourse to, but with very grave doubts as to the ultimate result. The vessels were acupressed and water-dressing applied. As was expected, there was considerable suppuration, accompanied by great fetor. The applications used at this time were daily syringing with 1 to 40 solution of carbolic acid and dressings impregnated with red lotion. Salicylic ointment was then applied, and within two days the fetor entirely disappeared and healing action commenced. I on several occasions directed the attention of the students to the almost marvellous change that in this case followed the use of the new antiseptic. Another noteworthy point connected with the case was the extremely small, healthy, and highly vascular condition of the granulations with which the lips of the wound were studded, forming a marked contrast to those which Mr. Callender stated he had seen when salicylic dressings were employed. The ointment used was the one containing paraffin, the formula for which will be found below, and though it is a pretty strong one—1 part of acid to 7—the patient repeatedly stated that it neither gave rise to pain nor smarting.

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* From the *Lancet*, Dec. 18, 1875.

In a case of medullary cancer of the mamma, where the fungoid growth involved the entire gland, extended upwards nearly to the clavicle and well down into the axilla, and from which the fetor was so intense that the patient had to be removed to an out-of-the-way apartment, I ordered daily syringing with a 1 to 40 carbolic solution and a liniment of olive oil and salicylic acid, with which the sore was covered. By these applications putrefactive changes were arrested, the fetor disappeared, and the patient was rendered comparatively comfortable, while the attendants were not, as before, repelled from attending to her, which they had been by the disgusting odour pervading the atmosphere which surrounded her.

These two cases of themselves show that salicylic acid is a trustworthy antiseptic. But carbolic acid has been proved beyond doubt to be so also, and boracic acid is largely used for similar purposes; therefore, unless salicylic acid possesses advantages over both, its substitution for either cannot be justified. It does, however, seem to me to possess certain advantages, which, though few in number, are not of less importance on that account; they may, I think, be best elicited by comparing carbolic and boracic acids with it. The two manifest objections to the use of carbolic acid, valuable agent though it be, are its irritating action and its smell. Salicylic acid can hardly be termed an irritant, and preparations containing only a small percentage of it can be thoroughly relied on as trustworthy antiputrescents, and it is odourless. These two points constitute its main claims to superiority to carbolic acid.

The more important of the two is, however, not yet universally allowed, for, from the statements made by Mr. Callender and Sir William Jenner at the Clinical Society's recent meeting, it would seem that in their experience salicylic acid had displayed most markedly irritant properties. But this is utterly at variance with the observations of continental observers, and also with my own, even where very much stronger preparations have been employed; for, though I have used it constantly since January, in only one case has pain been complained of—in that of a large varicose ulcer of the leg, for which a 1 to 8 ointment was prescribed,—and I have never seen the vesicular eruption, to which Sir William Jenner referred, following its action. But bearing the remarks of these accurate observers in mind, and for the purpose of testing whether it really gives rise to irritation or not, I dusted a granulating surface with the pure acid, purposely selecting a very nervous and susceptible patient, and one who was prone to give vent to his feelings on the slightest provocation. A number of students were present in the ward at the time, and heard the man state distinctly that he felt neither pain nor smarting; an hour afterwards I again visited him, and he still said that there had not been any pain. I then applied a little water to the acid, and rubbed it gently into the surface, but, beyond the slight uneasiness due to the pressure of my finger, he felt nothing, and next day the nurse said that she thought the man had been easier than usual. It seems almost impossible to reconcile this statement with those before referred to as emanating from Mr. Callender and Sir W. Jenner, and so different are they that one would be almost led to infer that either my sample of acid was a very weak one, and theirs a very strong one, or that some impurity had crept into the specimen employed, or that it was due to some peculiarity of constitution of the patients treated by it.

With regard to boracic acid, very many still doubt its reliability as an antiseptic, and I confess I am not yet convinced that implicit trust can be placed in it; but even granting that it is a useful agent, on account of the extreme difficulty of blending it with fatty substances it is the bane of those who have to compound ointments into the composition of which it enters. Salicylic acid can, on the contrary, be easily incorporated with such menstrua; salicylic acid is, on the other hand, only sparingly soluble in water, but a sufficiently strong watery solution can be readily prepared by the addition of a small quantity of biborate of soda and heating. The presence of a minute portion of borax could only seldom be looked on as objectionable, and might in fact be of value in those cases where the action of a mild astringent is indicated. Still, as aqueous solutions of carbolic and boracic acids of strength now in vogue do not act as irritants, it is unlikely that watery solutions of salicylic acid will ever come into general use, though Thiersch and others employ them. I certainly do not class this as a virtue possessed by the new antiseptic, but for the reasons given it can hardly be looked on as an objection. Finally, salicylic acid is not volatile, therefore dressings impregnated with it retain their antiseptic properties longer; it is tasteless, and nonpoisonous.

Preparations of Salicylic Acid.—Thiersch, who follows Lister's mode of treatment, with the exception of the substitution of salicylic for carbolic acid, employs cotton-wadding or jute impregnated with the acid in place of gauze; but as the preparation of his dressings is a complicated process, and requires a lengthy description, I may refer to notices of his paper which appeared in a medical contemporary for May 26th and June 2nd of the present year, where full particulars are given. The watery solutions employed by him contain 1 part of acid in 300 parts of water. As an application to granulating surfaces a lotion containing 1 part of acid, 3 of sodium phosphate, and 50 of water has been found useful. As already mentioned, heat and the addition of borax increases its solubility; a clear lotion of considerable strength can thus be obtained: for instance, ten grains of acid can be readily dissolved in an ounce of water by heating and then adding six grains of borax, or even twenty grains of the acid will be taken up by an ounce of water if fourteen grains of borax are added. These solutions, in addition to their use as lotions, may be used as gargles, where an antiseptic and astringent gargle is indicated. To a surface where it can be accurately applied, and where the discharge is slight, though I have tried it with excellent effect where it was profuse, as in the case of the girl above noticed, the cerate suggested by Professor Lister for rodent ulcer—salicylic taking the place of boracic acid—is a nice application. The formula is from half a drachm to a drachm of salicylic acid, one drachm of white wax, two drachms of paraffin, and two drachms of almond oil; melt and rub up in a heated mortar. It should be spread on strips of muslin or fine linen.

Another ointment may be made of sperm oil, one drachm and a half; oil of theobroma, five drachms and a half; salicylic acid, from half a drachm to a drachm. This forms a thick paste, which should be thickly spread on lint. The heat of the surface acting on the oil of theobroma, a diffusible ointment is formed, which is a suitable application when it is desired to have the discharge thoroughly saturated with the antiseptic. An ointment less easily acted on by the body-heat consists of sperm oil and paraffin, of each a drachm and a half; oil of theobroma, two drachms; oil of almonds, one drachm; salicylic acid, from half a drachm to a drachm.

A very simple and most useful ointment, and one which answers admirably in some affections of the skin, is formed of half a drachm to a drachm of the acid to seven drachms of simple ointment. Though neither watery nor oily preparations of this acid belong to what is termed elegant pharmacy, yet a liniment of salicylic acid and olive oil will be found of much efficacy in burns; as an example, I may cite a case of burn, involving the upper arm and nearly the whole back of a child aged seven, where I recently employed it. Carron oil had been applied; and when my advice was requested, two days after, free suppuration had taken place, accompanied by great fetor. Lint soaked in olive oil and salicylic acid—twelve drachms of the acid to sixteen ounces of oil—was prescribed. The result was most satisfactory; the fetor disappearing, the suppuration rapidly decreasing, the pain greatly abating, and kindly healing action taking place. in less than a fortnight the whole surface was healed, with the exception of two small spots covered by healthy granulations, to which red lotion was applied. I have since found that a much weaker oily solution (two drachms of the acid to eight ounces of oil) was all-sufficient in a case of severe scald of the foot lately under treatment.

For cancerous sores Thiersch recommends dusting with the pure acid, or with equal parts of the powder and starch, or powder formed of charcoal, and the acid might be employed for the same purpose, or for dusting over the face of poultices applied to sloughing surfaces. Endless preparations might be devised; but those I have described seem to me as useful as any combinations with which I am acquainted, and therefore I shall leave others to modify them in any way that may suit their tastes or modes of treatment.

Though I stated in the outset that I did not intend entering on details of cases, yet I cannot refrain from urging its use in eczematous affections, for nowhere is its beneficial action more marked than in them. In the eczema of children, more especially in that found affecting the head and face, it is far superior to any remedy I have yet employed; it was, in fact, the results attending the use of salicylic acid in a case of the kind that first convinced me of its value, and I have since found that others have formed a like estimate of it in similar cases. A child, aged eighteen months, had been under my care for many weeks with a patch of eczema rubrum on the cheek; I had tried all kinds of local applications, and had given arsenic and iron wine internally, but with no avail; for though at times it seemed to be giving way to treatment, a fit of itching, I suppose, had caused the child to rub it, and increased irritation always followed. I had not before used salicylic acid, and had but little faith in good accruing from its exhibition, but as a last resource I prescribed an ointment containing one drachm of acid to an ounce of lard. When I next visited the child, a few days after, the patch had nearly healed, and very shortly after it was perfectly whole. In another case the result was almost equally striking, but here it was the first application used. A child, aged six months, had a patch of E. impetiginodes on the occiput; it had first appeared about a month before. As some parts were thickly covered by crusts, a poultice was used to detach them, and then salicylic ointment was rubbed in. In six days every vestige of disease had disappeared. A brother and sister, aged three and five, were the subjects of eczema narium of short standing. Salicylic ointment was applied on a Friday, and on the following Monday the surfaces were perfectly healed. It is unnecessary to occupy space by entering on details of other cases, but I may simply say that in very many I have found it answer admirably.

THE ACTION OF SULPHURIC ACID UPON PLATINUM DURING CONCENTRATION.*

BY A. SCHEURER-KESTNER.

In his report upon the Exhibition in London in 1862, Dr. A. W. Hofmann mentioned the results of some experiments which had been communicated to him by M. Scheurer-Kestner, upon the wear of the platinum of the alembics used in the concentration of sulphuric acid. Since that time, M. Scheurer-Kestner has continued his observations, and has recently communicated the result to the Académie des Sciences, through M. Wurtz.

The action of sulphuric acid upon platinum varies with the purity, and especially with the concentration of the acid produced in the alembics. The presence of nitrous compounds in the acid introduced into the distillatory vessel augments considerably the attack of the platinum, the loss of weight in which is doubled or trebled according to the quantities of these compounds occurring in the evaporated liquors. In proportion also as the strength of the acid is raised the solution of the platinum increases until it amounts to tenfold in the preparation of the monohydrated acid.

The sulphuric acid of commerce, sp. gr. 1·767, usually contains 93 to 94 per cent. of monohydrated acid; but for some years past a more concentrated acid has been in demand, and acid containing 97 to 98 per cent. is now met with in commerce. At the same time the platinum alembics have ceased to last as long as they did formerly. M. Scheurer-Kestner's experiments have been directed to ascertaining whether the wear observed is due simply to a mechanical action, or whether the platinum is really dissolved.

The presence of nitrous compounds in the liquors from the lead chambers has been found to favour considerably the solution of the platinum. An alembic used in the manufactory at Thann for concentrating sulphuric acid lost in two years 12,295 grams, 4,309,000 kilograms of acid having during that time been concentrated to the ordinary strength, containing 93 to 94 per cent. of monohydrated acid. The loss was therefore in the proportion of 2·859 grams of platinum per ton of acid. The acid introduced into the distillatory vessel was contaminated with nitrous compounds. In order to destroy these, sulphate of ammonia was used, as recommended by Pelouze. The solution of platinum decreased immediately, and during the following year fell to 2490 grams for a production of 1,843,000 kilograms of acid, or 1·220 grams for each thousand kilograms of acid. In the following years the acid introduced into the alembic contained sulphurous acid; it was then free from nitrous compounds. The solution of platinum fell to 0·925 for each thousand kilograms of concentrated acid; in a production of 17,516,000 kilograms of acid the platinum vessel lost in weight only 16,178 grams. These figures and those which follow, relate solely to the loss of platinum in the boiler; the accessories, such as the head, siphon, etc., also underwent a loss of weight which is referred to later.

It appears that the presence in the chamber acid of a small quantity of hydrochloric acid which is constantly manifest, and is due to impurity either in the nitrate of soda or the nitric acid employed in the preparation of the sulphuric acid, influences sensibly the solution of the platinum.

But as soon as the degree of concentration passes the limits of 94 per cent. of acid, a much more considerable action is exercised upon the metal. As just shown in the preparation of 94 per cent. acid, the loss of platinum amounted to about 1 gram per ton of acid. When the concentration was increased so as to obtain 97 to 98 per cent. of monohydrated acid, the platinum dissolved exceeded 6 grams per ton. The boiler of a platinum alembic, which originally weighed 30 kilograms, was used in the evaporation of 180,000 kilograms of acid to 97 or 98 per cent.; the loss of weight of metal was 6·070 grams per ton of acid. A second experiment made upon an equal quantity showed a loss of 6·650 grams of platinum per ton of acid.

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* *Comptes Rendus*, vol. lxxxi., p. 892.

In the preparation of acid containing 99½ to 99¾ per cent. of monohydrated acid, the platinum dissolved reaches 8 and 9 grams per ton of acid. In the production of 102,000 kilograms of 99½ per cent., the boiler lost 861 grams of platinum, or 8·444 grams per ton.

This quantity of metal being sufficiently large to allow of its recovery, M. Scheurer-Kestner sought to corroborate the above figures by weighing the platinum obtained from a certain quantity of 99½ per cent. sulphuric acid. 73·6 kilograms having been diluted with water, the product was precipitated by a current of sulphuretted hydrogen; the precipitated sulphides, containing lead and platinum, were dissolved in aqua regia, and the lead was precipitated by sulphuric acid. After twice undergoing this treatment, the solution was completely freed from the lead it had contained; it had the characteristic colour as well as the properties of the salts of platinum. The platinum was then precipitated in the state of sulphide, and after calcination, weighed; 0·617 gram of metallic platinum was obtained, or at the rate of 8·380 grams per ton of acid, a figure that accords closely with the results previously mentioned.

In the diminution of weight of platinum above referred to, no account is taken of that which occurred in the head and other accessories, but opportunity occurring to measure the loss after five years' usage, the following results were found:—

	Actual Weight. Kg.	Original Weight. Kg.
Distillatory vessel . .	26·450 . .	30·346
Head	7·000 . .	7·255
Siphon	5·520 . .	5·689
Various pieces . . .	1·000 . .	1·075
	39·970	44·365
Total loss of weight .	4·395	

The vessel having lost 3·896 kilograms, the loss of the other pieces was 499 grams, or 12·8 per cent. of that of the vessel. In order therefore, to estimate the total amount of platinum dissolved in the acid it is necessary to add about 13 per cent. to the figures previously cited.

From the foregoing experience M. Scheurer-Kestner draws the following conclusions:—

(1) The loss of weight of the distillatory apparatus in platinum is not due to a simple mechanical action of the boiling acid.

(2) When the acid employed is free from nitrous compounds, it dissolves about 1 gram of platinum per 1000 kilograms of sulphuric acid concentrated to 94 per cent. When the concentration is carried on to 98 per cent., 6 or 7 grams per 1000 kilograms of acid are dissolved; and 9 grams per 1000 kilograms in preparing 99½ per cent. acid.

(3) When the acid introduced into the apparatus contains nitrous compounds, the metal is dissolved in much larger quantities.

An alloy of platinum and iridium resists the action of sulphuric acid much better than pure platinum. Two capsules, one of which consisted of pure platinum and the other of platinum containing 30 per cent. of iridium, were placed in an alembic, where they remained fifty-seven days. The capsule of pure platinum lost 19·66 of its weight, whilst that of platinum and iridium lost only 8·88 per cent. But the alloy of iridium is more brittle than the pure metal, and it is to this defect, is due doubtless, the abandonment of the use of platinum containing large proportions of iridium in the manufacture of the apparatus used for concentrating sulphuric acid.

NOTES ON TARTARIC ACID.*

BY R. WARINGTON, F.C.S.

(*Concluded from page 490.*)

Another condition must be mentioned which affects the amount of soda required for neutralizing a tartaric liquor; this is the presence of lime. It is probably well known that phosphoric acid is neutralized (to litmus) by very different quantities of lime and soda, the neutral sodium phosphate containing less soda than is sufficient to form disodic phosphate, while the neutral calcium phosphate approaches tricalcic phosphate in composition. In an experiment in which the same quantity of phosphoric acid was neutralized in the cold by lime water and by standard soda, it was found that for one equivalent of soda 1·59 equivalent of lime was required to produce perfect neutralization. This difference between lime and soda is also observed in neutralizing tartaric liquors containing alumina. A dilute solution of tartaric acid and potash-alum, exactly neutralized with soda, becomes strongly acid if neutral chloride of calcium is poured in. This new acidity may be neutralized with soda without producing any precipitate. In an experiment in which a solution of 1 part of potash alum and 5 parts of Rochelle salt was neutralized in the cold by lime water and soda respectively, it was found that for 1 equivalent of soda 1·21 equivalent of lime was required. The solutions in both cases were perfectly clear after neutralization. The amount of lime demanded for neutralization, or the amount of soda required in the presence of calcium chloride, was exactly equal to the sulphuric acid of the sulphate of aluminium present: alumina thus exerts no neutralizing power in a solution containing Rochelle salt and lime. The compounds formed under these conditions deserve further study.

These curious facts have no influence on the method of analysis just described, if the ash is perfectly dissolved in the standard acid, as there must then be the same amount of lime present in the final titration as in the first.

Nature of the Organic Acids in Tartaric Liquors.—It has been mentioned that the mother-liquors in a tartaric acid factory contain a considerable quantity of organic acid which is not tartaric. Concerning the nature of this acid some experiments have been made.

Attention was directed in the first place to those acids which are known to be formed when tartaric acid is subjected to heat: metatartaric and ditartaric acid were therefore sought for. In examining liquors for ditartaric acid, use was made of the property of its salts of becoming acid when boiled. Old tartaric liquors neutralized with soda and boiled do not become acid as far as my experience goes. If chloride of calcium is added to the neutralized liquor, it becomes indeed strongly acid, but this acidification takes place in the cold as well as in the hot, and is therefore not due to the splitting up of a ditartrate. The acidification caused by the addition of chloride of calcium to neutralized tartaric liquors containing alumina has been already noticed; the same reaction probably takes place when calcium chloride is added to neutralized old liquor.

While old liquor yields only negative results as to the presence of ditartaric acid, the evidence furnished by the waste liquor of the factory, obtained by precipitating old liquor with excess of chalk, is more ambiguous. If this waste liquor, which must contain all the ditartaric acid present, is neutralized with soda and boiled, it becomes distinctly acid, and in some rare instances the amount of acidification is very considerable. As, however, neutralized solutions containing phosphates of iron, aluminium, or calcium, become acid on boiling from the splitting up of the phosphates into basic and acid salts, the presence of ditartaric acid must not be concluded from this reaction.

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* Abstract of a paper read before the Chemical Society (*Journ. Chem. Soc.*, vol. xiii., p. 926).

The large acidification on boiling sometimes observed in waste liquors is, however, much greater than that obtained from artificial waste liquors containing phosphates unprecipitated by chalk.

Some further evidence as to the presence of altered tartaric acid was furnished during the examination of an old liquor. The free sulphuric acid had been removed with carbonate of barium, and the tartaric acid with acetate of potassium; the solution was then heated with a small excess of lime and filtered. The resulting liquid would now contain the metatartaric and ditartaric acid present, as both the potassium and calcium salts of these acids are far more soluble than the corresponding tartrates. The solution was acidified with acetic acid, and fractionally precipitated with nitrate of lead. The second fraction, a nearly white precipitate, was decomposed with sulphuric acid, the excess of sulphuric acid removed with nitrate of lead, the solution made hot, and acetate of lead added as far as possible without occasioning a permanent precipitate. On cooling, a lead salt was deposited on the sides of the beaker in the form of clear globular masses. A further crop of the same salt was obtained by a second edition of acetate of lead. The mother liquor again heated with lead acetate yielded a precipitate which was distinctly plastic while hot. It will be recollected that in an earlier section of this paper it was shown that a hot solution of fused tartaric acid treated fractionally with acetate of lead yields both the plastic and globular lead salts here described. The small quantity of globular lead salt obtained was decomposed with sulphuretted hydrogen, the resulting solution concentrated, and placed over oil of vitriol. It crystallized like ordinary tartaric acid, and when tested qualitatively gave all the ordinary reactions of that acid. The altered acid had thus apparently reverted into tartaric acid.

As a third method of ascertaining the presence of altered tartaric acid in old liquors, experiments were made to determine whether the amount of normal tartaric acid present was increased by dilution and long boiling. Test experiments were first performed as to the applicability of this mode of investigation, which gave results showing that the amount of dilution and boiling employed was quite sufficient to reconvert all the metatartaric and ditartaric acid into normal tartaric acid, and that the presence of much free sulphuric acid had no practical influence on the result. Similar experiments were now made with old liquors, and the results showed the presence of a small quantity of altered tartaric acid, which dilution and long boiling was capable of reconverting into tartaric acid. The author is disposed, therefore, to conclude that small quantities of metatartaric acid, and possibly also of ditartaric acid, may be present in concentrated liquors which have been long heated in the factory. In 'Gmelin's Chemistry' it is stated that both these acids are formed when tartaric acid is heated with a small quantity of water, as well as when it is heated in the dry state.

Jungfleisch has recently called attention to other products of the action of heat on tartaric acid. He has shown that when tartaric acid and water are heated in a sealed tube to 175° for many hours, the acid is entirely converted into racemic and inactive tartaric acid. Racemic acid has long been a bugbear to tartaric acid manufacturers; to its supposed presence in some tartars they have been ready to attribute the irregular losses of their factories. The author has not met with any indications of the presence of racemic acids in the liquors; the results of Jungfleisch, however, appeared to make its occurrence probable. He consequently made a few experiments on the subject.

Two samples of old liquor of different origin were diluted, the greater part of the sulphuric acid removed with acetate of barium, the solutions concentrated, divided into two equal parts, one half neutralized with potash, and the other half then stirred in, a little acetate of potassium being also added; the precipitates were finally collected and slightly washed. The attempt was now made to separate the various acid potassium tartrates by fractional crystallization, this being the method employed by Jungfleisch. Of the three salts the biracemate is the most insoluble, and the salt of the inactive acid the most soluble, while ordinary bitartrate lies between the two. The fractions which should contain the more insoluble salts were tested for racemic acid by adding solution of sulphate of calcium to a cold saturate solution of the salt.

An aqueous solution of biracemate of potassium is precipitated immediately by a solution of gypsum, racemate of calcium falling as a fine white precipitate. A solution of ordinary bitartrate, treated in the same way, yields large transparent crystals of tartrate of calcium after some hours standing. It was found on trial that a cold saturated solution of biracemate of potassium might be diluted with three times its volume of solution of ordinary bitartrate, and would still afford a distinct precipitate two or three minutes after the addition of sulphate of calcium. No indication of racemic acid was obtained from any part of the acid potassium salts crystallized from old liquor.

The mother-liquors from the fractional crystallizations should of course contain the salt of the inactive acid. From this liquor some unusually large crystals separated, which it was hoped might prove to contain the acid sought, since its acid potassium salt is stated by Jungfleisch to yield crystals of remarkable size and beauty. Two small crops of these crystals were collected and weighed. On neutralizing with soda they required the same amount of alkali as normal bitartrate. The neutralized solutions were examined by Dr. Gladstone in the polariscope, each solution being compared with a solution containing the same weight of ordinary Rochelle salt. Dr. Gladstone found that the rotations in the comparative experiments were in each case of the same amount and in the same direction; the crystals examined were therefore only ordinary bitartrate.

As far, therefore, as these experiments go, racemic acid and inactive tartaric acid are not produced during the heating which tartaric acid liquors undergo in a factory.

The author has ascertained the presence of one acid, which he thinks has not been previously recognized in tartaric acid liquors, this is oxalic acid. It was first observed crystallized in long needles in old liquor which had been diluted and exposed to cold. These needles melted at a low heat, and volatilized entirely with all the characters of oxalic acid. Dissolved in water they gave an immediate precipitate with sulphate of calcium. The acid was converted into a calcium salt, which was purified by solution in hydrochloric acid and reprecipitation by acetate of ammonium from a hot very dilute solution. The purified salt, dried at 100°, yielded 38·17 per cent. of lime; theory ($C_2CaO_4H_2O$) requires 38·35 per cent.

In another case a precipitate of calcium salts from an old liquor, previously deprived of sulphuric and tartaric acid, was suspected of containing oxalic acid. The precipitate was treated with very dilute cold nitric acid, which dissolved the associated salts and left the oxalate of calcium, which was then purified as above described. Dried at 100°, the salt, which was very small in quantity, yielded 38·09 per cent. of lime.

Oxalic acid is of frequent occurrence in old liquors; it is usually recognized by its appearance in the form of crystals. It is not easy to detect oxalic acid in the liquor by any qualitative test, even when it is known to be present; of the difficulties involved anyone may convince himself by dissolving oxalic acid in a solution of tartaric acid containing alum, and then trying to detect the oxalic acid added.

The subject of the organic acids present in old tartaric liquors is a very promising one for chemical investigation.

A NON-RETREATING BUNSEN BURNER.

BY PRESIDENT HENRY MORTON, PH.D.,

Stevens Institute of Technology, Hoboken, N. J.

The retreat of a burner will evidently occur whenever any part of the ascending column of mixed gas and air is moving at the orifice with a velocity less than that at which the same will burn. Now, in an ordinary burner, with its main tube of regular cylindrical bore, it is evident that the friction of the surface of the ascending column of mixed gases will cause that portion to move at a less velocity than the central part, and that even currents of the nature of eddies will be developed. It will thus happen that, while the central portion of the ascending column of gaseous mixture issues at a velocity much greater than that at which the material can burn downwards, and thus is quite free from any danger of retreating, the marginal portions of the column or jet of gas will be escaping at a rate so much less that the velocity of their combustion downwards will exceed that of their upward motion, and retreat of the flame will ensue.

It is well known that, to secure a jet of water or of any other fluid whose particles shall move with equal velocities in all parts, and thus avoid currents and eddies, it is only necessary to make the orifice of efflux an aperture in a thin wall. In following out this idea, I made a burner of a bore, rather large compared with its height, and then drew in its upper edge into the form of an open-ended thimble, so contracting the orifice of escape to about two-thirds of the area of the tube, and rendering this orifice practically an opening in a thin horizontal wall or plate. The results of this modification far surpassed my anticipations.

A burner thus constructed, gives a perfectly non-luminous flame with gas pressures varying between one and a half inch and one-tenth of an inch of water, and with the lowest of these pressures cannot be made to retreat by the most violent handling in the way of sudden movement or waving about in the air, even when this violence is carried to the extent of extinguishing the flame altogether. Under like conditions of pressure, a burner of the ordinary construction is made to retreat by a slight draft of air or a very moderate amount of motion.

THE SOUTH LONDON SCHOOL OF PHARMACY.

The annual dinner of the students of this institution was held on Friday evening, December 17th, at the Horns Assembly Rooms, Kennington, under the presidency of Dr. Muter, Mr. Baxter occupying the vice-chair.

The cloth having been removed, and the usual loyal and patriotic toasts having been given,

The Chairman, in proposing the toast of the evening, "Success to the South London School of Pharmacy," said: It was a proud moment for him to meet those present again in that room, and to drink success to the year nearly closed. It was especially a pleasure, as so few amongst them had passed away during the year, for he was not aware of more than one having gone from their midst; so that, with a few exceptions, the same old faces were present to drink the toast—in fact, they were all one family, and the secret of their success was that they all pulled together. He would not say anything as to the success of the School, as that was generally left to the vice-chairman in proposing the successful students, from whom no doubt they would receive a better account than he could give. In his capacity of director of the teaching department, it was perhaps expected he should say a few words upon the way in which the students had been affected by the examinations. The past year had been in most respects a very tame one; there had been nothing very striking, except that the new examinations had been upon trial, and, upon the whole, had been successful. They had now competent examiners at Bloomsbury Square, and everything went on in a way to be highly commended; and any one presenting himself would pass upon his merits, and would receive the consideration and fair play which Englishmen expected. Remarking upon the regulation which had just appeared of not publishing the names in the order of merit, he thought the proper way was to simply publish the names of students alphabetically, leaving them to get honours at the school in which they were trained. The new regulations very curiously did not precede but followed upon the alterations in their own regulations that the prizes should no longer be dependent upon the result of the examination at Bloomsbury Square, but upon the result of the examinations in their own School. They had decided to present a bronze medal in each of the branches at the end of the B. session, and a silver medal at the end of the A. session to the successful candidates, and furthermore that the B. men should have the privilege of competing among themselves for the silver medal, the second man to receive a certificate of merit. Curiously enough, the new regulations plainly showed that the authorities at Bloomsbury Square had the same idea, and that they thought it better that the order of merit should not appear in the Journal. An additional argument in favour of the course was that a man, although well up when he went to the examination, might get nervous and frightened, and perhaps fail, or if he did not actually fail, take a lower place than his abilities entitled him to. It seemed to him better that the authorities at Bloomsbury Square should not mention who were at the top or the bottom, but leave it to be fixed by the particular school. In future there would be no more order of merit, but the school at Bloomsbury Square and their own school—which he supposed were the two leading schools—would have their own series of awards to the best students. That assisted teaching in this way, that if a man could afford it, he would not study to pass his examination only, but also to obtain a medal.

The toast having been drunk, the following presentation of prizes took place:—

Chemistry, Senior.—Medal, Mr. Hannah; Honours, Mr. Bumpstead.

Materia Medica.—Medal, Mr. Keer; Hon. Certificate, Mr. Hannah.

Botany.—Medal, Mr. Hunter; Medal, Mr. Fryer.

Pharmacy.—Medal, Mr. Brooks; Certificate, Mr. Shepley.

Junior Chemistry.—Medal, Mr. Shepley; Certificate, Mr. Brooks.

The Vice-Chairman, in proposing the toast of the "Successful Candidates," said their success had been so great during the past year that very few words were needed from him. The South London School of Pharmacy had the credit of training the first lady pharmacist in the United Kingdom. He would not make a boast of this matter, as he was not one of those who advocated what were called women's rights, for he held that a woman's strength was in her weakness, but still great credit was due to the school for enabling a lady student to pass a successful examination. He thought the fewer lady pharmacists there were the better. In conclusion, he might say that something like 1000 students had passed through the school.

Mr. Shepley, in responding, said their studies would not have been of much avail without the kind attention and assistance of Dr. Muter and his assistants.

Dr. Mitchell proposed the "Representative Press."

The toast having been drunk and responded to,

Mr. Barker proposed "Dr. Muter," which was drunk with three times three.

Dr. Muter, in responding, said it was one of the greatest rewards of his labour to see the students, new and old, assembled around him, and know that when he had given up the duty of teaching the remembrance of friendship remained. He thanked them from the bottom of his heart for the manner in which they had received the toast, and hoped it would be long before the bonds of friendship between them were broken.

Several other toasts were given in the course of the evening.

The Pharmaceutical Journal.

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SATURDAY, DECEMBER 25, 1875.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

A NEW REMEDY FOR SECRET REMEDIES.

THE sale of so-called patent medicines appears just now to be attracting considerable attention at home and abroad, especially from the medical profession. An able lecture delivered before the Wolverhampton Chemists' Association by Dr. J. G. TOTHERICK, a report of which will be found at p. 513, contains, among other subjects, some plain speaking upon the supposed duties of chemists and druggists in relation to their sale. Many of our readers are aware also that early in the present month an influential meeting of members of the medical profession was held for the purpose of discussing the objects of the recently founded Medical Defence Association. These objects, as expounded by the chairman, Dr. B. W. RICHARDSON, included not only the proverbially difficult task of separating the tares from the wheat—*i.e.* the unqualified from the qualified prescriber—at a time when, as he stated, they are becoming undistinguishable, but also among other things, the suppression of secret quack medicines.

It is true that to some people either of the tasks mentioned might appear to offer scope for the undivided energies of any one Society, and to say which would prove the lightest, or which is the most necessary task, would be difficult. Present events have proved our contemporary, the *Medical Times and Gazette*, to be not altogether unjustified in saying, as it did lately, that at present it is possible to sell almost any poisonous concoction as a patent medicine, apparently under the direct sanction of the Legislature, evidenced by the Government stamp, and that this appears to be the more remarkable and inconsistent since the recent strict legislation with regard to the sale of poisons. The remedy suggested, however, of making it compulsory to state the composition of patent medicines on the bottle or vessel containing them is hardly yet within reach, although some movement has been made in that direction by the action which the Council of the Pharmaceutical Society has taken with respect to vermin killers and sheep-dipping compositions. Nevertheless, just now we are not prepared to suggest to the young Association a better. But admiring the strong appetite for work evinced by it, we are glad to be able to call its attention to a plan for limiting the sale of quack medicines, from which great results appear to be anticipated in America.

In the United States the traffic in patent and proprietary medicines has gradually assumed such dimensions that it is now estimated that two-thirds of the total quantity of medicines consumed there are dispensed in the form of nostrums. The unlimited field thus opened to mischief, and the necessity for circumscribing its area, has for some time occupied the thoughts of many of the leaders of pharmacy in America, who now express their belief that "public feeling and the true interest of the profession point to the pharmacists and druggists themselves as correctors of this evil." But how? The answer is—and one that our readers will remember has had the approbation of the Philadelphia College of Pharmacy and the American Pharmaceutical Association—not by refusing to sell a nostrum, or even by describing its ingredients, but by giving with the vended moral or material poison a universal antidote, and that antidote is—an Almanac!

In the United States, as in this country, one method of advertising adopted by the nostrum manufacturer is to supply druggists with almanacs for gratuitous distribution, with the name and address of the distributor printed on the cover. It is proposed that druggists shall now, without abandoning the sale of patent medicines, cease to distribute indiscriminately these advertising almanacs, and substitute for them, at the druggist's cost, an almanac which, whilst enlightening the reader as to changes of the moon, shall also make him wise in respect to the evils of quack medicines.

Bearing in mind the great object sought, we have looked forward with some curiosity to the appearance of the almanac, and a copy having been courteously placed at our disposal it was examined with the reverence due to the engine that is to work so mighty a change. It is a small pamphlet of forty-eight pages, termed the Popular Health Almanac, and so far justifies its title, that, besides the usual calendar, several pages are devoted to short well-written notes relating to the preservation of health; four pages are devoted to setting forth the special object of the issue, and about as many more to formulæ alleged to represent the composition of various nostrums. But we confess we are unable to specify the particular ingredient which is to convert the American nostrum taker from the error of his ways, or to reconcile the druggist to paying rather more than three-halfpence a copy for almanacs to take the place of those he has hitherto received for nothing. Still in this mystery there is something akin to the nostrums it attacks, and it may be that the treatment is based on homœopathic principles. Certainly if we were not assured by the well-known publisher, Mr. STEIGER, that publication at the price mentioned will not cover the cost, the almanac might have been suspected of a very close kinship with proprietary preparations.

Nevertheless, our lack of perspicacity need not prevent our calling the attention of the Defence Association to this new weapon, backed as it is by names deservedly held in honour. It is true that while considering it we have been irresistibly reminded of the cry, "In the name of the Prophet, figs!" But if the figs happen to be of the kind that were laid on Hezekiah's boil they are worthy of application after all. And we fancy that in this country they might be purchased at two-thirds the price without making any encroachment upon the generosity of the seller.

THE EARL OF DERBY ON THE ENDOWMENT OF SCIENTIFIC RESEARCH.

THE important conclusions arrived at by the Royal Commission on Scientific Instruction, and published in their last reports, appear to be already bearing fruit. On Friday last they received the adhesion of Earl DERBY, who, in a speech delivered at Edinburgh upon the occasion of his installation as Lord Rector of the University, averred that more liberal assistance in the prosecution of original research is one of the recognized wants of our time. As to the source from which this help is to be afforded he did not appear quite to have made up his mind; for whilst owning that he would not grudge help from the state in such a cause, he evidently looks rather to the "spirit of patriotism which animated founders of schools and colleges, and public benefactors of other days." Money, Lord DERBY asserts, is never wanting when men see their way to making good use of it; and the fact that at present science has no endowment, or next to none, is due, he considers, to the fact that interest in this class of subjects is comparatively new, and rich men who want to do good with their money have as yet scarcely looked in that direction.

Lord DERBY recognizes that endowments of all kinds are objected to by a certain class of thinkers, but these, he thinks, argue from the abuse of a thing against its use. The fact remains, he remarks, that the most enduring and valuable work done in the line of pure science may not bring a shilling to the man who does it, and while that is so he sees nothing unreasonable in saying that society should in one way or another make provision for those who are doing so much for society. Original capacity is not so common that we can afford to waste it, nor so difficult to discover that we may excuse ourselves by saying we did not see it.

The influence of such words in educating public opinion can hardly be over-estimated. And it is interesting to note that already the practical genius of this statesman foreshadows the nature and extent of the help that is desirable. "Who," he asks, "knows how many discoveries might be worked out, how many conquests by man over nature secured, if for—I do not say a numerous body, but even for some fifty or one hundred picked men, such modest provision were made that they might be set apart, free from other cares, for the double duty of advancing and diffusing science?" The question is one that deserves a careful consideration from all who believe in the future of this country; for if the modest provision is to be made by private benevolence the sooner a beginning is made the better.

STOLEN POISON.

AN extraordinary case of poisoning is reported by the *British Medical Journal* as having occurred in Lochmaben, Dumfriesshire. The assistant to a druggist there upon going into the shop after it had been left for a short time found a woman drinking from the bottle containing tincture of cantharides. Remedies were immediately used; but death resulted in a few hours from the effects of the poison. It appeared that the woman was a confirmed laudanum drinker, and had been in the habit of stealing into the shop when no one was present and helping herself to laudanum. On the occasion in question however, she took the wrong bottle.

FEW printed pictures suffer more from absence of colour than those which represent flowers; but the tedious and expensive operation of hand-colouring has, until the last few years, been the only available method of remedying the defect. The improvement, initiated by Mr. BAXTER'S process, has now, however, familiarized us with prints more or less correctly rendered in colours at moderate cost. Our spirited contemporary, *The Garden*, proposes to take advantage of this fact, and to issue every week a coloured illustration of some new or rare flower or fruit. Some specimens that have already come under our notice are really very handsome, though, perhaps, rather showy; but the artistic skill which is so characteristic of our contemporary is a guarantee that this interesting experiment will be tried under favourable conditions.

THE German and French pharmaceutical papers contain warnings against the roguish attempts upon continental pharmacists and chemical manufacturers by some person or persons residing in this country. The fraud is said to be effected by sending orders in the name of different houses for goods which are to be delivered with the greatest possible dispatch. Payment is then made with a fictitious cheque; but before the worthlessness of this is discovered the swindlers decamp. To such an extent has this practice been carried in France that the Minister of Agriculture and Commerce has thought it worth while to address to the Chambers of Commerce a circular of warning respecting it.

WE understand that the Soirée of the Association of Chemists and Druggists for Wolverhampton and District will be held towards the end of January. Manufacturers and proprietors of articles of trade interest, which they wish to exhibit, are requested to communicate with the Secretaries at once, at the rooms of the Association, 9, King Street, Wolverhampton.

M. DUMAS, the celebrated chemist, and President of the Commission to whom was committed the last revision of the French Codex, was last week elected to the French Academy, having gained the *fauteuil* of the late M. GUIZOT.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN EDINBURGH.

December 16*th*, 1875.

Present—Messrs. Ainslie, Buchanan, Gilmour, Kemp, Kinninmont, Tait and Young.

Professor Maclagan was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Two candidates were examined. *Both* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Baldock, James Thomas	Rochester.
Williams, William Thomas	Fairwater.

MINOR EXAMINATION.

Nine candidates were examined. *Five* failed. The following *four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cattell, John Thomas	Coventry.
Key, George Brown	St. Andrew's.
Mill, George	Edinburgh.
Watson, Robert	Carlisle.

MODIFIED EXAMINATION.

Two candidates were examined. *Both* passed, and were declared qualified to be registered as Chemists and Druggists:—

Blood, Charles	Bootle.
Howes, Henry	Bilston.

NORTH BRITISH BRANCH, EDINBURGH.

At the second scientific meeting, on Friday the 10th inst., a paper was read on "The Action of the Chinoline and Pyridine Bases," by John G. M'Kendrick, M.D., F.R.S.E. After introductory remarks as to the modes of investigating the actions of active substances on the living body, as illustrated by the method of demonstrating the action of woorara, Dr. M'Kendrick pointed out the great step in advance made by Professor Crum Brown and Dr. Thomas R. Fraser in their investigation into the physiological action of methyl-strychnia, methyl-veratria, etc., as showing how physiological action may be changed by altering the chemical constitution of a substance. He then proceeded to describe the results of a research by Professor Dewar and himself, an abstract of which appeared in the *Pharmaceutical Journal* for May 1 last, p. 868.

Dr. M'Kendrick then illustrated the general relations, both chemical and physiological, of the chinoline and pyridine series of compounds by the following table:—

TABLE—SHOWING CERTAIN CHEMICAL AND PHYSIOLOGICAL RELATIONS OF THE CHINOLINE AND PYRIDINE BASES; ALSO CERTAIN CONDENSED BASES AND NATURAL ALKALOIDS—

Derived by distillation with Caustic Potash from { Quinine .... $C_{20}H_{24}N_2O_2$
Cinchonine............ $C_{20}H_{24}N_2O$
Strychnine .... $C_{21}H_{22}N_2O_2$

Also obtained from Tar.

Properties	Bases of Chinoline Series.			Bases of Pyridine Series.			Condensed Bases of Pyridine Series.			Natural Alkaloids.		
	Name.	Empirical Formula.	Boiling Point in deg. C.	Name.	Empirical Formula.	Boiling Point in deg. C.	Name.	Empirical Formula.	Boiling Point in deg. C.	Name.	Empirical Formula.	Boiling Point in deg. C.
Chemical	Chinoline	C_9H_7N	238	Pyridine	C_5H_5N	117	Diapyridine	$C_{10}H_{10}N_2$	193 to 204	Nicotine	$C_{10}H_{14}N_2$	249
	Lepidine	$C_{10}H_9N$	about 270	Picoline	C_6H_7N	135	Parapicoline	$C_{12}H_{14}N_2$	260 to 315			
	Dispoline	$C_{11}H_{11}N$	282·304	Lutidine	C_7H_9N	154·5						
	Tetrahiroline	$C_{12}H_{13}N$	above 300	Collidine	$C_8H_{11}N$	180				Conia	$C_8H_{15}N$	171
	Pentahiroline	$C_{13}H_{15}N$		Parvoline	$C_9H_{13}N$	above 200						
	Isoline	$C_{14}H_{17}N$		Coridine	$C_{10}H_{15}N$					Physostigmine	$C_{15}H_{21}N_3O_2$	(unknown)
	Ettidine	$C_{15}H_{19}N$		Rubidine	$C_{11}H_{17}N$							
	Validine	$C_{16}H_{21}N$		Viridine	$C_{12}H_{19}N$							
Physiological	Lower, Narcotic; Higher, Convulsive.			Lower, Stimulating; Higher, Narcotic, and tend to arrest Respiratory Centres.			Strongly Convulsive, resembling action of Quinine and Cinchonine, but not Strychnine.			Cerebro-Spinal. Narcotic; Convulsive; Paralysis of Nerve Terminations.		

In conclusion, Dr. M'Kendrick stated that he considered it to be the duty of physiologists to investigate the action on the animal body of many substances known at present only to the chemist. Many of these might be found to have such actions as would render them valuable in the treatment of disease. It is not for a moment to be imagined that we have discovered at the present time the action of all the substances which may be of benefit to humanity. Thus, inquiries of this nature can hardly fail in being of practical utility, either directly by supplying the medical men with new remedies, or by throwing some light on those obscure chemical processes occurring in the living body, on which many of the phenomena of life apparently depend.

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION SOIREE.

The annual soirée of this association, which is now in a very flourishing condition, was given under the presidency of Mr. Thomas Barclay, at the Town Hall, on Thursday, December 16th, and there was a large gathering of members and their friends, including visitors, from London, Leamington, Bristol, and other towns. Probably the most entertaining portion of the evening's proceedings for the ladies present was the ball, which commenced shortly after nine o'clock. Prior to that time, however, there was plenty to occupy attention. The great gallery and the corridors were devoted to the display of a great variety of interesting objects and processes of art and manufacture. In the great gallery, Mr. Wright Wilson, F.L.S., had under his care about a score of microscopes and spectroscopes, with a good selection of objects for examination. Hard by Mr. W. Maidment and Mr. F. W. Kimberley exhibited a choice collection of rubies, diamonds, and other stones, precious metals, etc., with specimens of workmanship in different stages, and showing the changes effected by the application of the chemist's resources. The exhibitors described in an interesting manner, the process of manufacture, such as the alloying, melting, rolling, and wire-drawing of gold, and pointed out the necessity of the aid of the chemist's laboratory. Messrs. Grinsell and Sons, of St. George's, Birmingham, exhibited some rare works in silver and gold. A large case of new pharmaceutical preparations, rare drugs, and chemicals was shown by Messrs. Southall, Brothers, and Barclay, containing, among other things, tayaya — the new remedy for syphilis—along with tinctures of the drug for internal and hypodermic use ; specimens of emetine and crystalline tufts of its hydrochlorate as well as "liq. emetinæ" ; a solution of the alkaloid not liable to deposit and of a standard strength.

Messrs. Davy, Yates, and Routledge were also exhibitors ; and Messrs. Allen and Hanbury showed two cases of jujubes. A number of dried specimens of foreign plants were exhibited by Mr. William Southall, F.L.S. Mr. J. W. D. Hume, of Gloucester, sent a number of mounted microscopic slides of starches. Messrs. Chance and Co., of Oldbury, contributed an interesting model showing how sulphuric acid can be distilled at a much less cost than formerly, by a process the invention of an American gentleman, which has been patented for England by Mr. Chance. Fifteen pounds of coal are made to do the work of a hundredweight by the ordinary process. A large retort made of glass was shown as an example of the actual size and kind used in their laboratory. This firm also exhibited a complete collection of chemicals, illustrating the manufacture of ammonia salts from gas liquor. Among other things a striking specimen, placed under a glass shade, and standing several feet high, of muriate of ammonia, which showed the peculiar crystalline structure of the salt, was exhibited. Messrs. Lancaster and Son, of Bull Street, exhibited a number of optical and scientific instruments ; notably a number of beautifully coloured photographs shown by means of graphoscopes. Mr. C. Pumphrey made experiments with a newly arranged geometric pen. In the corridors a large space was devoted to Messrs. S. S. Hand and Co., of Little Cherry Street. Here were shown specimens of new fancy tobaccos, which Messrs. Hand have recently taken to manufacturing in large quantities, and tobacco leaves of all kinds. At other stands the processes of cigar making, from the stripping of the leaves to the sorting of the finished article, were exhibited, a number of Messrs. Hand's workpeople being present for the purpose. Mr. Tooth gave examples of glassblowing. Mr. P. Squaglia gave illustrations of medallion and figure casting. Messrs. White and Pike showed the art of colour lithographic printing, and the production of druggists' labels. Messrs. Southall practically illustrated, in the corridors of the hall, the manufacture of chemicals. The production of calomel and corrosive sublimate—the two principal compounds of mercury—was shown by means of suitable apparatus devised for the occasion, and, in addition to these two salts, others were shown derived from the same metal. The production of red iodide of mercury attracted considerable attention from the ladies, as the beautiful scarlet-coloured precipitate was formed by mixing two colourless solutions. An arrangement was shown by this firm illustrating the preparation of extracts, etc., *in vacuo*, by means of a still connected with an air-pump. Messrs. Southall also illustrated the manufacture of iodide of potassium. The specimens illustrating this chemical were arranged in groups. First came the different seaweeds which, when burnt, form kelp, fine specimens of which were shown ; and next came the various products of the burnt mass, including iodine, from which the salt under notice is made. The various stages through which the iodine passes till combined with potash to form beautiful white crystals, were shown by means of appropriate samples. In illustrating the manufacture of washing soda and bicarbonate of soda, magnificent specimens of these compounds, which assume forms technically known as "points," were shown under glass shades. This part of the exhibition was conducted by Messrs. Southall, in conjunction with Messrs. Chance, who contributed the crystals. Messrs. Harris and Co. exhibited in action a new thermo-electric generator. This apparatus, which is the invention of a French *savant*, threatens to supersede all older forms of apparatus for electro-plating and gilding. No ~~acids~~ being required, and heat alone being used, it is cleanly and gives off no noxious vapours which render it particularly valuable for house purposes, such as electric bells. In the course of the evening Major Gem gave a short reading, and after which dancing commenced to the music of a quadrille band. The committee room was fitted up as a refreshment department. The whole entertainment passed off in the most successful manner.

LEEDS CHEMISTS' ASSOCIATION.

The fifth general meeting of this Association for the present session was held in the Science Lecture Room of the Mechanics' Institution, on Tuesday, December the 14th, the President, Mr. Yewdall, occupying the chair.

The evening was occupied by Mr. Ward's second lecture on "Practical Pharmacy," and embraced the operations of "Drying and Powdering Medicinal Substances." At the outset, the lecturer explained that the capacity of the atmosphere for absorbing moisture depended upon its temperature. It was necessary to have a current of air passing over the article being dried, so that the surrounding atmosphere, as it became charged with moisture, should move on, and its place be suppled by fresh air in a condition to take up more. As a general rule the temperature to be maintained in drying drugs should be from 100 to 150 degrees. If allowed to remain below that temperature for any length of time, in some articles fermentation would probably commence ; whilst, if raised above it, decomposition might take place. Green herbs were usually dried at about 120 degrees, but certain substances, such as some of the gum resins, required a higher temperature. The best results were obtained by drying at as low a temperature and as quickly as possible. The influences affecting the evaporation of moisture from drugs might be summed up as being the condition of the surrounding atmosphere, the temperature, the physical condition of the article operated upon, and its affinity for moisture. The lecturer here passed a high encomium on Procter's 'Pharmacy,' and advised his hearers to study its pages respecting the subject in hand. He next described the different forms of drying closets, and exhibited a small water oven, some modification of which he recommended as the most suitable for the requirements and accommodation of a retail pharmacy. The two essentials of a good drying closet were thorough ventilation, and easy means of regulating the temperature.

After exhibiting and describing Fresenius's Desiccator for drying alkaloids by simply exposing them in a close vessel over sulphuric acid, Mr. Ward proceeded to the second part of his lecture, namely, Pulverization. Leaving the operations of bruising and reducing to coarse powder to be dealt with in his lecture on percolation, he confined himself on the present occasion to the modes of producing fine powders. The old system of hand powdering by pestle and mortar he dismissed with a passing notice, as being familiar to all, but thought that hitherto there had not been any satisfactory substitute introduced for powdering small quantities, the best, though far from perfect, being the steel or stone cup and cone mill. He then in detail described the different machines and mills used by drug grinders, commencing with the iron rollers used for crushing seeds and other substances previous to their being submitted to the action of the grinding stones:—the edge stones, so termed from their running round a small circle on their edges, and which—from the fact of their whole weight (some twenty or thirty hundredweight) resting, as it were, on one point at a time, and their inner edges travelling a smaller circle than their outer, thereby giving them a tearing as well as a crushing action—which he considered the most powerful disintegrator in use; the flat stones, similar to those used in ordinary flour mills, and in drug mills, mainly for crystalline substances; the stampers, an enlarged adaptation of the pestle and mortar; and the cylinder mills, containing a roller inside, chiefly used for grinding dye goods, etc. Sifting as practised by large concerns was next explained; the fineness of the powder produced being regulated by the custom of the trade and requirements of each case.

In conclusion, the lecturer expressed his conviction that the old system of adulterating powders was fast dying out, if it were not already extinct, and that by paying a fair market price, the retail chemist could now have from the respectable drug grinders a powder equally as pure, and certainly much softer and finer, than he could produce on a small scale at home. But should he meet with any doubtful samples, the microscope was, with a little practice, available as a ready means of detection, and ought to be in the hands of every dispensing pharmacist. The consideration of some drugs requiring special treatment was postponed until the next meeting.

As usual a short discussion followed the delivery of the lecture, during which the President remarked that he thought the statement of Mr. Ward, "that at present there was no really good drug mill adapted to the requirements of a retail business in existence," was a very good argument in favour of Mr. Schacht's proposition for establishing a pharmaceutical laboratory, or some modification of it, at Bloomsbury.

THE ASSOCIATION OF CHEMISTS AND DRUGGISTS FOR WOLVERHAMPTON AND DISTRICT.

The usual monthly meeting of the above Association took place on the evening of the 17th inst. in the Committee Room of the Agricultural Hall. Mr. W. Y. Brevitt (in the unavoidable absence of the president and vice-president) was in the chair, and there was a fair gathering of members and associates.

The Chairman remarked that the principal business of the evening was the reading of a paper by Dr. Totherick on the relations between medical practitioners and pharmaceutists. The subject was one which closely concerned pharmaceutical chemists, and much profit might be gained by its careful consideration. He was pleased to be able to inform the members of the Association that since they had come into possession of their new rooms, in King Street, they had received a number of valuable gifts for the library and museum, and had found people most anxious to assist them in making the new institution what they desired it to be.

The following list of donations was then read:—From Mr. T. Whiffen, a case of valuable specimens of bark, and of the most important salts of the cinchona alkaloids, specimens of quinetum, alkaloid and sulphate, and of nux vomica and St. Ignatius' bean, with samples of strychnia and brucia crystals; from Mr. Henry Silverlock, 250 library labels; from Captain Hay, Governor to the Hospital, a "notes and queries" box; from Mr. W. E. Coleman, a number of prescriptions; from Dr. Stevenson, 'Manual of Chemistry;' from the British Pharmaceutical Conference, per Dr. Attfield, the 'Year-Book of Pharmacy,' 1875; from Mr. George Barber, 'Medico-Botanical Map of the World,' 'Synopsis of British Pharmacopœia,' and 'Pocket Companion to British and London Pharmacopœias;' from Mr. J. G. Gould, some specimens of Indian bark; from Mr. A. W. Gerrard, specimens of jaborandi (large), Gelsemium sempervirens, and coca leaves; from Messrs. Symes and Co., specimens of carnauba root, Goa powder or araroba, as imported, and Caroba jacoranda leaves.

A vote of thanks was very heartily passed to the several donors, and the secretaries were instructed to at once take measures to ensure the proper preservation and exhibition of the very valuable specimens.

Mr. Barrett then read the usual monthly report, in which it was stated that the Association room and library were now in full working order. Classes were held on three days during the week. On Wednesday and other spare evenings the premises were thrown open for what might be termed the recreation of the students, as they could on that day inspect the books and specimens. The classes were not so well attended as they deserved to be, and after the efforts which had been put forth to provide a suitable and comfortable room and efficient teachers, the Council felt disappointed that a greater appreciation was not shown. At the next meeting, in the coming month, the present Council would complete their term of office, and in the same month the first soirée of the Association would take place. An offer of Mr. Scott, to deliver a special lecture to the members, would be considered at the next meeting of the Council; and also matters connected with the extension of their museum. He then read a letter from Mr. T. N. Morson, F.C.S. (of London), containing a promise to present a portrait of the late Mr. Morson, sen., who was greatly respected by many of the chemists in the district, and wishes for the success of the Association.

The Chairman then briefly introduced Dr. J. Y. Totherick, the reader of that evening's paper, who was very heartily received.

ON THE RELATIONS BETWEEN MEDICAL PRACTITIONERS AND PHARMACEUTISTS.

BY JAMES Y. TOTHERICK, M.D.

Physician to the Wolverhampton and Staffordshire General Hospital.

There has always been a difficulty arising from apparently opposed interests between the prescribers and the dispensers of medicine, and I suppose there always will be. I do not pretend that by any observations I can make on this subject I can overcome this difficulty, but I wish to state some common sense facts on the subject so as to raise a discussion out of which some true ideas may come.

In the outset I may state at once that medical practitioners in the country must always be to a great extent their own dispensers, simply because druggists do not exist in many country districts, and it would be absurd to send patients for miles into a town to obtain medicines. But in towns of course this difficulty does not exist. "How is it then that the great majority of medical men living in towns still continue to dispense their own medicines?" This question is one of great importance to both doctors and druggists.

One reason why the practice was continued is, I believe, a popular feeling, whether right or wrong, in favour of getting the physic from the man who prescribes it. I suppose that in the good old days, when doctors made out bills as long as my arm, with every item charged in full, it must have seemed to their interest to charge pretty well for their own physic; such a price, in fact, as would be grudged to any druggist. Much of this feeling has passed away with the old order of things, and I do not know a doctor who makes out his bills by item, the rule being to include the charge for medicine in that for attendance. A reason for the popular idea is probably the objection to having two bills running up instead of one, for many people have a shrewd suspicion that whether a doctor charges for physic or not, his bill will come to about the same amount. And really there is something in this. A doctor knows pretty well that he can, if he could spare the time, make up a goodly number of bottles for a few shillings, and that this need not greatly influence him in his charge to his patient; while he knows equally well that if he wrote a prescription instead, and sent it to a druggist, his patient would be twice charged. How then can the doctor secure his just remuneration, the druggist obtain the reward he labours for, and the advantage of the patient at the same time be secured? I know the difficulty of the subject is great, but there is a solution for it, and I believe that when united action becomes the rule amongst doctors, as it surely will in time, and when societies like this have become consolidated, and accustomed to act with a long-seeing beneficent self-interest, the two united bodies will solve the problem. As a rule, I believe the druggists have hitherto had too low an ideal; the tradesman element has been apt to overtop the scientific, and, if such be the case, it is scarcely to be wondered at that the public has hardly yet learned to transfer its confidence from the doctor to the druggist as a dispenser. If, however, pharmaceutists assiduously devote themselves to the higher branches of their calling, and prove themselves to be careful, conscientious, and expert dispensers, they will get dispensing to do. A time of transition is at hand. The members of the medical profession are tired of making up physic; it is not their work, and when the public wish it, when the druggists are ready for it, and the public will trust all of them, dispensing will and must fall into their hands.

After making various suggestions as to arrangements which might be made between medical men and the druggists, the lecturer went on to speak of the grievances which practitioners thought they justly had against druggists and which, he felt, raised a lofty barrier against the existence of a friendly and cordial feeling. One of these, he said, is counter prescribing. I do not refer to the mere giving of advice to any person who asks it, but to persons undertaking to treat long and complicated cases, which require special training, and which cannot be properly attended to by those who have a drug trade to look after. I have been sickened and disgusted by things which have come under my notice in this town. I have stood in druggists' shops and heard young men, whose beards required no shaving, asking women, who might have been their mothers, questions I should blush to repeat at this meeting, and giving directions which, to say the least, ought only to be mentioned in the privacy of a consulting room. I do not speak only from chance hearsay. I have learned dispensing in a public drug shop, and there, when quite a boy, I learned also how to treat, or at least how confidently to prescribe for, diseases which now-a-days I approach the consideration of with fear and trembling. These things ought not to be. Masters ought by their own example and precept to put a stop to all this detestable quackery, which is not right to the trade, nor to the public, nor to the profession. It will never happen that medical men will not provide themselves with medicines to use in all cases of emergency, and equally will it never happen that a druggist will be forbidden by common sense to give a rhubarb mixture for a temporary indigestion; but these things do not militate against the general principle that prescribing should be left in the hands of the prescriber, and physic-making in the hands of the druggist.

I have next to touch upon a nasty subject, and one which I would far rather leave alone, but that I felt compelled to refer to it. This is the subject of quack medicines, and in speaking of them I trust none of my hearers will impute to me any desire to be personal. I readily admit that there are a few doctors who have so prostituted their professional standing as to institute quack remedies and lend their names to advertising puffs; but then those are the acknowledged prostitutes of a virtuous society which lends them neither countenance nor support. Their standing was never recognized by any medical society in the country, and, in fact, they are pariahs, owned by nobody. Far different, however, is it, I grieve to say, amongst druggists. Their corporate morality in this respect is the very reverse of what it ought to be. Not a month, a week, or a day passes but advertisements are issued respecting the discovery of some wonderful pill, potion, linctus, or plaster, which is at once to cure "all the ills that flesh is heir to." An ignorant public is of course ultimately responsible for allowing itself to be gulled, but is it not lamentable that there are so many harpies always ready to gull the public? I have known poor, hardworking families spend half their earnings on some utterly worthless trash, backed up by specious testimonials and audacious lies. I know that these wares are looked upon by druggists in general as legitimate articles of trade, and are dealt in without the least scruple of conscience or feeling that there is any degradation in such a trade; but I know that it will be a long time before doctors will take the same view of the matter, and I feel quite sure that if the drug trade is to rise to that status in which we should all like to see it, the unclean thing which now defiles it will have to be cast away. There may be legitimate bounds to humbug—I cannot say; but it seems to me a pity that the trade which should be the highest, the most scientific, the most honourable of all, should have fastened on it the vilest and most loathsome of all the forms of humbug. It seems still more humiliating that so many whom we count honourable and upright men, and who are in every other respect patterns of what druggists ought to be, should glory in their quackeries as though they were something to boast of. What does the trade gain by such a business? Of course we must not consider the few who have some proprietary article, which, by dint of puffing, they have made profitable, and are not likely to give up. I am now speaking rather of Parr's and Holloway's pills, the porous plasters, and that large array of humbug which forms so large a part of the druggist's trade. Supposing these were given up, and all druggists were to take a firm stand in recommending instead the various preparations of the British Pharmacopœia. Surely the latter are quite as efficacious, devised as they are by the greatest living authorities, and surely they would yield as great a profit. It seems to me even from a utilitarian point of view, that the putting down of quackery would be a benefit to the trade, although at the same time, I know that human nature likes to be gulled, and so long as this is the case there will be plenty of people to gull it.

I wish in conclusion to give a word or two of advice to the younger members of this Association. Each one of you has a career before him. It depends upon yourselves what you make that career. If you employ all your time to gain useful knowledge and to train yourselves for success in life,—without accident—success by a law of nature, as certain as the law of gravitation, must be yours. If you let slip your opportunities, if you are careless and indifferent about the future, if you allow your morals to become corrupt, you are simply preparing for yourselves a life of misery, you are mere pieces of driftwood on the ocean of life and it would perhaps have been better for you had you never been born. You have a noble business capable of absorbing your keenest intellects, of employing your highest scientific acquirements of developing the highest power sboth of your moral and intellectual faculties. In the highest prosecution of that career I wish you God speed.

At the close of the paper, which was listened to with great interest, after a short discussion a vote of thanks which was proposed by Mr. Edward Morris, F.C.S., and seconded by the borough analyst (Mr. E. W. T. Jones, F.C.S.), was very heartily passed to the doctor for his interesting paper.

Mr. F. J. Barrett, F.C.S. (in the absence of Mr. Stokes-Dewson, who was advertised to have been present, but was unavoidably prevented), gave a running commentary upon the materia medica and chemical specimens which had been recently presented to the museum. In speaking of the characteristic appearances of the different cinchona barks, he pointed out two splendid specimens of "renewed" bark, which he stated were interesting from the fact that they were grown after the trees had been once stripped; the trees, or limbs, being then bound in moss, and the second growth of the bark thus protected. Bark grown in this way was much richer in alkaloids than the bark previously removed from the same plants. He showed some splendid samples of East Indian (Neilgherry) red bark, and said that although these barks did not contain so large a proportion of quinine as many of the South American barks, it was stated they were specially rich in cinchonine, cinchonidine and quinoidine. Mr. Broughton (the Government Indian plantations quinologist) had stated that in India the entire alkaloids of the bark were precipitated together, and thus employed in medicine in the place of quinine. Recently, Mr. Thomas Whiffen had introduced, under the name of quinetum, a preparation, which was, in fact, similar to that proposed to be made in India (stated to consist of the pure alkaloids of East Indian red bark). Although he had not had time to make a thorough examination of this drug, it appeared to be a really useful preparation, and if it were possible to ensure unvarying proportions of quinine and other alkaloids, one likely to find great favour with the medical profession. He then briefly alluded to the entire specimen and sections of Bael fruit, and pointed out a sample which had been prepared by the natives, and which, according to Mr. Gould, was of remarkably fine quality. It had been prepared by rubbing the pulp of the ripe fruit down to a uniform paste by means of a spatula, and afterwards drying it in the sun. Specimens of Jaborandi (*Pilocarpus pennatifolius*), yellow Jasmin (*Gelsemium sempervirens*), Coca leaves (*Erythroxylon Coca*), were then shown and commented upon; and Mr. Barrett concluded by giving a short *résumé* of articles which had appeared in the *Pharmaceutical* and other scientific journals on the three Brazilian drugs, Carnauba root, Goa or araroba powder, and the leaves of Caroba Jacoranda. He stated that the last three drugs were at present but little known in this country, but it was possible that after careful investigation by medical men they might take a high place in the materia medica of the land.

Votes of thanks were unanimously passed to Mr. Barrett, and to the Chairman for presiding, and the remainder of the evening was spent with the examination of the pharmaceutical novelties, with which the table was covered, and which were exhibited by Messrs. Lynch and Co., Maw, Son, and Thompson, and Henry Silverlock.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, December 16, 1875. Professor Abel, F.R.S., President, in the chair. After the usual business of the Society, Dr. C. R. A. Wright read a paper by himself and Mr. G. H. Beckett "On Narcotine, Cotarnine, and Hydrocotarnine," Part III., in which the authors brought forward experimental evidence of the constitutional formulæ for hemipinic acid, opianic acid, and meconin. Dr. H. E. Armstrong then gave an account of researches by Mr. Harrow and himself "On the Action of Alkaline Sulphites on the Haloid Derivatives of Phenol," and on "The Action of Nitric Acid on Tribromophenol." Mr. E. Neison subsequently made a communication on "The Sebates of the Alcohol Series." After which papers were read by the Secretary "On the Compounds of Ether with Anhydrous Metallic Chlorides," by Mr. P. P. Bedson, and "Observations on Variations in the Composition of River Waters," by Mr. J. Andrews. The meeting finally adjourned until Thursday, January 20, when there will be another paper by Mr. G. H. Beckett and Dr. C. R. A. Wright, "On Narcotine, Cotarnine, and Hydrocotarnine."

NEWCASTLE-UPON-TYNE CHEMICAL SOCIETY.

At a general meeting of this society, in the theatre of the College of Physical Science, November 25th, 1875, the president, John Pattinson, Esq., in the chair, Mr. R. C. Clapham read the following paper:—

Notes on a Visit to Chemical Works in France in the Summer of 1875.

During the past summer I had occasion to pay a visit to France, and I took the opportunity of making inquiries about, and personally visiting, some of the large industrial works there. To-night I propose to read to the members a few short notes, mostly made on the spot, specially referring to the soda manufacture in France. This industry is interesting to us in this locality from various points of view. It is to France that we are indebted for the process now universally adopted for making soda in England; for Gay Lussac's important invention for saving nitrate of soda; and for many other chemical inventions of great practical utility. In a paper read before the members in 1869, I stated that not many years passed away, after the establishment of the first soda works in Paris in 1794, before our own townsman, the late Mr. William Losh, commenced soda works on the Tyne—this district being, in fact, the cradle of the soda manufacture in England.

The chief points of interest I was desirous of directing my attention to were: The difference in the arrangements and construction of the works in the two countries; the quality and cost of the raw materials employed in the manufacture; the technical results obtained in the different departments; and the organization of the French workmen and the wages paid. To some extent all these vary in different parts of France, but the main features may be given.

There appear to be no published statistics in France relating to the consumption of materials in chemical works, or the products therefrom. Perhaps one of the best tests as to the extent to which the soda manufacture is conducted in any locality is the consumption of salt, and I took some pains to ascertain this in France, and as far as I could learn the total consumption for chemical works did not exceed 120,000 tons per annum. Part of this is employed in simply making sulphate of soda for glass works, and the remainder in making soda. When we recollect that the salt used on the Tyne alone amounts to about 190,000 tons annually, the quantity used in France appears very small; this is partly accounted for from the fact of France being an importer of chemicals from England, and also that owing to her bright and clear atmosphere and her sunny skies, the use of chemicals in which soda forms a part is not required. Chemical works are situated in different parts of France—at Rouen, Lille, Chauny, Alais, Marseilles, and other places. A few of these works are extensive, and one which I visited used as much as 20,000 tons of salt yearly.

The supply of raw materials is obtained from various sources: pyrites are chiefly got in France itself and from Belgium, and the cost at some of the works is 47s. per ton as compared to 26s. in England; salt costs about 28 francs a ton, the Belgium ground rock salt, which is at present being imported there, being rather less; manganese of 70 per cent. costs as much as £8 10s. per ton. Coals are obtained in large quantities from the Pas-de-Calais, also from Belgium, and certain classes of coal from the Tyne and Cardiff. The French coal is not at all bad for firing purposes, but contains a good deal of ash. It costs from 26 to 28 francs a ton. The supply of limestone is both abundant and cheap, and costs only a few francs a ton. It will be seen from the above that raw materials in France are much dearer than in England; this partly arises from the position of the works and from other local causes, but still the fact remains the same. On the other hand, wages of workmen are all lower than in this country, but at the same time the work turned out by each workman is less. It may, however, be safely stated that the daily wages in France, for this class of work, are from 20 to 30 per cent. lower than with us. As far as I could myself judge, from seeing the workmen at work, and also from visiting their houses, which I had an opportunity of doing, they were industrious, frugal, and orderly, drinking being little known.

Broadly speaking, it may be said that in France nearly all raw materials employed in chemical works are much dearer than in England; that the labour is cheaper, and that the quality of the products manufactured is practically far superior to the importations from England.

A few technical details may not be out of place before this society. The pyrites used are generally non-cupreous, and contain 46 to 48 per cent. of sulphur. The charge in the burners is light, not exceeding 7 cwts. in twenty-four hours; the burners are carefully attended to and leave an ore containing not more than 1½ to 2½ per cent. of sulphur. The yield of sulphuric acid, as might be expected under these circumstances, is very good, being about 135 per cent. on the pyrites. Owing to the heat of the climate in summer, the chambers are usually entirely roofed in, and are kept very neat and clean inside the passages. The men in this department, as in all others, work twelve hour shifts, and are paid 3*s.* per day, as against 5*s.* on the Tyne. In the sulphate of soda departments, the furnaces are large, and have three beds, but they only work two and a half tons of salt in twenty-four hours, as compared to about ten tons here. This small quantity is worked chiefly with the object of getting a complete condensation of the hydrochloric acid gas; the quality of the sulphate of soda is consequently very fine. The hydrochloric acid gas is first passed through long cooling pipes to an extensive series of Woulfe's fire-clay bottles, which are manufactured very skilfully and at moderate prices in different parts of France. It may be stated that it usually requires about 100 of these condensing bottles to each furnace, and by this slow and careful method of working, the gas which finally escapes to the chimney is reduced to a mere trace. As far as I could calculate on the spot, this system of condensation is considerably less costly, as far as erection is concerned, than the stone or brick condensers in England. The results are also better, as is shown in many places by the green fields and growing trees near the works. The acid obtained is very strong, standing 30 to 32 Tw. The workmen are paid 3*s.* 4*d.* per day of twelve hours.

The balling process again is different to ours. The sulphate, coal, and limestone, are first all finely ground, and a much heavier charge of the mixture than we use is put into the furnace at one time, but the number of balls made is less. For instance, in some places 17 cwts. to 18 cwts. of mixture constitutes a ball, and five or six balls are drawn out in a twelve hour shift, and in other places the weight is still greater, being as much as 40 cwts., and two to three balls are drawn in twelve hours. Owing to the slowness of working and the moderate fire-heat applied, it is not found necessary to use much more than the chemical equivalents in the mixture; for instance, instead of using 50 per cent. of mixing coals on the sulphates, the French only use 25 per cent. to 30 per cent. The balls produced are consequently nearly cream colour, instead of black as with us. They are so dense and hard, however, that they find it necessary to have them broken to small pieces before being sent to the vats. The wages in this department are 3*s.* 4*d.* per day, as compared to 5*s.* 3*d.* here. The vat liquors are generally boiled down in open pans by the waste heat of the ball furnace, the salt being fished out, and the remaining red liquors are used in making caustic soda. In some works the black salt so obtained is re-dissolved in pure water, settled, and then evaporated and calcined in brick furnaces with a dished bottom, similar to those used in England twenty-five years ago. The soda ash obtained by this plan of working is very white and pure, and nearly resembles the English refined alkali.

This calcined ash is used in making the French soda crystals, the solution being crystallized in small metal dishes about 15 to 18 inches diameter and 9 inches deep, producing a very good quality of soda. In a hot climate like that of France it would be found very difficult to crystallize the soda liquors in large vessels as in England, but the use of small vessels appears to overcome the difficulty, and the produce obtained is quite as large as in the colder climate of England. The dishes are placed in long rows, two deep and four in height, and appear to be readily worked, the cost of wages not being more per ton than with the large crystallizing cones here. The soda is afterwards carefully dried on shelves in another room, and then packed in casks for the Paris market. Owing to the care and cleanliness throughout, and the chemical purity of the materials, the French soda brings two francs per cwt. more in the Paris market than soda imported from England.

I will now turn for a few minutes to the bleaching powder process. At the time of my visit, the Weldon patent had not yet come into operation, but several works were already erecting plant for the purpose. I will therefore describe the old manufacture, which is so familiar to most of us in this room. Instead of using the large square stills which we have in this country, the French use a small retort made of fire-clay, and nearly similar to the Woulfe's bottles already referred to. A charge of about 50 lbs. weight of ground manganese is used, and hydrochloric acid of 30 to 32 Tw. is added. In some works this vessel is heated from below by means of a flue, and in others it is heated by steam; an almost complete decomposition of the manganese takes place, which consequently produces a larger yield of bleach than in England—no manganese being practically wasted. The chlorine is conveyed part of the way to the chambers in glass pipes, so that from the colour of the gas it is not difficult to see when the manganese is worked off and the still is ready for another charge. The bleach chambers are made of stone flags, containing a series of shelves, on which the lime is spread, and the bleach is not brought up higher than 32 degrees, which is the usual French standard. In one works which I visited, as much as 6000 tons were made annually.

At some of the works it was pleasant to notice, in a social point of view, that large schools were established for the education of the children of the workmen. I visited a school where 600 children were being taught; news-rooms, concert halls, and billiard rooms, were also connected to the same works; and on Sundays the men and women flock to these places of amusement in considerable numbers to enjoy themselves.

In England chemical manufacturers have for many years past laid themselves out for the establishment of works with very large productive powers, quantity being the main thing in view. The reason given for this has been, that owing to our high-priced labour it was absolutely necessary that a large weekly turn-out should be accomplished. Apparatus in chemical works has also been constructed on a similarly gigantic scale, and in this competitive race I fear it must be acknowledged that superior excellence, good colour, and general chemical purity, have to some extent been forgotten. On the other hand, the French, with their dear materials, their small but many times multiplied apparatus, the constant application of the chemical laboratory to every process, the cleanliness and care of their frugal and saving workmen, are producing chemical products which, although in nearly all cases dearer than in England, are certainly of superior quality, from which the English manufacturer may take a lesson.

In the discussion which followed—

Mr. W. H. Richardson said what struck him more particularly in France was, the use of nitric acid instead of nitrate of soda in the sulphuric acid chambers. The quantity of nitrate of soda used was less than one-half of the smallest quantity he ever heard of being used in this country for making sulphuric acid.

Dr. Lunge said he had been through some of the works which Mr. Clapham and Mr. Richardson had both visited. So far as the use of nitric acid was concerned, perhaps Mr. Richardson was under a misapprehension if he assumed that this was a peculiarity of these works. So far from that being the case, he believed it was universally practised both in France and Germany. A gentleman who had learnt alkali making from an English point of view, and afterwards became the manager of a German works, told him his experience there, and assured him there was a very great advantage indeed in the use of nitric acid. He might say that this gentleman's reasons so far convinced him, that when a case once came up to him to decide about the erection of alkali works, he had very serious thoughts indeed of relinquishing the English method and introducing the continental way; and in the end, the only thought which deterred him from doing it was, that he was afraid to have too much difficulty in the first instance with the workmen. The whole secret was, that the supply of nitric acid, when liquid nitric acid was used, was absolutely under control, and perfectly regular at all hours. The cost for nitre was less in works (conducted with about the same degree of skill as ours), which used nitric acid, than in those which use nitrate of soda, as in our own process. The nitric acid is always introduced in a special small chamber; in this way, that there is a terrace built of earthenware dishes one above the other in the form of a staircase, so that the nitric acid, running into the topmost, flows over from a lip, runs into the second one, overflows from it into the third one, and so on until it reaches the bottom; and at the same time the chamber gas, acting upon it, partly evaporates the nitric acid of the liquid, and partly changes it, even then, into the well-known mixture of hyponitrous acid and nitric oxide, so that, when the acid arrives at the bottom of the terrace, it is so far diluted that it acts no more injuriously upon the chamber lead. The nitric acid is always introduced by means of vessels which allow a perfectly constant flow of it, similar to what was formerly done in the case of sulphuric acid flowing into the Gay Lussac towers. The cost of fuel and labour in making nitric acid is exceedingly slight; so slight that it is like nothing to the saving which was effected. In some works it was professed that the percentage of nitre they worked with went down to 1 per cent. He could not vouch for that, but it was a fact that they work with less nitre than we do. So far as the general arrangements of the works are concerned, he entirely agreed with that part of Mr. Clapham's remarks which referred to the greater care bestowed by Frenchmen upon the quality of their productions, and as to the greater success in the matter of purity which they attain, although that is only done at the cost of much more labour, plant, and time. He did not think that, in many of the respects which Mr. Clapham had mentioned, their plant was preferable to ours; on the contrary much of it was of a very old fashioned character. Their decomposing pan was similar to what had been given up in this country almost a generation ago, but not altogether. They had adopted some of the English modifications, although they had only lately introduced cast-iron decomposing pans. Leaden pans are only used where special purity of sulphate is aimed at, for glass making. It might interest gentlemen who had worked in this matter to know that this industry was getting entirely crushed, and that was in consequence of Hargreaves' process. Only a few days ago a friend of his, the manager of a Belgian alkali works, told him that they had entirely given up a large branch of their works—the making of sulphate of soda—for glass making, because Hargreaves' sulphate was sent over to Belgium at such a low price that they were not able to compete. He thought the French were behind us in the working of their soda ash processes. They use almost the processes and furnaces that were introduced seventy or eighty years ago, and work those enormous batches. It would be of interest to some of them to hear that in perhaps the very best German alkali works he knew of, they used both the French and the English processes, the results being that the English processes, viz., the small furnaces and the small balls, were decidedly superior to the French processes. He thought a proof of this was given by the statement which Mr. Clapham had made to them, that their yield was only 72 per cent. of 50 per cent. ash. The crystallizing cones were, as Mr. Clapham had stated, about 18 inches in diameter, and not too large to be handled by one man. He believed they were allowed forty-eight hours to crystallize. They were taken one by one, and lifted up by a labourer and dipped into a pan with hot water for a few moments. The result was that the layer of soda salt immediately adhering to the pan became liquefied, and it was possible to tilt the whole contents of the pan as a solid cake out of it. These cakes, of the shape of these pans, were all placed on edge in rows, leaning against each other, and allowed to drain; then, after they had drained a certain time, they were again, without breaking, put into stoves, where they were dried, because the French market requires soda crystals to be perfectly clear. He must entirely agree with Mr. Clapham in his remarks about the quality of these crystals. The French were far more careful in the making, and the result was soda ash of very much whiter colour than ours.

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN v. TEAGUE.

This case was heard at the Ludlow County Court, before Josiah Smith, Esq., Q.C., the judge, on Wednesday, December the 15th.

Mr. Flux, on behalf of the plaintiffs, said: The defendant is sued for a penalty incurred under the 15th section of the Pharmacy Act, 1868, by a sale on the 25th of September last of two packets containing arsenic, he not being a duly qualified chemist and druggist. The defendant is a beer-shop keeper, and the sale, which will be proved, was made by his daughter at his beer-house to a tailor, who there applied for packets of sheep-dipping powder, and was supplied by the defendant's daughter (of course, as acting for him) with two packets made up, each packet being labelled as Sheep-Dipping Powder, and bearing the name of some person other than the defendant as the maker up of it. The sale thus made was so made without any of the precautions or formalities required by the statute. Each packet has been analysed, and found to contain a compound, whereof arsenic forms part, so poisonous that the contents of one of them might destroy the lives of over a hundred persons. There is reason to believe that the defendant has systematically sold such packets; but, in fact, he is not known to the plaintiffs, and they sue, not because of any vindictive feelings, but because the Council of the Society regard the duties cast upon them by the Act of Parliament as a trust to be exercised for the protection of the public, and therefore to bring home to the minds of those who may unlawfully deal in poisons the practical effect of the law, and that by sales of this kind penalties are really incurred, the plaintiffs have caused the action to be brought and press for a judgment in their favour. I produce the printed register of chemists and druggists for the current year, which, according to the Act of Parliament, is evidence. I point to the fact that the defendant's name does not appear therein, as for the purposes of this case conclusive that the defendant is not a duly registered chemist and druggist, and I shall call three witnesses to prove the purchase and analysis of the poison.

The Judge (addressing the defendant): What have you to say to this?

The Defendant: Your honour, I admit the sale of the packets, and that they contain arsenic, but in selling them I was acting as an agent to Mr. Hollier, of Shrewsbury, to whom I was accountable for the sales; and I did not know that I was liable to any penalty, or, in fact, breaking the law.

The Judge: Are there not very numerous persons who, not being chemists and druggists, sell for various purposes packets containing poison? I may suggest, for instance, packets containing poison for the destruction of vermin, such as bugs.

Mr. Flux: It may, perhaps, be said that in a sense the contents of the packet in question were intended for the destruction of vermin, such as sheep ticks, but I submit that no question arises on this Act of Parliament as to the purposes for which poisons are sold, and that the only question is as to whether the article sold is a poison within the meaning of the statute; that it is such a poison is beyond question in this case, for at the head of the schedule to the statute there appears "Arsenic and its Preparations," and clearly the contents of these packets consist of arsenic, or a preparation of arsenic. I may say that if there are, as your honour suggests, many persons who sell poisons without being on the Register, that state of things exists only by reason of the difficulties in the way of detection and proof, and that wherever a clear offence against the Act of Parliament exists and can be proved the Society does not fail to discharge its duty.

The Judge: It may be of importance to the public to obtain these packets without restriction and apparently no harm can result from the use of packets like these for sheep-dipping purposes.

Mr. Flux: The whole subject of the sale of poisons was carefully considered by parliamentary committees before legislation on the subject, and I submit that no public inconvenience can result from sales of poisons being made by registered persons only, for chemists and druggists are sufficiently numerous in all parts of the country and the restriction of sales of poisons to duly qualified persons was deliberately enacted by parliament and regarded as for the public good. True, no mischief will result from the use of these poisons for the purposes of sheep-dipping, but parliament contemplated the misuse of poisons either by accident or design, and that as mischief might result from poisoning there should exist those links in the chain of evidence which might perhaps be means for deterring or detecting wrongdoers which are established by the formalities on the sales enacted by the clauses of this statute. And further, parliament, when passing this statute, cast upon the Council of the Pharmaceutical Society a measure of responsibility with regard to the administration of this law, and therefore it is that the Council are careful that in the discharge of their duty for the protection of the public they shall not be reproached with negligence and they have instructed me to attend here to-day and afford the Court all the information which my experience in these cases may permit of.

The Judge: But there are patent medicines sometimes containing poisons. Do you contend that sales of patent medicines expose the sellers to these penalties?

Mr. Flux: I ought, perhaps, to have mentioned that special exemption exists with regard to patent medicines.

The Judge: What are the distinctions of a patent medicine?

Mr. Flux: Clearly this is not a patent medicine, for one of the leading distinguishing points of patent medicines is that they are for the healing of the human body, and I may say that they are sold by persons licensed for such sales, and that the medicines must be stamped with revenue stamps; so that if this were a patent medicine then the defendant would be in the position of having incurred heavy penalties to be sued for under the revenue laws.

The Judge: Then if persons unwittingly sell these poisons would they be liable to the penalties?

Mr. Flux: Certainly; I say so with confidence. What I am pressing for is a judgment, and I submit that judgment for the penalty is right in this case. Whether the judgment should be enforced is a matter which will remain in the discretion of my clients, and, as of course, I shall lay before them whatever recommendations may fall from your honour in the event of your being satisfied that the defendant acted innocently.

The Judge: I should like to know whether any case under this Act of Parliament has been before the Courts of Westminster—of course, by way of appeal.

Mr. Flux: I may say with confidence that there never has been an appeal from the decision of any county court judge. There was one case under this Act of Parliament before the Court of Queen's Bench, but that was not by way of appeal from a county court judge; and it resulted, in the course of action pursued by the Council of the Society being upheld, and the other party having to pay Queen's Bench costs.

The Judge: The fact that there has been no appeal may have resulted from the circumstance that the judgments are for sums not exceeding £5.

Mr. Flux: I understand that in such cases there may be appeals if the parties concur, and I am always careful to throw no obstacle in the way of an appeal; and, on the contrary, I have in other cases offered every facility for an appeal, and I offer to do so in this case. I have an opinion of a former attorney-general which I will read.

The Judge: In this case the plaintiffs are entitled to a judgment for the sum sued for, but taking all the circumstances of the case into consideration, I strongly recommend the defendant to the merciful consideration of the plaintiffs. It will no doubt be made publicly known that sales of this kind expose the parties to penalties, and that in any future case judgment for the penalty will be given.

Mr. Flux: I shall certainly be careful to communicate to my clients your honour's views; and I have to ask that the judgment may be in the usual form, and extend to the costs of three witnesses, who are in attendance, with solicitor's fee.

The Judge: Certainly; let the payments go in that form.

PROSECUTION UNDER THE SALE OF FOOD AND DRUGS ACT.—THE SALE OF LIME JUICE.

On Thursday, December 15th, at the Liverpool Borough Police Court, before Mr. Raffles, the stipendiary magistrate, Mr. Thomas Jones, chemist, Great Howard Street, was summoned for having sold lime juice that was not of the nature, substance, and quality demanded, by which he had made himself liable to a penalty not exceeding £20. Mr. Atkinson, the deputy borough solicitor, who supported the information, said that the case was the first one under the new Food and Drugs Act. A pint of lime juice was bought at the premises of the defendant, and on being analysed was found to be deficient in the properties of that commodity. He called attention to the label on the bottle, which was "Lime Fruit Juice, Evans, Sons, and Company, Liverpool," and which then went on to set forth the value of the article. The following was the certificate of Dr. J. Campbell Brown, the borough analyst:—

"I am of opinion that the said sample contained the parts as under:—3·88 per cent. of dry, solid matter, including acid corresponding to 2·135 per cent. of crystallized citric acid. The sample is of only one-third of the strength of genuine lime juice; and I am of opinion that so large a dilution as two to one was not made for the purpose of rendering the article portable, palatable, preserving it, or improving its appearance; and that such dilution was not unavoidable; and that it is injurious to health only in so far as it reduces the therapeutic value of a drug which is often a necessity of life during long voyages."

The case having been proved, the defendant said he bought the lime juice as a pure article from Messrs. Evans, Sons, and Company, who were the largest importers in Liverpool. They told him that taking the cork out of the bottle would have the effect of reducing the strength, as had been stated by the analyst.

Mr. Raffles.—You mean to say that you left it without the cork.

The Defendant.—I bought about half a gallon of it, more for my own use than for selling. It is a nice palatable drink with sugar and water. I have taken it myself in the summer.

Mr. Atkinson.—Well, if it is liable to lose its strength it is a serious matter. I am bound to say, however, that the defendant is a most respectable man, and I don't think that he is morally guilty. We are bound, though, to protect the public.

Mr. Raffles.—I suppose people who supply ships generally go to the wholesale dealers.

Mr. Atkinson.—I think they do.

Mr. Raffles said it was exceedingly important that lime juice, to have the effect intended, should be of the proper substance. He inflicted the small penalty of 5*s.* and costs. If it had been shown that the lime juice was supplied to ships he would have imposed a heavier fine.—*Daily Post.*

Since the hearing of the above case the following correspondence has appeared in the *Liverpool Mercury*:—

"Gentlemen,—Our attention has been drawn to a report in your journal of to-day of a prosecution under the Adulteration Act for selling lime juice which was not of a proper strength, in which report we are referred to as having supplied the defendant with the article in question; and we think that from the manner in which our name is brought into the case a few words of explanation are necessary on our part to put the public right in the matter. Let us state, then, with your permission, the facts of the case. It is quite possible that this lime juice originally came from us, but the defendant omitted to state when. This information we can supply, he having purchased it in October, 1874, or fourteen months ago. The fact that the juice was kept this length of time, coupled with the admission of the defendant that the cork was out of the bottle, is sufficient to prove to any one aware of the properties of the drug that decomposition would take place.

"Our worthy stipendiary magistrate seems to be under a misapprehension as to the description of lime juice ordered by the Board of Trade to be carried by merchant vessels for the use of the seamen. The juice is preserved from the very deterioration which we mention above by the means of alcohol, which is directed to be added.

"We may state that for the last month we have been aware of the fact that the inspectors have been busy in different quarters of the town purchasing our bottled lime juice fruit for the purpose of analysis, and it is only when they find the decomposed sample sold by the defendant that a prosecution takes place, and we think that if Mr. Jones had but taken proper precautions he would not have found himself before Mr. Raffles.

"In conclusion, we may give our chemist's analysis of the consignment of lime juice from which Mr. Jones received his supply. Specific gravity at 60 degrees F. 1·040, percentage of free citric acid 8·428, which is equivalent to 13·484 ounces of the acid in each imperial gallon.

"EVANS, SONS, and Co.

"56, Hanover Street, Liverpool."

"Gentlemen,—My attention has been drawn to Messrs. Evans, Sons, and Co.'s letter in your paper of the 17th instant, and am glad to find they acknowledge that the lime juice in question was obtained from them. I have been too long in the business not to know the value of keeping bottles well corked, and especially lime juice; and what I stated in court, though not reported, was that I could only account for its becoming weaker through the air getting in of necessity every time any was taken out of the jar. This information I also gave at the office of Messrs. Evans, Sons, and Co., when I called to see them respecting the case then pending. No doubt every time the cork is withdrawn, once air is let in, the process of deteriorating begins, hence the necessity of putting it up in small quantities; in bulk it is sure to get weaker, unless quickly used. The authorities after this will, no doubt, look sharply after the wholesale druggists and ship-store dealers who so largely supply this useful article to ships going long voyages.

"THOMAS JONES.

"162, Great Howard Street,
"December 18, 1875."

INFRINGEMENT OF TRADE MARK.

In the Second Divisional Court of the Exchequer Division of the High Court of Justice, on Saturday, December 18, the case of Hickisson *v.* Ashton was heard before Baron Cleasby and a common jury. It was an action for the alleged infringement of the plaintiff's trade marks. The defendant pleaded not guilty, and that the plaintiff had no exclusive right to the trade marks in question.

Mr. Yeatman, Mr. Willoughby, and Mr. Purcell appeared for the plaintiff; Mr. Serjeant Sleigh, Mr. C. Marsh-Denison, and Mr. T. J. Greenfield for the defendant.

The plaintiff carries on business at 75, Southgate Road, N., as the manufacturer of the well-known marking ink, called "Bond's Marking Ink," and the defendant is a chemist, at 11, Nile Street, Hoxton. It appeared that the late John Bond, the original inventor of the marking ink known by his name, left an only daughter, who inherited her father's right to manufacture the ink. She married the plaintiff, who now carries on her father's business. The plaintiff's ink is sold in small glass bottles of a particular shape and size, each of them being corked in a particular manner, and enclosed in a case made of cardboard, covered with marbled paper, on which is pasted a square white label bearing the Royal Arms of England, and, among others, the words "Crystal Palace and Royal Indelible Marking Ink," and directions for use. The label also bore the words "Prepared by the daughter of the late John Bond." The cardboard case is enclosed in a blue paper wrapper fastened by an oval white label bearing the Royal Arms of Holland, and words similar to those on the inner label. The plaintiff also sold the ink in bottles enclosed in a wooden pedestal, on which the part of the fabric to be written upon could be stretched by means of a wooden ring. It was shown that the defendant had sold a marking ink manufactured by a Mr. Murphy, who had purchased a chemist's business from the widow of the son of Henry Bond, the brother of the original inventor of the ink. The ink manufactured by Murphy is sold in bottles and cases similar to those of the plaintiff, which are wrapped in blue papers, but of a different shade to those of the plaintiff. On the outside of the whole is an oval white label, with the addition of a square piece, on which are printed the Royal Arms of England and the following words:—Manufacturer of Indelible Marking Ink to Her Majesty's Army Clothing Department, Bond's Genuine Indelible Phœnix Marking Ink. Original trade mark. Established A.D. 1815. Prepared by the legal successors of the late Henry Bond." It was also proved that the defendant had sold Murphy's ink in pedestals somewhat similar to those of the plaintiff, and labelled in a similar manner. The plaintiff only asked for nominal damages.

The defence was that Murphy had purchased the right to manufacture the ink in question from the successors of the late Henry Bond, and that there was a sufficient distinction between the colours of the wrappers and the wording of the labels to prevent the public being misled into the belief that the two inks were identical.

His Lordship, in summing up, directed the jury that they must say—first, whether there was a general resemblance between the wrappers and labels; and, secondly, whether there was such a particular resemblance between them as showed an intention to deceive and as was likely to mislead.

Verdict for the plaintiff—damages, 1*s*., and costs.

His Lordship ordered execution to be stayed for a month to enable the defendant to move.—*Times.*

Suicide of a Physician.

On Friday, December 17, Dr. Diplock, the Coroner for West Middlesex, held an inquest on the body of Matthew Wilkes Bourne, M.D., lately residing at 9, Claroe Terrace, West Brompton. Mrs. Frances Bourne, said deceased had lately been in the habit of taking doses of chloroform and morphia to produce sleep. On Tuesday afternoon last, whilst she was engaged in making him some broth, she noticed a change in him, and he said, "Good-bye." Before she could reach him he was speechless. In the morning he had taken some chloroform in water, and this had caused him to sleep. She found a bottle containing chloroform by his side when he became insensible. His death was almost instantaneous. He had been suffering from depression of spirits on account of being disappointed in an appointment he expected. He had often said he was weary of life, as he had had so many disappointments. The Jury returned a verdict of "Suicide, whilst in a state of unsound mind."—*Echo.*

Death from an Overdose of Morphia.

The *Carlisle Journal* reports that Mrs. Sarah Theed, wife of the Rev. William Theed, rector of Great Orton, has met her death from an overdose of morphia. For some time Mrs. Theed's health has been in a very indifferent state, and she has been taking morphia to induce sleep. On the night of Thursday, December 16, feeling unwell, she took a dose, and told Mr. Theed what she had done. In a short time Mrs. Theed became unconscious, and her husband feeling alarmed sent for medical assistance from Carlisle. Efforts to restore Mrs. Theed, to consciousness were, however, in vain, and she died about five o'clock on Friday morning. A coroner's inquiry was held, and the jury returned a verdict of "Accidental death."

Death from an Overdose of Laudanum.

The *Scotsman* states that a *post-mortem* examination of the body of Lady Chesterfield, made yesterday in Edinburgh by Dr. Littlejohn, showed that death had been produced by an overdose of laudanum.

Obituary.

Notice has been received of the death of the following:—

On the 4th of December, 1875, at Redruth, Mr. Robert Blee, Chemist and Druggist, of Hill Park Villas, Plymouth, in his 70th year.

On the 19th of December, 1875, from pneumonia, resulting from a cold taken a few days previously, Mr. Thomas Witherington, Pharmaceutical Chemist, of Worcester. Mr. Witherington joined the Pharmaceutical Society in 1842, and for several years acted as one of its local secretaries.

On the 21st of December, 1875, after a few days' illness, Mr. Wellington Edwards Groves, Pharmaceutical Chemist, of Blandford, Dorset. Mr. Groves had been a member of the Pharmaceutical Society since 1854.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

In Memoriam.

Sir,—Death has suddenly removed one whom to know was to respect and love.

Mr. W. E. Groves, Pharmaceutical Chemist, Blandford, brother-in-law of the able Ex-President of the Pharmaceutical Conference, was snatched away from a loving and attached family on the morning of the 21st inst., after a brief illness of only three or four days. A severe cold, resulting in congestion of the lungs, brought the sad conclusion—not sad for the departed, for he was a man of Christian faith and hope—yet sad, most sad, for the loving wife and clinging children.

Having known Mr. Groves intimately for some years, and cherishing for him the highest regard, my estimate of his character and ability might be deemed somewhat partial; but this I can truthfully and deliberately affirm, I have known few men who combined a greater number of attractive and solid qualities then my deceased friend.

Dignified yet bright and cheerful in mien, gentlemanly and refined in manners, a cultured mind well stored with literary and scientific truth, he read extensively and kept fairly abreast of the literature of the day. He was a well-trained pharmaceutist, a diligent and accurate botanist, and a keen observer of both the laws and phenomena of nature; so varied were both gifts and attainments that had his many other engagements permitted him to have stepped forward in our ranks he would immediately have commanded the respect he so justly deserved.

Mr. Groves' career was, as I have just intimated, marked by general activity and usefulness; no good work, secular or sacred, in Blandford but secured his ready aid in counsel and purse, so much so that I have often wondered how he found time to fulfil his varied engagements.

Such men occupying comparatively retired spheres of labour, content to do their work and do it thoroughly without the meed of distinction which a more prominent platform would have secured; such men are the very salt of society.

I have written thus much, sir, regarding the public life and usefulness of my departed friend; into the sacred precincts of his private life I will not venture to intrude, except to say that it was in perfect harmony with that of which I have spoken—refined, and affectionate, whilst over all was thrown the mantle of Christian charity.

S. R. Atkins.

Salisbury, December 21, 1875.

J. W. (Manchester).—Dynamite is prepared from nitroglycerine by incorporating with it about 25 per cent. of a silicious earth. For further information see Professor Abel's paper on "The More Important Substitutes for Gunpowder," in vol. iii., pp. 565 and 583 of this series.

J. W.—A Register of Pharmaceutical Chemists and Chemists and Druggists is published in accordance with the Pharmacy Act, 1868, early in every year. Copies may be had of the Registrar, 17, Bloomsbury Square, price 5*s*. each; postage extra.

"*A Member.*"—Up to the present time the regulations under the Trade Marks Registration Act have not been issued. We are therefore unable to supply you with the information asked for.

"*Enitar.*"—(1) By making a solution of bromide of iron from bromine and fine iron wire with water, q.s., shaking till the froth becomes white, and filtering into a strong syrup. (2) Try filtering through fine calico and returning the filtrate into the filter until it comes through clear. If much coloured shake it up with a little polished iron wire previous to filtration.

Communications, Letters, etc., have been received from Professor Dragendorff (Dorpat), Mr. Nuthall, Mr. Warrick, Mr. Woodland, Mr. Stenhouse, Mr. Abraham Mr. Mason, Student, Q. Z.

GELSEMIUM SEMPERVIRENS.

BY E. M. HOLMES,

Curator of the Museum of the Pharmaceutical Society.

(*Continued from p.* 482.)

Official part and its characters.—The part of the plant official in the United States' Pharmacopœia is the root. As met with in English commerce it occurs in two states; either in packets, prepared by the Shakers of New Lebanon, which contain the root in small pieces formed into a compact mass by hydraulic pressure, and in which state it is difficult to powder, or it is sold simply cut up into pieces varying from 2—8 inches in length, and $\frac{1}{3}$—$\frac{3}{4}$ of an inch in diameter. It is frequently mixed with about half its bulk of long wiry pale brown rootlets.

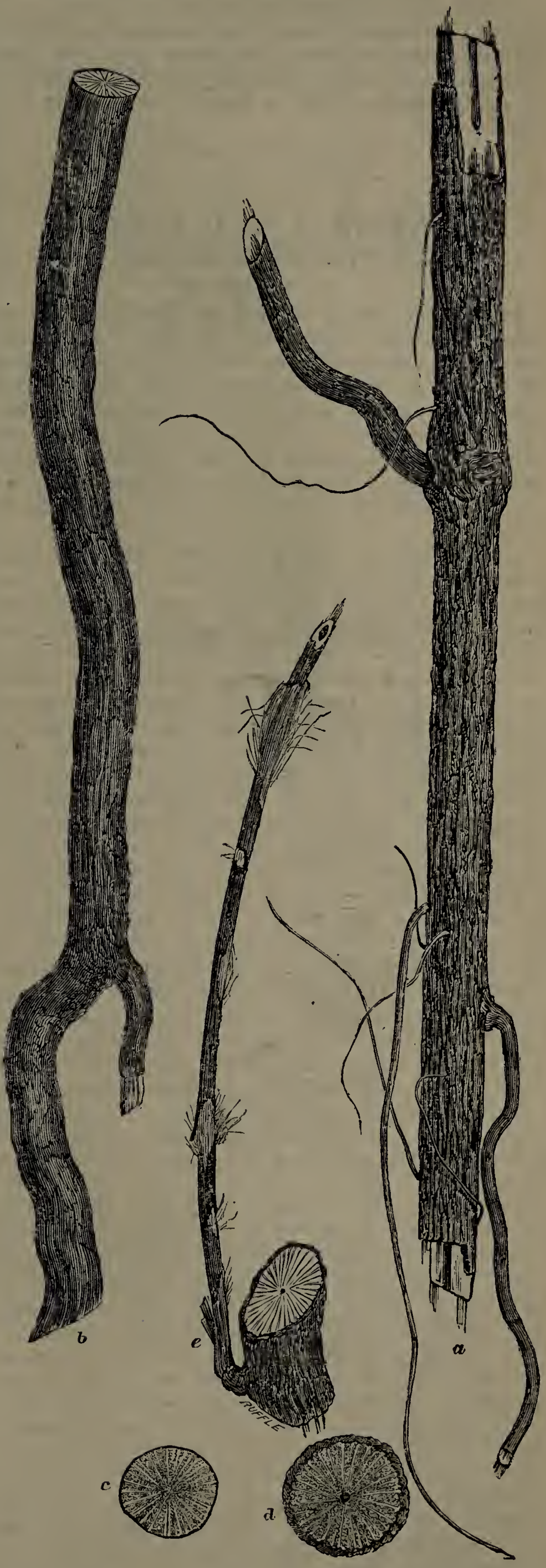
The so-called Gelsemium root, consists chiefly of subterranean stem with a small proportion of true root; occasionally a slender piece of the aërial stem may be found intermixed, and is readily distinguished by its purplish colour and hollow centre, and by the silky or tow-like fibre, rendered visible when the epidermis is peeled off. Fig. 1 *e*.

The true root is hard and woody, slightly undulated in outline, very sparingly branched, except in the slender pieces, externally of a pale brown colour, nearly smooth, and furnished with a thin scurfy cuticle which is slightly cracked longitudinally. When a transverse section is examined with a lens, the bark of the root is seen to be very thin, and to consist of two layers, the inner one being usually almost as pale as the woody portion and of somewhat soft texture, the outer one is darker and more compact. Fig. 1 *b*, *c*.

The meditullium, or woody portion of the root, occupies nearly its whole diameter, is of a pale yellowish white colour, the yellow tint becoming much more distinct when the root is wetted. The medullary rays are white and very distinct, and the woody tissue between the rays is very porous, the pores being very small, but visible to the unaided eye, especially when the root is broken instead of cut. Fig. 1 *d*. There is no pith or central cavity in the root.

The root has a bitter taste and pleasant flavour, and an odour somewhat between those of senega and green tea; this is more readily perceived in the tincture.

The subterranean stem, Fig. 1 *a*, is also furnished with rootlets, but is easily distinguished from the root by the presence of a small dark coloured central cavity representing the pith, and by the external surface being rougher and frequently variegated with dark longitudinal lines, which are the remains of the same purplish cuticle which presents so marked a feature in the aërial stem. The bark is thicker than that of the true root, and the inner layer is usually dark brown. If the subterranean stem is broken slowly and carefully a thin row of silky fibres projects fully a quarter of an inch from the broken edge. These fibres do not appear when the bark of the root is broken and thus serve to distinguish the stem of this drug from the root. Experiments as to the relative value of the bark of the root and stem are wanting. The bark of the stem has the same bitter taste as that of the root, and if it be hereafter shown that it is equally active, the above character of the presence of scattered strong fibres, taken in conjunction with the flavour of the drug and its porous structure will serve to distinguish it from all other roots or stems used in materia medica.



The importance of being able to recognize a drug by its physical characters is sufficiently obvious in the case of such a powerful one as Gelsemium, as the substitution or admixture of other roots with it might lead, when administered in the form of tincture, etc., to difficulties in accurately determining the proper dose or even to dangerous consequences to patients; and therefore that the above characters may be easily comprehended a figure of the root is here given.

(*To be continued.*)

ERGOTININE, A NEW ALKALOID DISCOVERED IN ERGOT.*

BY C. TANRET.

In a paper just presented to the Académie de Sciences through M. Berthelot, the author announces that he has discovered a new solid and fixed alkaloid in ergot. As the name ergotine has already been applied to several badly-defined products, he has thought it advisable to term the new substance ergotinine. It is stated to exist in ergot in very small quantity, and to be extremely alterable in the air, so that its extraction is a delicate and difficult operation.

The method adopted by the author in its preparation is as follows:—The ergot reduced to a fine powder is treated with two successive portions of boiling alcohol (86°), so as to obtain two parts of tincture for one of ergot. This is distilled in a water-bath. When the residue from distillation is cold it consists of three parts: a fatty layer on the top, liquid extractive matter, and resin which is deposited. The fatty matter is placed in a stoppered bottle, the liquor is filtered rapidly, and the resin is washed with ether. It is necessary that the ether used during the operation should be previously freed from alcohol by washing. The fatty matter and extractive liquid are treated separately for the removal of the alkaloid.

The fatty matter is dissolved in the ether which has previously been used to wash the resin, about 250 grams per kilogram of ergot being required. The solution is filtered and shaken with dilute sulphuric acid (1 in 15), which takes up the ergotinine; this treatment is repeated several times. Lastly, the aqueous solutions of the sulphate of the alkaloid are filtered, then washed with ether to remove traces of fatty matter still remaining, treated with excess of potash, and shaken with chloroform. The liberated ergotinine is taken up by the chloroform, from which it may be obtained by evaporation sheltered from the air.

In treating the extractive liquor it is distilled in an oil-bath in a current of hydrogen. When it is judged that all the alcohol it retained has passed over, this first portion is rejected, a slight excess of carbonate of potash is added to the remainder, and the distillation continued. The water next collected holds in solution methylamine and another very odorous body. When the liquid in the retort has become so concentrated as to render spirting possible, warm water is added and the distillation recommenced. If the distillate be shaken with chloroform, the chloroform becomes charged with the odorous body just referred to, which the author thinks is a volatile alkaloid resinifying very quickly in the air, but the small quantity at his disposal has not allowed him to clear up this point. The ergotinine remains in the syrupy residue from the distillation. This is acidulated, washed with ether, and after the addition of a slight excess of potash shaken with chloroform, which dissolves the alkaloid.

Ergotinine has a strongly alkaline reaction, and is capable of saturating acids. It gives precipitates with the double iodide of mercury and potassium, with iodine and iodide of potassium, phosphomolybdic acid, tannin, chloride of gold, chloride of platinum, and bromine water. It is soluble in alcohol, chloroform and ether, and one particular character is the facility with which it is altered when exposed to the air.

The most characteristic reaction of ergotinine is the colour that it takes with sulphuric acid of moderate concentration, which is first a yellow red and then an intense blue violet. After exposure to the air a few minutes the reaction loses its sharpness, and presently is no longer produced. The saline solutions of the alkaloid quickly become rose-coloured, then red, under the influence of air.

The author has observed that when the extractive liquid is distilled with a concentrated solution of soda or potash, only traces of the alkaloid are obtained, but a large quantity of methylamine is produced, doubtless through its decomposition. In another operation, when the liquor was evaporated slowly in the air and treated with potash, only ammonia was obtained, the alkaloid having entirely disappeared. The great instability of this alkaloid explains, the author thinks, the rapid alteration of powdered ergot.

SOME ERRORS IN THE STATED STRENGTHS AND DOSES OF THE OFFICINAL PREPARATIONS OF OPIUM.*

BY E. B. SHUTTLEWORTH.

Teachers of pharmacy, and others accustomed to classify and compare the various officinal compounds, must have noticed occasional discrepancies and inconsistencies in pharmacopœial statements which are difficult to explain away and which give rise to much uncertainty and confusion in the mind of the student. To direct attention to some of these is the design of the present paper, and the writer is encouraged to believe that this criticism will be received in as kindly a feeling as it is offered. To call into question the correctness of the national pharmaceutical standard was at one time deemed an evidence of bad taste, but that time has happily passed away, and it is now the interest of all to cultivate and exercise a spirit of inquiry, so that our Pharmacopœia may be rendered as nearly perfect as possible.

In the edition of 1867, on page 230, under the head of *Opium*, is an enumeration of the officinal preparations of that drug, and also an estimate of their relative strengths. In this table there are some omissions and errors.

The *Suppositoria Plumbi Comp.*, which contain in each one grain of powdered opium, are omitted. *Morphiæ Acetas* and the *Liquor* are given, though the hydrochlorate is the only salt directed to be prepared directly from opium.

It is stated that the proportion of opium (moist) in *Trochisci Opii* is one-tenth of a grain in each, while on pages 124 and 350 they are said to contain one-tenth of a grain of extract, which is at least double the strength of moist opium.

The proportion of opium in *Pil. Ipecac. cum Scillâ* is said to be 1 in 16½ nearly. The treacle ordered in the formula has evidently been omitted in this calculation. It will be found that this will bring the mass up to a strength of about 1 in 24.

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* *Comptes Rendus*, vol. lxxxi., 896.

* Reprinted from the *Canadian Pharmaceutical Journal*, Dec. 1875.

In the reprint of 1874 the compilers publish, on page vi, "a list of corrections made in 1874 in the reprint of the British Pharmacopœia of 1867." *Only one of these relates to opium preparations*—that of the *Pil. Ipecac. c. Scillâ,* above noted, of which the correction is made "instead of $16\frac{1}{2}$ read $23\frac{1}{2}$." On referring, however, to the page indicated, it will be found that another proportion—1 in 23—is given.

The notes for this paper were made with reference to the edition of 1867, but we find that in the reprint of 1874 some of the errors have been corrected, though they do not appear in the list of corrections referred to. This is an omission originating in carelessness, or perhaps some other cause, but, in any case, the list should be made complete.

In regard to the doses of the opium preparations there are some strange inconsistencies. Some of these would at first appear to be explained by the supposition that the stated doses of preparations have been established and perpetuated by long usage, but this view is not correct, as many of the preparations were either entirely new or of altered strength in the edition of 1864, and of those compounds which were taken from the other pharmacopœias the doses do not coincide.

On page 230 of the edition of 1867, and also 1874, the dose of ordinary opium is stated to be from $\frac{1}{2}$ grain to 2 grains. This may then be assumed as a standard to which may be referred other preparations which owe their activity entirely to opium.

The dose of *Ext. Opii* is stated (page 123 in 1867 and 1874) to be from $\frac{1}{2}$ grain to 2 grains, or the same as that of opium, though 2 parts of opium are said to yield about one of extract. It is obviously inconsistent that while the latter is double or more generally more than double the strength of the former the dose should be the same.

Ext. Opii Liquid, and *Vin. Opii,* of which 11 (10·9) minims equal one grain of moist opium, are directed to be administered in doses of from 10 to 40 minims, equal to nearly 1 to 4 grains of opium.

The dose of *Tinct. Opii* is given as from 5 to 40 minims. $14\frac{2}{3}$ (14·63) minims equal one grain dry opium, making the dose range from about $\frac{1}{3}$ to nearly 3 grains. Estimating the amount of moisture in commercial opium to average 15 per cent. (an amount which by trials of many hundreds of pounds of opium I have found to be nearly correct), one grain of moist opium would be contained in about $12\frac{1}{2}$ (12·43) minims, and the stated dose would range from $\frac{5}{12}$ to $3\frac{1}{5}$ grains.

This want of uniformity is rendered more evident by reducing to grains of moist opium the pharmacopœial dose:—

Opium	0·5 to 2·0	grains.
Ext. Opii	1·0 to 4·0	„
Ext. Opii Liquid.	0·9 to 3·7	„
Tinct. Opii	0·4 to 3·2	„
Vin Opii	0·9 to 3·7	„
Pulv. Ipecac. co.	0·5 to 1·7	„

It is not for a pharmacist to say what the correct dose of opium is, but whatever may be the amount fixed upon by competent authorities, it seems but reasonable that the doses of the various preparations should be made to correspond as nearly as possible. It may also be maintained that some uniform system of posology should be followed. Whether the average adult dose, or the maximum and minimum dose should be stated, I do not wish to determine, but one or other plan should be rigidly adhered to. From the table above given it is evident that the compilers of the British Pharmacopœia regarded this no more than their alleged rule of reducing to a uniform dose of 15 or 25 minims the more active medicinal tinctures.

Before drawing these remarks to a close I may state that in a foot-note to an article on *Vinum Opii* (p. 368 in editions of 1867 and 1874), that preparation is stated to be one-fifth weaker than *Vinum Opii,* P. L. The B. P. wine contains in each pint 437·5 grains of extract of opium; the P. L. wine 600 grains. The difference is $162\frac{1}{2}$ grains, which is over one-fourth instead of one-fifth.

I append an enumeration of the nearest quantities of the officinal preparations of opium which are equal to one grain of dry opium. The amount of moisture in ordinary opium is taken at 15 per cent.:—

Confectio Opii	40·3	gr.
Emp. Opii	10·0	„
Enema Opii	1	oz.
Ext. Opii	·588	gr.
Ext. Opii Liquid.	12·8	*m.*
Lin. Opii	30·0	*m.*
Morphiæ Hydrochlor.	$\frac{1}{10}$	gr.
Pil. Ipecac. c. Scillâ	24	„
Pil. Plumbi c. Opio	8	„
Pil. Saponis co.	6	„
Pulv. Cretæ Arom. c. Opio.	40	„
Pulv. Ipecac. co.	10	„
Pulv. Kino co.	20	„
Pulv. Opii co.	10	„
Tinct. Camph. co.	$\frac{1}{2}$	fl. oz.
Tinct. Opii	14·6	*m.*
Tinct. Opii Ammon.	96·0	*m.*
Troch. Opii	5·8	troch.
Vinum Opii	12·8	*m.*
Supposit. Plumbi co.	1	supp.
Ung. Gallæ c. Opio	14·6	gr.

BEHAVIOUR OF TARTARIC AND CITRIC ACID TOWARDS IRON, ALUMINIUM, AND PHOSPHORIC ACID.*

BY R. WARINGTON, F.C.S.

The marked difference between tartaric and citric acid, shown in the gradual accumulation of alumina and phosphoric acid in tartaric liquors, and the absence of such accumulation in the case of citric liquors, led me to investigate the subject.

If ferric oxide is dissolved in citric acid, or ferric chloride added to the acid, the acid being in excess, the solution may be boiled with excess of chalk without precipitating the iron. The precipitated citrate of calcium is white, the solution is of a lemon-yellow colour, and quite neutral to litmus. With alumina the results appear to be similar; the solution becomes neutral on boiling with chalk, and a great part of the alumina, probably the whole, remains in solution. If instead of the citric acid being in excess at starting, an excess of ferric chloride is present, then on boiling with excess of chalk the whole of the iron is precipitated, and the solution becomes colourless. The complete precipitation of the iron in this case is doubtless due to the fact that the citric acid is carried down as a basic ferric salt.

With tartaric acid the reactions are different. The addition of chalk to a hot solution containing ferric oxide or alumina precipitates these bases even when the tartaric acid is in great excess. The tartrate of calcium thrown down by the first small addition of chalk is yellow in colour, even when but little iron is present, and at the conclusion of the operation the solution is found to be colourless, neutral, and containing only a trace of iron.

In the cold, the reactions of citric acid with ferric salts are similar to those in hot solutions. When moderate quantities of iron are present the whole of the iron remains in solution; with excess of iron the whole is precipitated: the solution is neutralized by the chalk. Tartaric solutions of iron are also neutralized by chalk in the cold. When only a small quantity of iron is present a little falls with the tartrate of calcium, and the greater part remains in solution; with an excess of iron the whole is precipitated. The excess of iron required for this purpose is much smaller than in the case of citric acid. The affinity of tartrate of calcium for iron is remarkable; tartrate of calcium crystallizing from a ferric solution is sure to be yellow, even when little iron is present, and the solution strongly acid with tartaric acid.

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* From the *Journal of the Chemical Society.*

Ferrous salts, it is well known, are not precipitated by chalk in the cold; nor is ferrous sulphate perfectly precipitated by chalk on long boiling, if air be excluded; the solution in this case remains somewhat acid. In the presence of tartaric acid ferrous sulphate is also not precipitated by chalk in the cold, but at a boiling heat chalk occasions a bluish precipitate clearly containing iron; a considerable quantity of the iron remains, however, dissolved, forming an acid, olive-coloured liquid, which further boiling with chalk does not seem to affect if air be excluded. With citric acid and ferrous salts, the addition of chalk fails to precipitate iron, either in the cold or on boiling.

It appears from the above, that citric acid liquors containing ferric or ferrous salts, may be treated with excess of chalk even at a boiling heat without precipitating the iron, but that in the case of tartaric liquors there is at a boiling heat a complete precipitation of ferric, and a partial precipitation of ferrous salts. Alumina appears to behave with these acids in much the same manner as ferric oxide.

The behaviour of phosphoric acid in tartaric and citric liquors must next be considered, as this acid occurs with iron and aluminium in old liquor. Tartaric, citric, and phosphoric acids are singly easily neutralized by chalk at boiling heat, but if phosphoric acid is mixed with tartaric or citric acid the solution may be boiled with chalk a long time without neutralization being accomplished. The solution in this case contains an acid calcium phosphate. When the solution is separated, and neutralized with soda, it again becomes acid on boiling, especially if chloride of calcium be added. This acidifying is probably due to the splitting up of the phosphates into acid and basic compounds.

Tartaric acid mixed with ferric chloride and phosphoric acid is not perfectly neutralized by chalk, even when boiling is long continued, the acidity, may, however, become very faint. The solution contains a small quantity of acid phosphate, but no iron. Tartaric acid with ferrous sulphate and phosphoric acid, is not neutralized by long boiling with chalk in a covered beaker; the solution is in this case very acid, and contains a notable amount of iron, and some phosphoric acid. Tartaric acid mixed with potash alum or sulphate of aluminium, and phosphoric acid, behaves as in the experiments with ferric salts if the phosphoric acid is in excess of the alumina, but if the alumina is in excess, neutralization takes place after a short digestion with chalk near a boiling heat. In the case of ferric salts I have not succeeded in obtaining the same speedy neutralization by increasing the proportion of iron to phosphoric acid.

These reactions of tartaric solutions containing iron and aluminium with phosphoric acid, explain the facts observed when old tartaric liquors are treated with chalk, which is the ordinary mode of purification employed in tartaric acid factories. This treatment with chalk, however long continued, always leaves a very acid liquor containing ferrous salts in considerable quantity, but very little of ferric salts, alumina, or phosphoric acid. In one quantitative experiment on a large scale, it was found that the waste liquor, containing all the matters unprecipitated by chalk, held in solution 30·1 per cent. of the iron, 1·02 per cent of the alumina, and 3·58 per cent. of the phosphoric acid originally present in the old liquors. The treatment with chalk thus effects a tolerable purification from iron, but scarcely any from alumina or phosphoric acid: the two latter, therefore, as already mentioned, continually accumulate in the tartaric liquors. The considerable acidity of the waste liquor resulting from precipitation with chalk, is probably mainly due to the ferrous salts and phosphates which it contains. The ferrous salts in tartaric liquors are probably formed by the reducing action of tartaric acid at a high temperature.

In the case of citric acid, the admixture of a ferric salt and phosphoric acid yields a solution from which iron is not precipitated by boiling with excess of chalk, and which remains more strongly and more permanently acid when boiled with chalk than the corresponding tartaric solution. If an aluminium salt is substituted for iron, the solution also remains acid after long heating with excess of chalk, even when the alumina is in such excess as would cause an early neutralization in the case of tartaric acid. The solution after boiling with chalk contains much alumina and phosphoric acid.

It appears from the above that citric acid liquors can be far more effectually cleansed by precipitation with chalk than tartaric acid liquors. With citric acid the whole of the iron, whether ferric or ferrous, will be removed by such treatment, and at least a considerable proportion of alumina and phosphoric acid. This agrees with experience acquired on the large scale, which proves that there is no such accumulation of impurities in citric liquors, even after many years' working, as that which takes place in the case of tartaric acid. The easy removal of the impurities in citric acid is, however, at the expense of that acid. Iron is not precipitated from citric acid by chalk simply because it forms a soluble stable compound with the citric acid. In short, the larger the amount of impurity, the greater will be the loss of citric acid when the liquors are treated with chalk.

The following reactions of tartaric and citric acid towards ferric and aluminic salts in presence of phosphoric acid have also been observed:—

When phosphoric acid is added to a dilute freshly prepared solution of ferric chloride till the liquid becomes colourless, no precipitate is produced, but on heating opalescence commences at 40°—50°, and at a boiling heat a considerable precipitate of ferric phosphate is produced; on cooling, this precipitate slowly redissolves, forming an opalescent liquid. If the solution contains an excess of ferric chloride, no turbidity is produced on boiling; a tolerable excess of phosphoric acid does not, however, hinder the precipitation.

If tartaric acid is added in some quantity to a solution of ferric chloride containing just sufficient phosphoric acid to be colourless, the tartaric acid will actually produce a precipitate in the cold, which will be greatly increased on boiling. If, however, the solution contained an excess either of ferric chloride or phosphoric acid, tartaric acid produces no precipitate in the cold, but on heating considerable precipitation takes place. The precipitates have the appearance of ferric phosphate, they redissolve very slowly on standing in the cold. If citric acid is substituted for tartaric acid, no precipitation takes place in any case, either in the cold or on boiling.

If ferric chloride is mixed with a considerable amount of tartaric acid, and excess of phosphate of sodium added, no precipitate is formed if the solutions are very concentrated and cold, but on dilution, or heating, precipitation of ferric phosphate takes place. If the phosphate of sodium is in excess to the iron, very large quantities of tartaric acid may be added without preventing precipitation on dilution or boiling, but with a smaller proportion of the phosphate permanent solutions are obtained. Under any of the above conditions, the substitution of a small quantity of citric acid for the tartaric acid suffices to prevent precipitation.

A mixture of sulphate of aluminium and phosphoric acid is precipitated on boiling only when the solution is very dilute, the precipitate speedily redissolves on cooling if the boiling has not continued too long. Precipitation is prevented both by tartaric and citric acid, a smaller quantity of the latter sufficing.*

If sulphate of aluminium is mixed with a small quantity of tartaric acid, and excess of phosphate of sodium added, no precipitate is produced if the solution is strong; but if largely diluted and boiled, or if acetate of sodium is added, precipitation takes place. When much tartaric acid is added, the solution is permanent under the conditions named, but it requires about seven times as much tartaric acid as of citric to produce a permanent solution.

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* A mixture of phosphoric acid and sulphate of aluminium is not precipitated by acetate of sodium in the cold when the aluminium is in excess; this reaction is well known in the case of ferric salts.

A mixture of potash alum with excess of phosphoric acid is precipitated on the addition of Rochelle salt, but is not precipitated by citrate of potassium.

It appears from the latter experiments, that the capacity of tartaric acid or tartrates for holding phosphate of iron or aluminium in solution is very small, and far inferior to that possessed by citric acid and citrates.

OBSERVATIONS AND EXPERIMENTS ON ERGOT.

BY A. STEPHEN WILSON, OF NORTH KINMUNDY.[*]

The present paper does not propose any microscopic examination of ergot, or of the structure of the fungus growing from it. Indeed the drawings and descriptions of Tulasne (*Annales des Sciences Naturelles*, 1853) leave little regarding structure to be added. The fault of Tulasne's drawings is, that they are too fine. He has made a neater job of the *Claviceps* than Nature has done. For example, his vertical section of the hymenium shows a symmetrical arrangement of conceptacles all round; but as these conceptacles are scattered irregularly over the head, no section can cut them all through the centres at equal distances apart.

What is here intended is simply to set down such facts in the life-history of ergot as seem to hold true in the locality in which they were observed.

In those parts of Aberdeen and Kincardine shires here referred to, about twenty of the grasses are usually ergotized. In what way ergot has come to be specially associated with rye, I do not know; at the present time, in the places named, ergot is nearly as rare upon rye as upon barley. Year after year, I have searched fields of rye, without finding more than a very few spurs; some fields yielding none. The first ergot found by me on rye was on a plant of twenty-four stems in the garden, at a great distance from any point which had ever been known to bear rye; the strong probability thus being that it was produced from the *Claviceps* of some of the common grasses.

But if in remote times, or in other localities, or other countries, ergot is or was much more prevalent on rye than in the places named, certain conditions must be different. Are these conditions botanical, agricultural, or meteoric? In June last, the Canterbury Agricultural Association, of New Zealand, offered a prize of twenty guineas "for the best essay on the recent appearance of ergot in rye and other grasses, and on the best mode of preventing and curing the disease." Probably the ergot has been carried with grass or rye seed to New Zealand, and has there found conditions favourable to its growth and multiplication. What these may be will be considered below.

Grasses most Subject to Ergot.—The grasses which are most liable to ergot are the floating meadow-grass (*Glyceria fluitans*, R. Br.), the common rye-grass (*Lolium perenne*, L.), the cat's-tail-grass (*Phleum pratense*, L.), soft-grass (*Holcus mollis*, L.), vernal-grass (*Anthoxanthum odoratum*, L.), and some others. *Glyceria fluitans* grows mostly in the sides of ditches, or in wet patches of untilled meadow ground. In places of this sort I have found it covered with ergot. But the notion, sometimes expressed, that ergot is caused by damp, is seen to have no foundation by finding *Glyceria fluitans* in recently cut ditches, to which ergot has not yet been conveyed, wholly free from ergot. Places which are affected in one season are more affected the following season than any other spots in the same district. I have seen this grass thickly ergotized at one end of a ditch, and wholly free at the other, not a hundred yards apart.

The common rye-grass (*Lolium perenne*) is ergotized in all situations—in waste corners of fields, on public roads, and on dry or damp arable land. I have found it in great abundance on the green sides of roads. In such situations it appears that the florets of this grass are much exposed to the floating spores. The rye-grass of the hay crops is never affected in the least, simply because it is past flowering before the *Claviceps* is ripe.

I have found the cat's-tail-grass (*Phleum pratense*) much ergotized along the margin of the River Don. In cases where the spikes have been bent down to near the ground ergotizing is most severe, showing apparently that the spores are most numerous in the lowest stratum of the air; indeed, it is a fact in all cases that the nearer the spike or panicle is to the surface of the ground, the more it is ergotized. This may be part of the explanation of the greater prevalence of ergot on the short-strawed Continental rye.

The vernal-grass (*Anthoxanthum odoratum*) is most ergotized in shady places, in woods, or on the north border of woods.

The mat-grass (*Nardus stricta*) is ergotized in woods, and also on open healthy moors, where no shadow falls upon it.

The soft-grasses (*Holcus mollis* and *lanatus*) are ergotized everywhere, but to the greatest extent amongst rank grass in places somewhat shady.

The reed canary-grass (*Phalaris arundinacea*, L.) I have found ergotized only by the edge of the Don.

Wheat and barley are very rarely ergotized, and on none of the cultivated oats (*Avena sativa*, L.), or the wild oats (*A. fatua*, L.), or the bristle-pointed oats (*A. strigosa*, Schr.), or the fly oat (*A. sterilis*, L.), have I ever seen a single case of ergot. The dog's-tail-grass (*Cynosurus cristatus*, L.) has never afforded a case of ergot in the localities observed, though it abounds and is mixed up with grasses much ergotized. Various species of *Bromus* are also proof against the ergot spore. Mr. Carruthers mentions (*Journal of the Royal Agricultural Society of England*, vol. x., part ii., 1874) amongst the grasses most subject to ergot, *Bromus secalinus*, L.; *B. mollis*, L.; *B. pratensis*, Ehr., but without stating the locality where those grasses are affected. This is a point which deserves to be looked into, since, if a grass—whether *Bromus*, dog's-tail, or cereal rye—is ergotized in one country, and not in another, some important fact will come out in the explanation.

Relation to Season.—The time of the year at which the grasses begin to be ergotized depends on the time at which the *Claviceps* is ripe. On May 25th, 1874, I found a great many spurs of *Glyceria fluitans* in the sides of a half-dry ditch, below decaying grass. At that time scarcely any of them had begun to produce the fungus; but, laid on a damp cloth, between two plates, they nearly all in a few days began to show signs of growth, and in a fortnight were covered with beautiful specimens. On June 9th I examined the same ditch, and nearly all the ergots I found had fungi upon them in an early stage of growth; the weather having been very dry, and apparently supplying too little moisture for vigorous growing. A few ergots of *Holcus mollis* found at another place at the same time had also the young fungi beginning to make progress. By June 27th, 1874, the fungi in the ditch had made considerable advance. Some of them were nearly ripe, with stems of half an inch in length, but most were not nearly so far advanced. A month later, on July 25th, they had attained their final size, some being upwards of an inch in length. The grass beside them was in flower, with some of the florets ergotized. On June 24th, 1875, the fungus in the same ditch was more than an inch in length, but although the grass was then in flower none of the florets seemed to be yet attacked.

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[*] Read before the Botanical Society of Edinburgh, and reprinted from the *Gardeners' Chronicle*.

It would, therefore, appear that in the north-east of Scotland ergotizing begins after the middle of June. The latest case of ergot in an early stage which I have noticed, was the middle of September. But the fact that the artificial application of moisture brought the *Claviceps* to maturity, shows that when the early part of the summer is damp and warm, ergotizing may take place sooner than when it is dry.

It is almost invariably the case that ergotized spikes or panicles have flowered late. None of the spikes of the vernal grass which come up early are ergotized; no spores are floating abroad when they are flowering. As already noticed, the hay crops are past flowering before the sporting season has begun; but the spikes of *Lolium perenne* which come up late, and stand solitary or in little groups in field or road, are sure to fall victims.

To what cause the greater prevalence of ergot on cereal rye in some parts of the Continent is attributable is a question quite within reach of observation. Tulasne observes that in 1852 it was easy to collect at Beaumont-sur-Oise and in the vicinity of Paris and Versailles, abundance of ergotized grasses, the ergots of each of them in all states of development in the middle of summer: which would seem to show that, in France, the time at which the *Claviceps* ripens holds a different relation to the season from that which it holds in Scotland. In Scotland no ergot is to be found on the grasses so early as the middle of summer. The greater prevalence of ergot on rye in France is probably to be thus explained —by the earlier maturity of the *Claviceps*; it must there be ripe while the rye is blossoming, which is only the case to a small extent in Scotland. If the rye in Scotland opened for fertilization a fortnight later than it usually does, or if the ergot fungus was ripe a fortnight earlier, more ergot would grow upon Scots rye. It is not certain that in the old husbandry of this country the cereals fertilized at a later period than they do at present. In Tusser's time rye began to be sown in September, but it was also sown in several of the following months, while barley was sown as late as May; but autumn and spring-sown rye flower about the same time, unless where the spring sowing has been late. But it is certain that in the old husbandry the quantity of grasses which infested the corn lands was much greater than it is now. Under June Tusser advises:—

> "Now down with the grass upon headlands about
> That groweth in shadow so rank and so stout;
> But grass upon headlands of barley and pease,
> When harvest is ended, so mow if ye please."

And when all the appliances of modern tillage have not been able to extirpate couch-grass (*Triticum repens*) and oat-grass (*Arrhenatherum avenaceum*), we may be sure that these and other grasses laid claim to a large proportion of the old corn lands. The oat-grass is one of those most subject to ergot. The large area of uncultivated borders and waste pasture land in early times also afforded greater facilities for the undisturbed growth of the *claviceps*, while the want of drainage afforded that half-dry, half-damp bed most favourable to the growth of this fungus.

Now one question here is, which circumstance is it which is favourable to the recent growth of ergot in New Zealand, and which is it that favours its growth on the Continent?

One point seems certain, and affords a starting ground for inquiry—wherever ergot is prevalent on any grass, there that grass fertilizes simultaneously with the dissemination of the spores of the ergot fungus. If a climate somewhat warmer than that of Scotland brings the sporing of the ergot fungus and the flowering of cereal rye into necessary contemporaneity, there is probably no cure in that place for ergot upon the rye. Since, if in Scotland, where cultivation has drained the land and laid hold of the waste places, there is still a great deal of ergot on the forage grasses and patches of wild grasses sufficient for nurseries; much more are there nurseries and damp uncultivated grass lands in countries of a less advanced agriculture. The ploughing down of grass lands every few years in the course of rotation buries a great deal of ergot, which is thus entirely destroyed. Where land is permanently in pasture, and the grasses of a kind which throw up seed-bearing spikes, the ergot has full opportunity of multiplying.

We thus get some glimpse of the reason why the disease called ergotism was more prevalent in former states of agriculture than in the present state.

In Mr. Carruthers' paper referred to allusion is made to the differences of opinion which exist in regard to the kind of season most productive of ergot. "Edward Carroll, observing in Ireland, says ergot is more frequent in dry than in wet seasons;" on which Mr. Carruthers observes, that this reversing of English and Continental experience is probably due to the normally moist atmosphere of Ireland. I have found ergot more prevalent in Aberdeenshire in a dry season than in the following wet season. The times are noted above at which the fungus is usually ripe. A certain amount of moisture is required while the fungus is growing, in order to bring it to maturity at a certain date. If this moisture is defective, the date of maturity will be retarded; but now when the fungus is ripe, and the mouths of the conceptacles have risen above the general surface, the question whether wet or dry weather is favourable to further processes depends altogether on the character of the spores, and the agencies by which they are scattered.

The hymenium of a *Claviceps* from the ergot of *Glyceria fluitans*, of one-twentieth of an inch in diameter, contains about 3000 conceptacles, or bladderform sacs of needle-shaped spores. Before the fungus is ripe the surface of the head is smooth, but as it ripens each conceptacle rises in a projection above the surface a height equal to the breadth of that part of it which appears as a brown papilla. This breadth is about ·0018 of an inch, while the distance between the papillæ is about ·003 of an inch. The spores of this fungus seem in general to consist of but one long cell, though sometimes they are septate. Sometimes they are ·0075 of an inch in length, but for the most part only about ·0046 of an inch. The length is about eighty times the diameter.

Mode of Dissemination.—Some of the modes of the dissemination of spores are noticed in Cooke and Berkeley's recent work on fungi (ch. vi.). The mode peculiar to the present spore, and perhaps to others of the same character, seems to differ a little from any of these.

It might be inferred that a spore which comes in contact with a grass floret, raised from 1 foot to 5 feet above the ground, cannot be conveyed by water or rain. But a direct observation is generally better than an inference.

I placed a large number of ergots, with many ripe fungi growing upon them, in a clear bottle, on a piece of wet cloth, and held them up in the bright sunshine. Very soon a conceptacle here and there began to deliver a shower of arrows right out into the air. Placing a black background to the bottle, the flights of bright needles could easily be seen with the naked eye, coursing through the bottle like shoals of minnows in a clear pool; now to the right, now to the left, then upwards or downwards, as if under the influence of forces different from any air eddies which might be supposed to be moving in the corked bottle. It is most probable, however, that currents of vapour were being raised from the wet cloth, and giving the variety of motions. When the heads became dry the discharge of spores ceased. With an eye-glass they could be more closely watched. Some darted, or were shot out with great rapidity; but after a time, on a papilla here and there, the spores merely wriggled out and fell over on the surface. The process went on for hours, and, from the large number of ergots enclosed, was ready to show itself again for several days.

(*To be continued.*)

The Pharmaceutical Journal.

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1875.

THE year one thousand eight hundred and seventy-five has passed away, and here, on the very threshold of another year we have the pleasure of giving New Year's greetings to our many readers and of presenting them with a brief record of the pharmaceutical activity of another twelve months.

The history of pharmacy in Great Britain is now so closely bound up with the history of the Pharmaceutical Society that, in dealing with what may be termed the political portion of it we cannot do better than to give precedence to subjects that have come under the consideration of the Council. The only alteration in the constitution of the Council itself that took place during the past year was due to the regretted determination of Mr. STODDART of Bristol, after seven years of service, and Mr. RADLEY, of Sheffield, not to allow themselves to be nominated for re-election; Messrs. HANBURY and CRACKNELL, of London, being elected to the vacant seats. The President, Mr. T. H. HILLS, the Vice-President, Mr. A. BOTTLE, and the Treasurer, Mr. J. WILLIAMS, received the well-merited compliment of re-election for a third term of office. The Annual Meeting was an extremely short one, the enforcement of the law for breaches of the poison regulations of the Pharmacy Act, 1868, and the Preliminary examination being almost the only subjects discussed.

The total number of persons presenting themselves for examination during the year, according to the Reports of the Boards of Examiners presented to the Council, was 1166, showing a large falling off from 1874, when the gross total exceeded 2500. The Preliminary candidates numbered 824, of whom 408, or nearly 50 per cent., failed to pass, against 1251 in 1874, with 52 per cent. of failures. The Minor candidates numbered 285, against 1160 in 1874; the failures amounted to 144, or rather over 50 per cent., against more than 67 per cent. of failures in the previous year. For the Major examination 82 candidates presented themselves, of whom only 28, or 34·1 per cent. failed to pass. It is interesting and satisfactory to find that the disturbing influences which last year temporarily affected the proportions between the successful and unsuccessful candidates having passed away, the percentages again closely approximate to the results experienced before the introduction of increased stringency in the examinations

The Preliminary examination has been the subject of yet another change—and, we believe, improvement—during the late year. For some time past facilities have been afforded—by the acceptance of certificates of having passed an equivalent examination before some recognized examining body—for passing the Preliminary stage without having recourse to the Board of Examiners in connection with the Society. It has been felt that the latter body should not be called upon to conduct a scholastic examination in addition to the technical examinations for which it is specially appointed, and on more than one occasion Mr. S. R. ATKINS and others have urged that the duty of conducting the Preliminary examination should be entrusted to a scholastic body. In March a motion was brought forward in the Council by Mr. ATHERTON that the questions for the Preliminary examination after the present year should be prepared and reported upon by the College of Preceptors. The proposition stood over for consideration until the April meeting, when it was adopted by a large majority. The Council still retains the control of the examination, the determination of subjects, etc., and the answers will be written in the presence of the superintendents appointed by the Council as heretofore. At a subsequent conference between deputations from the Council and the Board of Examiners and a deputation from the College of Preceptors, for making the necessary arrangements, it was unanimously decided to include simple and compound proportion in the arithmetical portion of the examination, and also to take into account the handwriting of the candidates in awarding marks. The College of Preceptors has undertaken to set the questions and supply them to the Secretary of the Pharmaceutical Society before the day of examination, and afterwards to examine the answers and assess their values, the passing or rejection of the candidates still devolving on the Board. The new arrangement comes into operation at the examination next Monday.

The method of indicating the relative degree of merit exhibited by successful candidates at an examination by the position of the names of candidates upon the pass list became a subject of consideration by the London Board. The conclusion come to was that the practice should be discontinued in favour of a list in alphabetical order. To meet a consequent difficulty with respect to the award of the PEREIRA medal and the prize of books, the competition for which had been restricted to those who passed in the first division of the Major and Minor examinations respectively during the year, the Board suggested that both prizes should be offered for competition by all candidates who pass the Major examination during the year. These propositions, after receiving the partial adhesion of the Edinburgh Board, were adopted by the Council at its last meeting, the arrangement of the details as to the prizes being referred to a Committee which has not yet made its report. A suggestion was also made by Mr. GREENISH that a "HANBURY" gold medal should be instituted as a reward for original research in materia medica or pharmacy.

A memorial, signed by the Chairman and Secretary of the Glasgow Chemists and Druggists' Association on behalf of a meeting of chemists and druggists of the West of Scotland, and addressed to the Council of the Pharmaceutical Society in April, has formed the topic of considerable discussion and correspondence. It proposed that candidates should have two opportunities of passing an examination for one fee; that no portion of a fee should be returned to a candidate who failed, but that in a second attempt credit should be given for the subjects passed in the first; also, that the examiners should be drawn from a wider area, and that examinations should be held in Glasgow at least twice a year. The suggestion that the field from which examiners were chosen was at all limited met with strong protestation from the executive of the North British Branch, and it was pretty satisfactorily shown that efforts had been repeatedly but unsuccessfully made to persuade a larger proportion of suitably qualified gentlemen residing in the West of Scotland to serve on the Board; at any rate it was shown that the nomination of examiners for Scotland was in the hands of the whole body of members living north of the Tweed. The Council considered the memorial on two occasions, but some resolutions based upon it received no support beyond that of the mover, Mr. FRAZER. It may be presumed, however, that even in Glasgow, judging from the recent address of the president of the local association, there is no serious exception to the general satisfaction with which the Society's examination operations are viewed by the trade generally, and this satisfaction has again been amply indorsed by the reports from the Government Visitors, Dr. GREENHOW and Dr. MACLAGAN.

Another proposed alteration in reference to the examinations is also closely connected with the financial position of the Society. This subject was broached early in the year by the Finance Committee and the Treasurer, not in consequence of any immediate difficulty, but in view of the fact that for some time to come the income from the subscriptions of Pharmaceutical Chemist Members must necessarily decrease yearly, whilst that from the subscriptions of Chemist and Druggist Members must ultimately cease. The subject was revived in December by a motion brought forward by Messrs. WILLIAMS and SANDFORD, that after the 31st of December, 1876, the fee for the Minor shall be five guineas instead of three, and that for the Major three guineas instead of five, thus involving a charge of an extra two guineas on candidates who do not go further than the Minor examination, but the total of the fees remaining the same for those who pass the Major. As the proposition involves an alteration in the Bye-laws, it must be passed at three separate meetings of the Council and receive the sanction of a General Meeting of the Members. The further discussion of the motion was deferred until the February Meeting of the Council. The Council has resolved that the Board of Examiners shall meet only six times during the present year, with a view to a reduction of the expenses.

Much anxiety was thrown upon the Council during the Parliamentary session by the introduction of no less than three Bills into the House of Commons in a form to which it was found necessary to offer the most energetic opposition. As, however, the steps which were taken will be fully described in recounting the history of these Bills, no further reference need be made to them here.

The illegal sale of poisons has evidently had a considerable amount of attention during the past year from the Council. Proceedings have been commenced against several offenders. In some cases the object was attained and the penalty enforced without going into court; in every case, however, where it has been necessary to do so a conviction has been obtained, the latest conviction being for the sale of a sheep-dipping powder, being a preparation of arsenic.

In addition to the subjects mentioned above as having come before the Council during the year, may be mentioned an application for a sum of £25 towards increasing the number and efficiency of the lectures, etc., in connection with the Leeds Chemists' Association. This request was readily granted, as was we believe a former one, and the opportunity was taken of expressing the willingness of the Council to assist whenever a good case is made out. But, unfortunately, the burden of the reports of many of the provincial associations is still to the effect that the existing educational facilities are not utilized as they should be by those for whom they are provided. It is pleasant to learn, however, that a "marked improvement" in the progress of the Manchester Association has been at least coincident with the grant to that society.

The subscriptions and donations to the Benevolent Fund have been in excess of the previous year, amounting to about £1200, including a legacy of £50 left by Mr. BARRINGTON GARNHAM, of Brighton. The experiment of widening the basis of the Fund by giving a vote to every subscriber of five shillings has proved so satisfactory, resulting in almost doubling the number of five shilling subscriptions and considerably increasing those at half-a-guinea, that the Council at its last meeting resolved to advance further in the same direction. On the recommendation of the Benevolent Fund Committee it was resolved that henceforth subscribers to the Fund of half-a-crown shall have one vote, of five shillings two votes, of half-a-guinea five votes, of one guinea ten votes, and so on in proportion. In the "interest of the poorer and more friendless candidates for annuities" Mr. SHAW brought forward a proposition that the Council should desire that no canvassing cards or circulars should in future be issued by or in behalf of candidates, confining the publication of the details of their cases to the official statement. Notwithstanding his able advocacy, however, the majority of the Council thought it unadvisable for various reasons to adopt the motion. In October four annuitants were elected, bringing the number on the Fund up to twenty. The casual grants made during the year have amounted to £423 10*s*.

The Society's School of Pharmacy appears to have enjoyed a fair measure of prosperity, and the Professors were able to make favourable reports, on the occasion of the distribution of the prizes, as to the numbers and progress of pupils in the session 1874-75. At present the attendance at the lectures is very satisfactory, the number of pupils attending those on Botany and Materia Medica especially being in excess of former sessions; whilst applications for admittance to the Practical Chemistry class have been so numerous that it has been necessary to increase the number of benches in the laboratory.

The manifest improvement in respect to the Evening Meetings, to which allusion has before been made, was extended through last year. The attendance was good and the papers were followed by interesting discussions. The Inaugural Address of the present session was delivered by Mr. CHARLES EKIN, of Bath. The papers read have been the following:—"On the Construction of an International Pharmacopœia," by Mr. F. SUTTON; "Note on a Spurious Senna," by Mr. E. M. HOLMES; "Note on Salicylate of Methyl," by Mr. J. WILLIAMS; "Lead Plaster," by Mr. C. UMNEY; "The Estimation of Fat in Milk," by Mr. E. L. CLEAVER; "The Identity of Goa Powder and Araroba," by Mr. E. M. HOLMES; "Notes on the Pharmacy of Atropine," by Mr. W. WILLMOTT; "Ergot and its Liquid Extract," by Mr. A. W. GERRARD; "The Analysis of Cinchona Bark," by Mr. E. L. CLEAVER; "Note on the Chemical Formula of Commercial Molybdate of Ammonium," by Mr. A. T. CARRINGTON; "Pharmacy in Portugal," by Mr. T. GREENISH; "Notes on the Preparation of Pure Chemicals," by Mr. LOUIS SIEBOLD; "The Spices, Groceries, and Wax of a Mediæval Household," by the late Mr. DANIEL HANBURY; and "Senna Extracted by Alcohol," by Mr. LOUIS SIEBOLD.

The Library and Museum have as usual experienced vigilant care from their respective custodians, under the supervision of the Committee. The former has received numerous additions of books during the year, and the number of foreign periodicals has been increased. A legacy of one hundred pounds, less legacy duty, was bequeathed by the late Mr. DANIEL HANBURY "for the increase of the library." The average attendance in the Reading Room has been good, showing an increase in the evening. The Conversation Room, which was provided by the Council in compliance with a memorial, has not been much in request. It has been open on two hundred evenings, on one fourth of which it was not used at all. On another fourth the attendance ranged from one to four; and on a third fourth it ranged from four to seven. By the permission of the Council an association in connection with the School of Pharmacy now meets once a fortnight in an adjoining room. It has been the unpleasant duty of the Librarian recently to report that several books are missing from the Library, and we take the opportunity of directing attention to the list of them published among the official notices.

A large number of donations for the Museum have been received during the year, including a considerable number of Brazilian drugs, an addition to the collection of Morocco drugs, and specimens of several new remedies that have been referred to in these pages. In November, the Council came to a decision which will doubtless have an important influence upon the future efficiency of the Museum. To avoid damage to museum specimens separate sets are to be provided for the illustration of the Lectures. This will much facilitate the proper arrangement of the specimens in the Museum, and when the bottles are all labelled and numbered in accordance with the catalogue now in process of compilation, it may be anticipated that this collection will be valued more than ever by students of materia medica. A proposition has been made by Mr. SCHACHT to add to the Society's possessions a "practical pharmaceutical laboratory," as likely to be useful to students and to chemists and druggists in want of information respecting apparatus. The committee to whom the subject was referred reported adversely, however, and this decision has been confirmed by a vote of the Council. Nevertheless, several prominent pharmacists have pronounced in favour of the scheme, and it was mentioned with approval in the address of the President of the British Pharmaceutical Conference. The attendance in the Museum during the day has been good, but it has been very small in the evening. It will not be out of place here to recall the fact that the principal features of interest to pharmacists in the newly-opened India Museum have been recently described in this Journal.

The North British Branch of the Pharmaceutical Society having taken possession of its new premises has been able to report that the existing arrangements are most comfortable and suitable in all respects for the purposes of the Society. Since this report some additional apparatus has been provided for the more convenient carrying on of the examinations. The library and museum have been enriched by numerous donations, and what is quite as satisfactory there appears to be a disposition to use these educational advantages. The growing importance of this Branch has necessitated the appointment of an Assistant-Secretary, Mr. STENHOUSE, who will relieve Mr. JOHN MACKAY from some of the detailed work that has fallen upon him during the lengthened period he has generously acted as Honorary Secretary.

Nil homini certum est! When the present ministers came into office it was assumed on every side, and by pharmacists among the rest, that the time had come for a lull in legislation; but it has fallen to the lot of pharmacists to be more than usually affected by the work of the last session. Within a week of the opening of Parliament a Bill was introduced by Mr. SCLATER-BOOTH to repeal the then existing Adulteration of Food Acts, and "to make better provision for the sale of food and drugs in a pure state." Although ostensibly based upon the report of the Select Committee, its history was by no means a happy one. Stigmatized by its author as being unfortunately named as an Adulteration Bill, no definition of adulteration being given, it raised such a chorus of opposition, especially in respect to the too frequent use of the word "knowingly" and an ominous tolerance of the "usages of trade," that although it was read a second time on the 19th of February, and went to Committee on the 4th of March, the amendments accepted by the Government were so numerous that it was immediately ordered to be reprinted, and came out of the ordeal as the Sale of Food and Drugs Bill.

In the meantime, the Council of the Pharmaceutical Society seeing the danger that results most prejudicial to the interests of pharmacists might be evolved from the chaos of proposed amendments, specially requested the Parliamentary Committee to watch the progress of the Bill in order to prevent the introduction of objectionable clauses into it. A deputation from this committee, therefore, waited on the Secretary to the Local Government Board and urged the retention of the principle that it should be open to an accused party to prove that he had a reasonable belief in the purity of his wares, and that proving this he should be regarded as an innocent man; further, it urged the necessity of great care in the appointment of analysts.

In deference to the prevalent opinion that the first Bill would relieve traders at the expense of the public, the second Bill was made more stringent. The word "knowingly" was still retained in some clauses, although it was eventually struck out in the House of Lords; but the Bill as it passed gives the accused an opportunity of proving that he did not know of an adulteration. This boon is due mainly to the representations of a deputation from the Council appointed at the suggestion of Mr. SANDFORD. Moreover, the new Bill contained a clause of great importance to druggists, and introduced at the instance of the deputation from the Council, exempting from penal consequences cases where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation. The Bill went from the Commons to the Lords on the 21st of May, but before doing so, underwent two other important modifications: one providing that cases of disputed analysis should be referred to the chemical staff at Somerset House, the other that no public analyst should be connected with the sale of food or drugs in the place for which he holds the appointment. A curious provision as to the laying down of a basis of purity by the Pharmaceutical Society, which nobody seemed to understand, disappeared. Eventually the Bill passed both Houses on the 4th of August and received the Royal Assent on the 11th, having occupied just six months in its concoction.

Since the passing of the Act the Post Office authorities have issued instructions as to the packing and transmission of samples in dispute, one peculiarity being that liquids are ordered to be enclosed in "stout bottles," and the Inland Revenue authorities have stated that their maximum fee for an analysis will be one guinea. In respect to the new offences under the Act, a conviction has already taken place under the section which makes it an offence to abstract from an article of food any part of it so as to affect injuriously its quality,—the charge being for abstracting cream from milk,—and one for refusing to sell to an inspector a sample of lard exposed for sale. We have not noticed that any disputes have yet been referred to Somerset House.

Either from a real improvement having taken place in the quality of articles of food, etc., or from the transition state of the law having partially paralysed those charged with carrying it out, prosecutions for adulteration have not been so numerous during the present year. Still there have been several presenting special points of interest to pharmacists. A charge at Leeds, of selling "milk of sulphur" adulterated with sulphate of lime, which resulted after a long hearing in the withdrawal of the summons evoked some correspondence, and formed the special topic for discussion at a meeting of the Sheffield Pharmaceutical Association. It was held by some that milk of sulphur is a synonym of precipitated sulphur, and that the presence of the lime salt was rightly considered an adulteration by the prosecution. But, although advocating the disuse as far as possible of the offending article, we cannot see that a difference of opinion on this point is an offence, against the law. And we have had an opportunity of showing that our American brethren have a decided opinion on the matter to the contrary. Three other cases, however, where it was proved that "precipitated sulphur" had been asked for, and an article containing sulphate of lime supplied, stood on a different footing and convictions very properly took place. Two prosecutions for selling adulterated scammony illustrated the necessity for the new provision as to impurities unavoidably mixed with some drugs, to which reference has before been made. In one case where the analyst simply certified to the presence of impurities, without stating the proportion, a stipendiary magistrate felt bound to convict; in the other, where the same analyst certified to the presence of 26·98 per cent. of flour and mineral matters the summons was dismissed at quarter sessions. Ginger adulterated with one-third its weight of plaster of Paris, and another sample composed mainly of wheat and rice flour, white pepper, and turmeric have figured in the Yorkshire courts; and Mr. POCKLINGTON'S microscope has made some further revelations as to the nature of "ginger" sold in that county. Yorkshire tradesmen have also provided samples of pepper with 26 per cent. of starch and 50 per cent. of pea flour and been convicted accordingly; and here again Mr. POCKLINGTON has shown that the offence was a common one. In a neighbouring county a summons for selling pepper containing nearly 7 per cent. of sand besides 20 per cent. of vegetable matter was dismissed because the seller gave the buyer notice that the pepper was not genuine, before the sale was effected. A similar defence, however, did not avail a milkman recently, who was convicted in spite of an announcement that milk and water was sold at his establishment. It may be mentioned that in another case evidence was given to the effect that pepper might contain as much as 20 per cent. of sand from legitimate causes. A prosecution at Greenock for supplying as "citrate of magnesia" the article conventionally known by that name, broke down, thanks to the energetic assistance given to the defence by Mr. KINNINMONT and others. The failure provided an outlet for vituperation from some of our medical contemporaries, but we think the *reductio ad absurdum* has been fairly effected by a pharmacist who offers to supply the medical purist who means citrate of magnesia when he orders it with the first draught at one shilling per ounce, and the second for nothing. There have also been convictions for the sale of decoction of sarsaparilla containing liquorice juice, lemon juice with an excess of sulphuric acid and another sample with a deficiency of citric acid, pickles and preserved peas containing copper, sweets coloured with chromate of lead, beer flavoured with salt, cider made of flavoured treacle and water, and soda water containing carbonate of lime and copper but no soda.

The contributions during the year to what we have before termed the literature of adulteration, have been numerous and valuable. Messrs. EKIN, UMNEY, MACADAM and DRAPER have investigated the origin of the lead which last year involved some aërated water manufacturers in trouble, and have satisfactorily shown how, and the extent to which it may have been derived from the metal pipes, the citric acid, or the oil of lemons used for flavouring. Mr. EKIN has shown a probability that tellurium is a frequent impurity in bismuth. Dr. WITTSTEIN has published an exhaustive process for the detection of foreign bitter substances in beer, and though neither he nor any other author has yet confirmed the prevalent belief as to the use of cocculus indicus, Mr. JOHNSON has reported that during an extensive examination of Melbourne ales, a substance resembling crystals of picrotoxin, and liable to be mistaken for them, was met with. Mr. THRESH has furnished an improvement upon STROHL'S process for the detection of mineral acids in vinegar. Mr. SHENSTONE has suggested a method for removing lead iodide from syrup of iodide of iron. M. JACQUEMIN has indicated a delicate test for carbolic acid in oil of cloves. Turning to the vegetable materia medica, Mr. HOLMES has described and figured a spurious senna, which has since been imported largely. Mr. BLYTH has written a history of Piper nigrum. Mr. WIGNER has reported the results of a series of analyses of teas. And, lastly, in a paper read before the British Pharmaceutical Conference, Mr. GREENISH threw considerable light upon the history of Natal arrowroot, ignorance concerning which had led more than one public analyst astray. We have also been able to reproduce an interesting report presented by the Committee on Adulterations to the American Pharmaceutical Association.

The legislative proceedings which resulted in the passing of a Pharmacy Act for Ireland, assumed at times during the session an aspect of considerable interest to English pharmacists. At first it appeared possible that there would be two Bills before the House on the subject, as after the Government had expressed its intention of introducing one a committee was appointed by the Society of Chemists and Druggists of Ireland to draw up another, and to submit it to Sir DOMINIC CORRIGAN for his advice. The result was a draft providing for the establishment of a Pharmaceutical Society for Ireland, which, acting through a council of twenty-four members, three-fourths of whom were chemists and druggists, was to be entrusted with the management of qualifying examinations. Three registers were to be kept: one of "pharmaceutical chemists," who were to be entitled to dispense prescriptions and sell poisons; one of "chemists and druggists" who were to sell poisons, but not dispense; and a third of "students, apprentices, and assistants." There was also permission to arrange at any time with the Pharmaceutical Society of Great Britain for a "reciprocity of privileges and practice." It may be presumed that this was the sort of Bill the Chemists and Druggists of Ireland would have liked, but it differed widely from what they got. The Government Bill was introduced on the 13th of May. This also provided for a separate Society for Ireland, which was to be governed by a Council, at first not named, the President and Vice-President of which and their successors were to hold office as long as they had seats at the Council, a provision that was afterwards altered. The names of the Council as eventually adopted were introduced while the Bill was in Committee; they were twenty-one in number, only one third of whom represented chemists and druggists. Provision was made but for one examination; nevertheless, this was to entitle the person passing it to the title of "pharmaceutical chemist," and, upon payment of a fee, to being placed on the Register of Pharmaceutical Chemists of Great Britain, though the British Society was not to be represented in any way at the examinations. It was only natural that these latter proposals should attract the serious attention of the English Council, and at a special meeting of the members resident in London it was resolved to wait upon the CHIEF SECRETARY FOR IRELAND respecting them. At the interview a paper sketching the history and position of the existing Society was handed to Sir MICHAEL HICKS-BEACH for his consideration, and it was stated that, although not desirous of doing so, the Society was willing to extend its operations to Ireland as the best way of securing the uniformity in examination rendered necessary by the reciprocity clause. It was urged that an examination equal to the Major would probably defeat the object of the Bill by limiting the supply of dispensers which it was intended to provide, and that unless some such provision was made as that which enables the Medical Council to be represented at all examinations affecting the Medical Register, there would be a consequent danger of the proposed Irish examining body competing injuriously with those in this country. The CHIEF SECRETARY promised to consider these points, he, on his part, suggesting that the Council should consider the possibility of adopting "*ad eundem* examinations,"—the applicability of which term neither then nor since has been quite apparent,—and let him know the result. But it was evident that he was little disposed to give up the reciprocity clause; it was therefore decided to request the members of the trade to petition Parliament against the second reading. At the June meeting of the Council the Committee reported the steps it had taken, and after discussion these were approved. On the motion of Mr. BETTY a deputation was appointed to wait again upon the CHIEF SECRETARY to represent the opposition of the Council to the Bill unless the reciprocity clause was removed; and on the motion of Mr. HAMPSON a petition against the second reading was ordered to be sealed with the corporate seal and presented to Parliament. The second deputation, however, fared scarcely so well as the first, the CHIEF SECRETARY expressing curtly his determination to pass the Bill in its entirety. But before an opportunity was afforded for the second reading a large number of petitions against it were poured into the House, and these probably assisted Sir MICHAEL HICKS-BEACH in coming to the conclusion that reciprocity was not an essential feature of the Bill. Upon an intimation to that effect being forwarded to Bloomsbury Square, through Mr. SALT, who had given notice to reject the Bill, the Parliamentary Committee thought it advisable to withdraw further opposition. At the ensuing meeting of the Council a resolution was, on the motion of Mr. SANDFORD, adopted, approving of this course, but expressing an opinion that as the title "pharmaceutical chemist" had been created and confirmed by the Pharmacy Acts 1852 and 1868 it ought not to be used by persons other than those entitled to it under those Acts, and urging that "dispensing chemist" should be substituted for it in the Irish Bill when in Committee.

The second reading of the Bill took place on the 18th of June, when Sir MICHAEL announced his intention of abandoning the provision for reciprocity, and on the 21st the Bill went into Committee *pro formâ* and was ordered to be reprinted. In its new form, besides the omission of the clause in question, the names of the first council of the new Society were inserted, and a new clause provided that the operation of the Bill should only extend to Ireland. Several efforts were made to substitute the term "dispensing chemist" for "pharmaceutical chemist" in the Bill during the remainder of its career in the House of Commons, and they were renewed, equally unsuccessfully, in the House of Lords. The Bill was introduced into the latter house on the 22nd of July, and read a third time and passed five days afterwards.

This appropriation of the name "pharmaceutical chemist" has, however, excited considerable dissatisfaction, and whilst the Bill was in the House of Lords, Mr. RICHARD REYNOLDS gave vigorous expression to his discontent, in which he alluded to what he termed a "want of united action," and stated an opinion that had the local secretaries been again appealed to, the Irish Secretary could have been rendered as amenable on the second point as on the first. A similar opinion was manifested in the address of the President of the British Pharmaceutical Conference, in which he stated that the title had been conceded "after a weak protest," and that the Society had saved its purse and lost its chance of some day achieving a good name. The recent issue of a paper purporting to be the regulations for the new examination, in conjunction with the announcement, under the auspices of a society with which more than one member of the new Council is connected, of classes where men could undergo preparation for passing in six months, combined with other curious statements, revived this feeling, and although we are sorry to say that the remarks we felt it our duty to make on the subject were deprecated by some members of the Council at its last meeting, it has since found energetic utterance in letters from Messrs. BRADY, PROCTOR, WHITFIELD, etc. On the other hand, Mr. HAMPSON has stated his opinion that Mr. BRADY'S dissatisfaction is based upon an imperfect acquaintance with the difficulties with which the Council had to contend. Since the issue of the above-mentioned paper, the "regulations" have been reported to have undergone some modification, but up to the present time we have no information as to their having received the assent of the Privy Council of Ireland.

In May last the Council of the Pharmaceutical Society received a communication from Sir John D. Astley, M.P. for North Lincolnshire, calling attention to a practice that had become prevalent of administering poisonous drugs to horses, and suggesting that the mineral acids, the sulphates of iron and copper, and other similar substances, should be placed in Part 1 of Schedule A of the Pharmacy Act. The Council having replied that it was unable to accede to the suggestion, a few days afterwards Sir John introduced a Bill into Parliament on the subject. This Bill proposed to make the administration of poisonous drugs and compounds to horses and other animals a punishable offence, and also to extend the more stringent regulations as to registration, witnesses and labelling, at present only applicable to poisons in Part 1 of the poison schedule, to sulphuric, nitric and hydrochloric acids, muriatic antimony, and the sulphates of iron, copper and zinc. It was obvious that such an abitrary mode of dealing with the evil would be intolerable and impracticable, and a deputation from the Council invited the opposition of the Government to the Bill. The author of the Bill afterwards excised all reference to the sale of poisons; but even in this truncated form the Bill failed to reach a second reading, and was withdrawn at the end of the session.

There still remain several subjects to be noticed in the history of the last, to pharmacists, eventful session of Parliament. Early in the year Mr. Lopes announced that it was not intended to re-introduce the Juries Bill during that session, and thus the attainment of the boon of exemption from service, which has been dangled close to the eyes of chemists and druggists for several years past, was again postponed. On the other hand, the Government made a promise, which was unredeemed, to introduce a Bill to provide for the appointment of a Public Prosecutor. Patent medicine licences furnished the subject of a surprise; for when the Inland Revenue Act was issued it was found to contain a section making the payment for a licence uniformly five shillings throughout the country, although no reported allusion to the alteration appears to have been made either in the Budget speech or in any of the subsequent discussions in Parliament. The expiring law relating to petroleum, which has been before the House for amendment several times, was extended for another year. An important Act providing for the Registration of Trade Marks was passed, the application of which will depend greatly upon regulations which have been drawn up by the Lord Chancellor. Although the Act comes into operation to-day, these regulations were only issued on Thursday last; but the multiplicity of interests involved make the subject a very intricate one—hence, doubtless, the delay. Lastly, an important and lengthy Act, dealing with Explosive Substances, was passed, and as in the present state of public feeling it is probable the law will be rigorously enforced, it will be important for some of our readers to note that for the purposes of the Act, in the regulations as to retail dealing—such as registration of premises, storing, packing, etc.—the term "explosive" includes coloured fires, fog signals, fireworks, fuses, rockets, percussion caps, detonators, cartridges, ammunition of every description, and every substance "used or manufactured with a view to produce a practical effect by explosion or pyrotechnic effect." The subject of Cooperative Stores was again brought before the House of Commons by Sir Thomas Chambers, but the discussion did little towards advancing the elucidation of the difficulty.

In September, the British Pharmaceutical Conference held a most successful meeting at Bristol under the presidency of Mr. T. B. Groves. There was a good supply of good papers, to which reference will be made elsewhere, and the festive portion of the meeting was very enjoyable. A pharmaceutical veteran, in the person of Professor Redwood, was elected to succeed Mr. Groves in the presidential chair, and it was decided to hold the next meeting in Glasgow. As the British Association is to meet there the same week, with Sir Robert Christison, who is an Honorary Member of the Pharmaceutical Society, as a president, pharmacists will look forward with special interest to the meeting of these kindred societies under the presidency of two gentlemen so closely connected with their body. Last month the Committee of the Conference made several fresh grants in aid of original research, and this recalls the important report in favour of similar grants from the State, made by the Royal Commission on Scientific Instruction. The British Association meeting showed no falling off in point of numbers, but it lacked what has been one of its characteristic features during the last few years; Sir John Hawkshaw did not provide a sensational Presidential Address. The British Medical Association held its annual meeting in Edinburgh, the President being Sir Robert Christison. At an International Medical Congress held in Brussels, in September, there was the novelty of some discussions on pharmaceutical subjects initiated by pharmacists; but the result appears to have been *nil*. The twenty-seventh meeting of the American Pharmaceutical Association was held in Boston, in the same month. Another important event in the scientific world has been the inauguration of the Yorkshire College of Science. Among what may be looked upon as holiday anniversaries must be mentioned the Annual Dinner of the Members and Friends of the Pharmaceutical Society, held at Willis's Rooms, the day before the Annual Meeting in May, and the

Conversazione at South Kensington Museum, which succeeded it. Last, but not least, there was the Chemists' Ball, a repetition of which we would remind our readers is near at hand.

During the year, we have been enabled, frequently by the courtesy of correspondents, our indebtedness to whom we take this opportunity of expressing, to report 46 fatal cases of poisoning, being exactly the same number as reported in the previous year. Although this number cannot be said to represent all the cases of death from poisoning that have taken place in this country it probably includes the major part of them. The deaths due to different poisons were as follows:—aquafortis, 1; arsenic, 6; caustic potash, 1; chloroform, 1; chloral hydrate, 3; coal gas, 1; colocynth, 1; corrosive sublimate, 1; Epsom salts, 1; laudanum, 5; liniments, 3; lotion, 1; morphia, 1; neuraline, 1; nitrate of silver, 1; opium, 2; oxalic acid, 1; prussic acid, 2; soothing syrups, 4; strychnia, 3; vermin killers, 6. Upon the above it it may be remarked that it would appear that in not one of the six cases of poisoning by arsenic was the arsenic coloured in conformity with law; the corrosive sublimate was supplied in the place of subnitrate of bismuth by a woman servant improperly left in charge of a shop; two of the three liniments were supplied in insufficiently labelled bottles by medical men; in one case the strychnine was dispensed by a doctor's assistant in mistake for santonin; and in four of the six cases of poisoning by vermin killer, one of them a murder, the poison was supplied without complying with the legal requirements as to registration, etc. But in only one case, that of the doctor's assistant, was a prosecution ordered by the coroner. The large number of cases in which "soothing syrups" proved fatal confirms the necessity for great care in administering even weak preparations of opium to children.

In connection with the subject of poisoning it may be mentioned that in August 58 boys were poisoned by chewing laburnum roots,—which they mistook for "stick liquorice,"—though all recovered; the symptoms, nevertheless, suggested the use of laburnum in medicine as a narcotic. Numerous severe and almost fatal cases of poisoning by camphor have also been reported.

An important prosecution instituted at Hull by the Inland Revenue authorities, for the sale of a "morning tonic" without a licence for the sale of exciseable liquors, resulted in a drawn battle, the magistrate declining to give judgment. But no doubt the object of the authorities was attained by the warning conveyed that they would sanction no colourable evasion of the law. Several persons have also been prosecuted by the Board for the sale of methylated spirit without a licence, and convicted.

Two new Medical Scales have been issued by the Board of Trade, to supersede those previously in force. One is a Scale of Medicines and Medicinal Stores for Emigrant Ships, and the other a like scale for ships clearing under the Passengers' Acts, other than steam ships engaged in the North Atlantic trade.

The year has not passed away without yielding numerous contributions to the literature of pharmacy and the sciences allied to it. Not the least interesting or valuable have been those which have thrown light upon the history of new or little known remedies. Among these, perhaps the first place is due to the new Brazilian drug, jaborandi, concerning which little was known at the commencement of the year beyond its bare name and the fact that it appeared to be a powerful sudorific. As the same name, however, is applied in Brazil almost indiscriminately to several plants possessing more or less the sudorific property, most of them belonging to the order Piperaceæ, considerable uncertainty existed as to which of the substances remitted from that country in response to the demand which sprung up was the real Simon Pure. The quantity of the original specimen was so small, and that which arrived in this country was so fragmentary, as to promise little assistance in removing the uncertainty; but fortunately the efforts of Mr. E. M. Holmes in this direction were rewarded by the discovery of a parcel imported as "jaborandi," which he was able to identify as the drug sought. Some ripe fruits which were found were Rutaceous in their character, and enabled Mr. Holmes to confirm a conjecture of Professor Baillon's that the leaves which constitute the drug were from a species of *Pilocarpus*, though whether from *P. pennatifolius*, Lémaire, or from one, or even two closely allied species was not clear; an examination of the leaves favouring the latter view. Within a few days of the identification, an illustrated description of the leaves and fruit, by Mr. Holmes, was published in this Journal, and this constitutes all that up to the present time has been ascertained respecting the botanical origin of the drug. Meanwhile Mr. Martindale had experimented with an infusion of the drug upon himself, obtaining results which proved satisfactorily—except, perhaps, to himself—that the drug acted energetically as a sudorific and sialogogue. Mr. Martindale also noticed an approximation of vision accompanied by dilatation of the pupil, which has not yet been explained, unless by the suggestion that the action is due to two or more principles in the drug. A chemical examination by M. Byasson, the result of which was published in April, gave the first indication that the active principle was alkaloidal, but the quantity obtained was very small, and the substance was described as volatile. Within a few days Mr. A. W. Gerrard was able to announce that he had isolated an alkaloid, which he called "pilocarpine," and a process for preparing which he described. Subsequent experiments have proved that this substance possesses the characteristic properties of jaborandi leaves; it does not, however, appear to be volatile, and in this respect does not correspond with the substance obtained by M. Byasson. A short time afterwards Mr. Gerrard obtained the nitrate in a crystalline form, the alkaloidal substance being non-crystalline, and other crystalline salts have been since prepared in this country and in France. The presence of a second alkaloid has been reported by M. Hardy; and in the report on further researches made by Mr. Gerrard and presented to the Conference he speaks of an aromatic essential oil solid at ordinary temperatures, tannic acid, a peculiar volatile acid, and chloride of potassium. In addition to the foregoing, Parodi reports the isolation of an alkaloid from *Piper Jaborandi*, which he has named "jaborandine," and Drasche reports the isolation of one from "Serronia Jaborandi," which he has named "serronine."

Early in the year, Dr. Charles Symes called attention to the arrival of two bales of "carnauba root," described as the root of *Corypha cerifera*, a wax-bearing palm growing in the Brazils, and as being a valuable blood purifier and diuretic. A sample of the root was afterwards submitted to a chemical examination by Mr. E. L. Cleaver, who states that he found indications of an alkaloid in small quantities, an acrid resinous body, a red colouring matter, a variety of tannic acid, and a volatile oil.

Some interest was excited by a suggestion that araroba, or arariba, or chrysarobine, a substance that has recently obtained repute as a remedy for ringworm and other cutaneous diseases, was identical with Goa powder or "poh di Bahia." Mr. Holmes was able to confirm this suggestion, first made by Dr. Da Lima, and to point to the probability that this substance with many names was derived from a species of *Centrolobium*, growing in Brazil. An examination of a specimen of chrysarobine by Professor Attfield showed that it contained 80 to 84 per cent. of chrysophanic acid, to which probably the therapeutic action of the drug is due.

Dita, the bark of the *Echites scholaris*, a forest tree growing in the Philippines, has acquired some reputation as a febrifuge, and a substance called "ditain," exhibited at Vienna, was represented to be a valuable substitute for quinine. The bark was therefore thoroughly examined by Messrs. Jobst and Hesse, who found besides a fatty and a crystallizable acid and certain resinous bodies, an alkaloid, which they named "ditamine." This alkaloid was present, however, in such small proportion that the authors were unable to attribute to it any therapeutic property the bark might possess.

Coto bark, a reputed remedy from Bolivia against diarrhœa, rheumatism, and gout, the botanical origin of which is unknown, has been the subject of an elaborate investigation by Drs. Wittstein, Hartz, and Von Gietl. Dr. Wittstein obtained from the bark a strongly aromatic essential oil, a volatile alkaloid with a herring like odour and resembling trimethylamine, two resins, one soft and aromatic, the other hard, brittle, and without smell or taste, besides other unimportant constituents. The best menstruum of the bark for pharmaceutical purposes was found to be rectified spirit. The result of clinical experiments showed the powdered bark and the tincture to be effective against diarrhœa, but the drug does not appear to have been tried in cases of rheumatism or gout. In addition to the above Herr Jobst has isolated from coto bark a body crystallizing in handsome prisms, to which he thinks the therapeutic properties are probably due.

Tayuya, the root of a Brazilian Cucurbitaceous plant, is another new drug, which is said to have antisyphilitic properties. Several other drugs, also from that apparently inexhaustible storehouse in Brazil, have been described in two papers by Mr. Holmes. From the United States we have heard of the fame of "Damiana," which for some time laboured under the disadvantage of having no botanical representative, it making its first appearance as a pharmaceutical preparation; but which now is represented by no less than three different kinds of leaves, the botanical origin of all being unnamed. Should any of our readers, in their search for novelties, import this article, we advise them to beware of introducing some of the circulars in which its virtues are set forth, or they may suffer under the provisions of Lord Campbell's Act. Gelsemium is another drug from the United States, which is rapidly coming into favour, and full information concerning it is in course of publication in this Journal. In India, gurjun balsam, obtained by incision from the *Dipterocarpus lævis*, has been adopted under the auspices of the Government, as a remedy against leprosy. In Havana, the oil of the nuts of the candlebury tree (*Aleuritis triloba*) has been used as a substitute for castor oil. In France preparations of the myrtle and an extract of mahogany have been used as astringents; whilst layers of wadding saturated with a decoction of *Fucus crispus* have been highly spoken of as poultices. Nearer home a tincture or extract of artichoke has been recommended in cases of rheumatism.

The cinchona barks have been the subject of several communications during the year. With regard to the acclimatization of the plant in India it is evident that some of the more glowing accounts as to the financial success of the experiment must be taken *cum grano salis*, and the same may be said of ipecacuanha. It is true that the *Cinchona succirubra* flourishes in the Sikkim plantations, but unfortunately the bark from this variety proves to yield chiefly cinchonidine, and to be deficient in the more valuable alkaloid. On the other hand, the propagation of *C. Calisaya* by cuttings is difficult, whilst an attempt to produce it from seed has proved a failure. The Government has not, however, lost sight of the possible value of cinchonidine, and much of the future of the cinchona plantations of India appears just now to depend upon the results of an experiment with a large quantity of that alkaloid which has been sent out to India for trial by medical officers in all parts of the country. The preparation of the mixed alkaloids from the Indian barks at Ootacamund has been abandoned, but a proposition by Mr. C. H. WOOD to revive the experiment in Calcutta is under the consideration of the Indian Government. Experiments in the acclimatization of cinchonas have also been reported as progressing favourably in Madeira, Jamaica, the Mauritius, the Isle of Bourbon, and Ceylon, but in most cases the plant grown appears to be the *C. succirubra.* In presenting a series of Indian barks to the Society's museum, Mr. J. E. HOWARD supplemented the gift with a descriptive paper, in which he also called attention to the extraordinary variations in the state in which the astringent principles exist in different cinchona barks, and the widely varying medical effect that must result from the use of infusions or decoctions of such barks. The importance medicinally of the astringent principles has also been referred to by Dr. DE VRIJ, who states that water removes the major part of them, together with a considerable proportion of the alkaloids present. Mr. DAVID HOWARD has confirmed an interesting observation of Dr. DE VRIJ, that there is a tendency to the production of quinidine in the renewed bark of *C. succirubra.* Dr. DE VRIJ has also recommended the iodosulphate of the amorphous alkaloid, or, as he terms it, "chinioidin," as an excellent means of forming herapathite for the qualitative and quantitative determination of quinine. The solubility of quinine has been investigated by M. REGNAULD, whose results differ from those of previous authors, and the perplexing question of the influence of varying conditions upon the solubility of alkaloids has been partially studied by Professor PRESCOTT. Dr. JAILLARD has described the neutral sulphovinate of quinine, and strongly recommends it for use in hypodermic solutions. Herr JOBST has described the salicylate and the carbolate of quinine. Lastly, Mr. DAVID HOWARD has re-examined aricine, and Herr HESSE has presented us with an exhaustive treatise on quinicine and cinchonicine.

Opium has been the subject of an interesting note by Professor FLÜCKIGER, in which he gives the results of analyses of ten samples of opium from different sources. The highest yields of morphia were from a specimen of Patna opium (8·6 per cent.), one of English opium (8·3 per cent.), and one of Persian (7·1 per cent.). The proportion of morphia in the India opiums was usually low, narcotine being frequently present to a larger amount. Mr. BATEMAN, writing from Shanghai, states that the proportion of morphia in the native grown Chinese opium also averages only about 1·5 per cent., and that in appearance the Chinese opium resembles that produced in GIPP's land. In a recent consular report it is stated that the growth of opium in China is increasing, and a description is given of the different effects of various opiums upon the smokers, from which it appears that the Bengal opium is esteemed "mild," the Malwa "fiery," and the Chinese more "fiery" still. Professor DYMOCK, of Bombay, has contributed to our knowledge of asafœtida, and expressed an opinion that the Persian and Affghan varieties of "hingra," that is the asafœtida of European commerce, are from different sources, the former probably from *Scorodosma fœtidum,* and the latter from FALCONER'S *Narthex.* He has also mentioned the presence of seeds, together with other parts answering to the descriptions of *Dorema ammoniacum,* in ammoniacum, as evidence that the collection of that gum-resin is made after the plant has matured.

Professor FLÜCKIGER has cleared up the origin of the three kinds of rhatany that are met with in the European market. On the other hand, MAXIMOWICZ has raised a ghost that it was hoped had been laid, by re-asserting the right of *Rheum palmatum* to be considered the source of "Turkey rhubarb." Its rival, *R. officinale,* has this year fruited for the first time in England, and the same may be said of the flowering of the *Euryangium Sumbul.* The veratrums and their alkaloids have been the subject of an exhaustive essay by Mr. MITCHELL; and several Indian medicinal plants have been brought forward by Mr. Surgeon EVERS.

The announcement by KOLBE that salicylic acid possessed considerable antiseptic properties, and that it could be prepared artificially by the action of carbonic acid upon carbolic acid in the presence of sodium or caustic soda, has attracted much attention. There seems to be some question as to whether all that is claimed for salycylic acid will prove true, and it has been asserted that its antiseptic properties are inferior to those of carbolic or benzoic acids. Professor THIERSCH has reported favourably of it in antiseptic surgery, but Professor LISTER is said still to prefer carbolic acid. It is possible that the result of some experiments with this substance have been affected by forgetting that it is only in the free state that salicylic acid acts as an antiseptic, but that when saturated, even by the ammonia of decomposed nitrogenous matter, it ceases to do so. Naturally the fact that the acid is free from offensive taste or smell and non-poisonous suggested its use in the preservation of certain pharmaceutical preparations, and the extent to which it may be thus useful has been shadowed forth by the experiments of Messrs. GODEFFROY, THRESH, and BENGER. Several formulæ for preparations and dressings of salicylic acid have appeared, and it has been stated that its solubility in water is increased in the presence of phosphate of soda or of ammonia, and by previously cautiously heating it in glycerine. The salicylates of soda and of ammonia have been recommended for internal medicinal use. It has also been found that salicylic acid can be obtained perfectly white by distilling it in a current of superheated steam, or by dissolving it with heat in glycerine and precipitating it with cold water. Oil of wintergreen being, as is known, mainly salicylate of methyl, Mr. WILLIAMS was induced to experiment in this direction and exhibited a sample of artificial oil of wintergreen at one of the evening meetings.

There can be little doubt that borax also has antiseptic properties worthy of more attention than they have yet received, and M. SCHNETZLER has shown that it exercises a considerable influence upon fermentation and putrefaction. The chemistry of the tar antiseptics has been the subject of a lecture by Mr. BICKERDIKE, and what was claimed to be absolutely pure phenol has been produced. The disinfecting properties of turpentine have been attributed to the production of ozone, but Mr. KINGZETT has found that peroxide of hydrogen and not ozone is yielded by turpentine and all essential oils the terpenes of which are represented by $C_{10}H_{16}$, by the oxidation of an intermediate organic peroxide. M. BERT has found that fermentation and putrefaction are retarded or arrested by increased atmospheric pressure, and M. MUNTZ has shown that chloroform may be used to discriminate between chemical and physiological ferments.

The preparation of pure chemicals has been the subject of several papers. Mr. SMITH has described a process for obtaining pure potassium and sodium carbonates and absolute alcohol. Mr. SIEBOLD has given processes for the potassium and sodium carbonates and nitrates, potassium permanganate, sodium chloride, and bismuth subnitrate, subcarbonate and oxide. Professor FLÜCKIGER has prepared a crystalline principle from kousso, which he has named "kosin." Mr. POWER has described the preparation and characters of elaterin. M. GLENARD has given a new process for obtaining emetine in crystals, to which he attributes the composition $C_{20}H_{22}NO_4$. M. DUQUESNEL has prepared crystals of neutral hydrobromate of eserine which he recommends for ophthalmic purposes. Dr. TILDEN has made further researches upon the crystalline constituents of different aloes: zanaloin he believes to be identical with socaloin, and isomeric with barbaloin in the anhydrous state, but all three to be widely different from nataloin. Dr. CRAIG has come to the conclusion that aloin is probably the active principle of aloes, and that the purified resin has no purgative properties. Dr. WRIGHT has confirmed Mr. GROVES' discovery of an inert aconite alkaloid, and has continued his elaborate investigation of the opium alkaloids. Professor SCHROFF is of opinion that species of aconite do not become innocuous through growing in certain localities, but that certain species are non-poisonous. From the root of *A. septentrionale* a poisonous alkaloid has been obtained which scarcely exists in the other part of the herb. M. ROUSSIN has made an interesting study of the sweet principle of liquorice root, and has pointed out that glycyrrhizin is not sweet except its solution be effected in alkalies; upon this he has based a suggestion for the preparation of an ammoniacal glycyrrhizin which he says represents the sweet taste of liquorice to a remarkable degree.

At the Conference meeting Mr. UMNEY urged that citrate of lithium in crystals should replace in the Pharmacopœia the amorphous pulverulent form now official, and the suggestion was well received. Bromide of lithium has been recommended by M. YVON, and a method of obtaining it in crystals described, and Mr. SHUTTLEWORTH has done similar service in respect to the benzoate. Professor BABCOCK has given improved processes for the preparation of iodide of arsenic, and of ferrous sulphide free from iron. Mr. CREUSE has reported on the methods of preparing reduced iron and the tests for its purity. Mr. WILLIAMS JONES has described a syrup of ferrous phosphate prepared from metallic iron, and a formula for syrup of ferrous iodide has been given by Mr. TSCHIRNER, and one for a syrup of calcium iodide by Mr. MARTIN.

A process for the preparation of dilute phosphoric acid by the intervention of bromine and nitric acid was described by Professor MARKOE to the American Pharmaceutical Association. A departure from the strict instructions led to an accident, which in its turn resulted in a modification of the process. Phosphorus itself is now so largely prescribed that considerable attention has been devoted to ascertaining the best mode of administering it. M. MÉHU still thinks a non-saturated solution in previously heated almond oil the best; but this preparation is condemned by Mr. THOMPSON, who prefers a solution in absolute alcohol. As excipients for its administration in the pill form, cacao butter, cacao butter and castile soap varnished with shellac, and pulv. hordei, treacle and gum tragacanth have had their advocates. One point seems to have been cleared up by Mr. THOMPSON, who found that the administration of amorphous phosphorus in several cases produced no apparent effect.

An observation that any oil soluble in spirit vastly facilitates the mutual solution of turpentine and spirit led Mr. W. SYMONS, of Barnstaple, to bring before the Pharmaceutical Conference an improved method for preparing Linimentum Terebinthinæ Aceticum, in which castor oil and glacial acetic acid were used. This was followed by the observation of Mr. BARNES that the fact of many fixed and essential oils being soluble in glacial acetic acid in all proportions might be utilized in obtaining solutions of the alkaloids. Mr. Gregory has confirmed the unadvisability of adding alcohol to acetum scillæ. Mr. Umney has advocated the use of more litharge than is at present used in lead plaster.

Besides the foregoing, formulæ have been published for a mistura gentianæ, by Dr. Symes; for cod liver oil and quinine, cod liver oil and the hypophosphites, elixirs of hops and guarana, iodoform pencils, and many other preparations, which we have no space left to enumerate.

During the year we have had the opportunity of publishing several very instructive and interesting lectures. Amongst these may be mentioned those of Dr. Burdon Sanderson on the Occurrence of Organic Forms in Connection with Disease; Dr. Dougall on Zymotic Poison; Dr. Richardson on Alcohol; Dr. Macadam on Milk; Mr. Pattinson on New Chemical Processes; Dr. Spence and Dr. Totherick on the Relations between Medicine and Pharmacy; Dr. Mueller on Pharmacists as Scientific Investigators; Professor Dewar on the Physiological Action of Light; Mr. W. N. Hartley on the Action of Light on Coloured Liquids; Lord Rayleigh on the Dissipation of Energy; Professor Abel on Accidental Explosions, etc.

To record the work of death is an inseparable portion of such a task as this.

> "Let this one sorrow interweave among
> The other glories of our yearly song."

But not in many years will it be the lot of the chronicler to record the loss of one so illustrious in the history of materia medica and pharmacy as Daniel Hanbury. In Anton Schrötter, too, the discoverer of amorphous phosphorus, the Pharmaceutical Society has lost one who reflected honour upon it as an Honorary Member. In Charles Colin Luckombe of Wimbledon, a former Auditor, and in Samuel Manthorp, of Colchester, John Parnell, of Peterborough, Thomas Witherington, of Worcester, Wellington Edwards Groves, of Blandford, and William Henry Radnall, of Ulverston, men who had served the Society as Local Secretaries have passed away. David Rennie Brown had shown his sympathy with students in the science he adorned by his donations to the library and museum in Edinburgh. John Palk and Nathaniel Jacobson were also names well known among pharmacists. To turn to losses more widely felt, Sir Charles Wheatstone has gone, after having rendered services to the whole world; while Sir Charles Locock and Dr. Hughes Bennett in England, and Demarquay and Duchenne in France, have been lost to medicine. Nor can we close this list without including the name of John Churchill, for many years the publisher of this Journal, and to whom students were indebted for the Manuals of Fownes and Bentley, and many other like works.

Neither authors nor publishers can be reproached with want of energy or enterprise during the year 1875, for never perhaps has the book market been more fully supplied. Of the books that have been specially noticed in these pages may be signalized Planchon's splendid treatise on the Identification of Drugs of Vegetable Origin; a new volume on Materia Medica, by Phillips, and a new edition of an old favourite on the same subject by Scoresby-Jackson; the 'Year-Book of the British Pharmaceutical Conference,' and the 'Proceedings of the American Pharmaceutical Association;' the commencement of Bentley and Trimen's finely illustrated 'Medicinal Plants,' and a capital elementary book on Botany by the former author; 'How to Teach Chemistry' according to Professor Frankland, and still another edition of Attfield's perennial Manual; a valuable report on the Gums and Gum Resins in the India Museum, by M. C. Cooke; Lubbock's beautifully illustrated volume on Wild Flowers in Relation to Insects, succeeded by Darwin's book on Insectivorous Plants; and, finally, an historical, antiquarian, philological *olla podrida*, by Clements R. Markham, on the vexed and, to him, important question of Chinchona *versus* Cinchona, which evoked, perhaps, the last contribution from the pen of Daniel Hanbury.

Such are some, but by no means the whole, of the subjects which have occupied the pages of this Journal during the past year, and thus faithfully, we hope, reflected the pharmaceutical history of the country. If this *résumé* accomplishes no other purpose, it will help, perhaps, to the realization of the enormous variety and extent of the field in which pharmacy now plays its part. The year that has now opened does not threaten any falling off in this respect, and we, as in the past, shall do our best in keeping our readers well informed on all points connected with their calling. At present, we conclude by wishing them heartily, A Happy and Prosperous New Year!

THE TRADE MARKS REGISTRATION ACT.

Just as we are going to press the Regulations under this Act have been issued, too late, however, for more than an announcement of the fact in this number. The Trade Marks Registry Office will be opened on the 1st of January in Quality Court, 47, Chancery Lane. Mr. H. R. Lack of the Board of Trade has been appointed Registrar. We hope next week to place a *résumé* of the Act and Regulations before our readers.

Parliamentary and Law Proceedings.

A Lady Poisoned by an Overdose of Morphia.

On Monday, December 20, the Deputy Coroner for East Cumberland (Mr. John Carrick) held an inquest at the Rectory, Orton, near Carlisle, regarding the death of Mrs. Theed, wife of the Rev. Wm. Theed, who had been poisoned by a dose of morphia taken in order to procure sleep and alleviate pain.

Mr. Page, surgeon, said he had attended Mrs. Theed medically for many years. She used to suffer much from neuralgia in the face; she had also had attacks about the chest, coughs and colds; but the most long continued of her ailments was the neuralgia in the face. He had not seen her very recently; the last time was some weeks ago, when she had a cough. On Friday morning shortly before one o'clock, he was called up by Miss Parker, who told him that Mrs. Theed had, as she thought, taken too large a dose of morphia. Miss Parker said her mother had been sleepless on the two previous nights. On Thursday night she seemed to feel rather better; she had in fact been playing cards with the children, and after they went to bed, she was playing bezique with Mr. Theed. As bedtime approached, she said she thought she would take some morphia; she went upstairs, and returning, said she had taken it.

The Deputy-Coroner: Was she in the habit of taking morphia?

Mr. Page: Certainly not as a habit. She may have taken a little laudanum for the face ache on various occasions, but she was not an habitual opium taken.

The Deputy-Coroner: It would have the effect of alleviating pain?

Mr. Page: Oh, yes, and of producing sleep. Shortly afterwards it was noticed that her speech became thick; Mr. Theed observed that she was pale; the rapidity with which she became drowsy alarmed the family; and assistance was sought. They went upstairs, and there found, on the dressing table, a bottle [produced], which contained a solution of morphia. When Dr. Macdougall and witness arrived they found Mrs. Theed absolutely unconscious, and nothing would arouse her in the slightest degree. They immediately used the stomach-pump, and thoroughly washed out her stomach; and gave her such remedies as are usually given as antidotes for poisoning by opium. But all efforts to arouse her were useless; there was not the slightest sign of sensibility from first to last. Indeed, from the first they had no hope that she would rally. She died about five o'clock in the afternoon.

The Deputy-Coroner: Could you or Mr. Theed tell the jury anything which could explain the quantity she may have taken?

Mr. Page: I am afraid that is a point which no one can clear up. This is the bottle. I went upstairs and found she had a medicine closet containing various drugs. That is explained by the fact that at Skirwith—I don't know whether it was her practice here—she used to give medicine to the people of the village in their ailments.

A Juror: She used to do so here also.

Mr. Page: I imagine this was her stock-bottle for keeping morphia in, and she must have brought it from Skirwith. You see, it is an old fashioned bottle, and is dirty, the label being scarcely legible.

The Deputy-Coroner: Have you tested the strength of the solution?

Mr. Page: I have. It is hydrochlorate of morphia, and is very strong. I infer that she had it a long time in her possession, for several reasons. You will see from the label that it was got from "Redfern, chemist," at Penrith, showing that she must have got it when she was at Skirwith Abbey, now a good many years ago. The label "poison" is at the bottom of the bottle, so that a person taking up the bottle would be liable to cover up that label with his or her hand, and not see it at all. I have examined the solution of morphia, and I find it very strong. It is a great deal stronger than that ordered in the present Pharmacopœia, which prescribes half a grain to the drachm; hence it seems probable that it is of the strength ordered in the former Pharmacopœia, which was a grain to the drachm. Consequently, if she took hold of the bottle, believing it to be an ordinary medicine bottle, and took the ordinary dose of medicine, a tablespoonful or two tablespoonfuls, she would, in one tablespoonful, take four grains, and in two tablespoonfuls, eight grains of morphia, which would certainly be a fatal dose.

The Deputy-Coroner: How much would be a fatal dose?

Mr. Page: That question cannot be answered with absolute precision, because different persons are differently affected by it; but in either case—in the case of eight grains certainly, and in that of four grains almost certainly—the dose would be fatal.

The Deputy-Coroner: Have you any doubt that Mrs. Theed died from this cause?

Mr. Page: Not the slightest. It is absolutely certain she died of poisoning by opium.

Mr. Theed was also briefly examined, and corroborated what Mr. Page had said. Mrs. Theed had for more than a week been far from well. She ate scarcely anything, and slept very badly. More than once he wanted to send for Mr. Page, but she did not feel inclined to do so. On Tuesday night she had no sleep, and on Wednesday night she had no sleep. During Wednesday night he got up and got her some brandy and water. On Thursday morning she took some pills and a seidlitz powder, which seemed to do her good. On Thursday afternoon and evening she appeared to be considerably better; so much so, that in the evening, after he left the study, they both joined in a game with the children, and after that had a game at bezique. About ten she left the room, and came back in a little while, saying she had taken a little morphia. He did not take any notice of that, because she was often taking a little chlorodyne, or something of that kind, in order to get sleep. It might be twenty minutes after she returned that the morphia appeared to take effect. When he first noticed it, he asked her how much she had taken. She said she did not know. In fact, she was then getting drowsy, and her increasing drowsiness alarmed him, so he at once sent for Mr. Page. She remained conscious twenty or five-and-twenty minutes after that. He got a tumbler of warm water, thinking it would do her good, and she drank it, but it had no effect. He had no reason to suppose that she took the morphia otherwise than for the purpose of inducing sleep.

The Jury came to the conclusion that deceased took the overdose accidentally, and a verdict to that effect was recorded.—*Carlisle Patriot.*

Reviews.

Taschenbuch der Geheimmittellehre. Eine kritische Uebersicht aller bis jetzt untersuchten Geheimmittel, zunächst für Aerzte und Apotheker dann zur Belehrung und Warnung für Jedermann. Herausgegeben von Dr. G. C. Wittstein. Vierte sehr stark vermehrte Auflage. Nördlingen: Druck und Verlag des C. H. Beck'schen Buchhandlung. 1876.

The Pocket-Book of Nostrums. A Critical Summary of all hitherto examined Nostrums, chiefly for Physicians and Pharmacists, but also for the Information and Guidance of the People. Edited by Dr. G. C. Wittstein. Fourth edition, greatly enlarged. Nördlingen. Printed and published by C. H. Beck. 1876.

Dr. Wittstein is favourably known to British pharmacists as the author of a work on pharmaceutical chemistry which, when similar books were less numerous in our language than they happily are now, did good service for the profession. In these latter years, when news travels so rapidly, and we know to-day what was done yesterday all over Europe, when scientific papers even are read in other tongues than the original almost before the ink is dry, his name and labours have become more familiar to us, and the reputation he enjoys in Germany is only more assured than what pertains to him amongst ourselves. Books relating to pharmacy are not so plentiful yet that each is not welcomed even before its deserts are known. If this were not the case, Dr. Wittstein's name on a title page would be considered ample assurance for the merit of what comes after. The volume before us has its merits undeniably, but it says little for the sufficiency of pharmacy as a profession in Germany, that gentlemen of Dr. Wittstein's standing should have the leisure, seriously to set to work and analyse, or compile analyses of, nostrums. That four editions should be published in ten years shows that the 'Taschenbuch' is in demand from some quarters, but whence, it would perhaps be difficult to say. This difficulty arises from the circumstance that it is written in the vernacular "so as to be useful not merely to those who prescribe and those who dispense medicines, but also to the general public." Its object with regard to the latter is to be achieved by bringing to them the consciousness, following on their reading and seriously considering the contents of the book, of the superfluity—the injurious action, of the arcana of medicine. It seems to us that another consequence may flow from such a course of action not less prejudicial to both sections of the art of healing than that it is sought to remove. It is possible that an enlightened public may find in the 'Taschenbuch' means of prescribing for and doctoring both themselves and others.

Each formula is accompanied by the name (and address, where possible) of the projector or the manufacturer, the qualities claimed for it, the price demanded, and the actual value, so that all necessary information is given to render it *pro bono publico*. Each European country furnishes its quota, but the greater proportion of the formulæ are of German origin. A few come from America.

Whether the compilation is sufficiently comprehensive or otherwise may be inferred from the following list of English nostrums which find a place in it:—Brandish's Alkaline Solution, Tomlinson's Butter Powder, Brown's Chlorodyne, Chloralum, Condy's Fluid, James's Powder, Warburg's Fever Drops (the formula is much simpler than that recently published by Dr. Maclean), Bishop's Citrate of Magnesia (this, we are assured, contains neither citric acid nor magnesia, but consists solely of bicarbonate of sodium and tartaric acid), Cooper's Mustard Paper (contains no mustard, but extract of Spanish pepper and euphorbium), Holloway's and Morrison's Pills, Revalenta Arabica, Holloway's Ointment, Steedman's Soothing Powders (rice starch), and Thorley's Cattle Food. Altogether about 900 formulæ may be found here, more or less useful to the pharmacist. The proportion of toilet preparations is very large.

The 'Taschenbuch' may be useful to the physician and the pharmacist, but we believe it to be a mistake to place it in the hands of the public.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF SPIRIT OF WINE.

The following correspondence, which has taken place between our local secretary, Mr. Randall, and the Inland Board of Revenue, will be interesting to our readers:—

"*Wareham, Nov.* 29, 1875.

"Gentlemen,—It has hitherto been the practice in the trade to supply spirits of wine to surgeons, for preparing pharmaceutical articles, and likewise to professional men for scientific purposes. A friend of mine has disputed the legality of this proceeding unless a licence is first obtained.

"I shall therefore, feel much obliged, if you will kindly give me an authoritative reply.

"I am, Gentlemen,
"Yours faithfully,
"THOMAS RANDALL.

"The Commissioners of Inland Revenue."

"*Inland Revenue, Somerset House, London, W.C.*
"*December* 15, 1875.

"Sir,—In reply to your letter of the 29th ultimo., requesting to be informed as to the legality of the sale of spirits of wine by chemists for pharmaceutical or scientific purposes, I am desired by the Board of Inland Revenue to acquaint you that a licence is by law required by every person who sells spirits.

"In the event, however, of a small quantity being required for strictly medical or scientific purposes, of highly rectified spirit such as could not ordinarily be obtained from the licensed trader, the Board would not in such a case interfere with the supply of a few ounces by a chemist not licensed for the sale of spirits,—but the application for such spirit, and the sale of it, must be strictly limited to such purpose, and strict proof to that effect would be required, in the event of any complaint being made of a violation of the statute,

"I am Sir,
"Your obedient Servant,
"W. C. MITCHELL,
"*For the Secretary.*"

IMPURITIES IN BISMUTH.

Sir,—In reading Mr. Ekin's note on "Tellurium as a probable impurity in Bismuth," it appeared to me that the offending substance might not be tellurium but selenium. M. Edmond Willm describes Bornine or Tetradymite as a natural sulfotelluret of bismuth having the formula Bi_2Te_2S crystallizing in rhombohedrons of a leaden grey colour and metallic lustre and always containing a small quantity of selenium. He also describes an alloy of bismuth with tellurium to the extent of 2½ per cent. which is found native in lamellar masses from the summit of Sorata in Bolivia, but does not say whether that contains selenium. As regards the sources of bismuth in the English market, several of the German manufacturers have lately introduced their bismuth products in competition with the English makers and though the ultimate source of the metal is the same, yet the process obtaining here may have prevented the contamination complained of.

D. P. STEVENS.

4, *Jewry Street, Aldgate, E.C.*,
Dec. 29, 1875.

COCCULUS INDICUS IN WINE LEES.

Sir,—An old pupil of mine the other day obtained some port lees from a well-known firm of wine merchants. Upon examining the specimen, in it was found a fair sprinkling of Cocculus Indicus berries. Has their presence in lees been previously noticed?

EDWIN NUTHALL.

T. Call.—Sachet perfume may consist of nearly any agreeable mixture of dry scent; such as, for instance, lavender flowers, orris root, rose leaves, and bonzoin, of each equal parts, with a little tonquin, vanilla, and musk added according to taste. These should be ground or roughly powdered.

W. C. W.—So far as can be judged from the fruits alone, the plants would be *Physalis alkekengi* and *Staphylla pinnata*.

"*Spes.*"—We cannot undertake to pronounce an opinion on the question.

"*A Member*, 1852."—The use of such a label without a stamp would render you liable to a prosecution.

G. H. (Brighton).—In the absence of a special agreement any arrangement as to holidays partakes of the nature of a concession on the part of the employer. Your other question should be asked of your solicitor.

"*Pharmacien Hibernicus.*"—The advertisement referred to is not indicated with sufficient clearness. Moreover, your question is one that should be addressed to the Secretary of the body whose licence you hold.

"*Student.*"—The precipitate is ferric hypophosphite, and the colour is due to the formation of ferric acetate.

"*Inquirer.*"—The chemical formula of nitro-glycerin is $C_3H_5N_3O_9$

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Landerer (Athens), Mr. Mason, Mr. Richter (Geneva), Mr. Druce, Mr. Pitman, Smith Major.

STUDIES UPON ESSENTIAL OILS.

BY G. DRAGENDORFF.

Professor in the University of Dorpat, and Honorary Member of the Pharmaceutical Society of Great Britain.

I.—THE ADULTERATION OF ESSENTIAL OILS WITH TURPENTINE OR COPAIBA OIL.

Two years since I contributed to the *Neues Repertorium für Pharmacie* (vol. xxii., p. 1) a memoir which had for its subject an investigation of how far the statement made by Zeller, and afterwards by Heppe, that the adulteration of essential oils with turpentine could be indicated by testing with alcohol, was practically valuable. The result of my experiments, published at that time, was that in those essential oils which are soluble in dilute alcohol an adulteration with 10 per cent. and upwards of oil of turpentine could be demonstrated, and that since copaiba oil is still more difficultly soluble in dilute alcohol than oil of turpentine, the presence of an admixture of copaiba oil could also be demonstrated upon the same principle.

My work at that time consisted principally in ascertaining in the first place for each essential oil what mixture of alcohol and water would dissolve one fourth of its volume of the oil in question at a temperature between 15° and 20° C. I then compiled tables of the solubility of the more important essential oils in alcohol of different strengths, to which I refer the reader, and from which I now repeat here those figures which express the solubility in the mixture of alcohol and water suitable to my present purpose. The following table represents the quantity and strength required to dissolve 1 c.c. of the respective oils:—

Name of Essential Oil.	Cub. cent. of Alcohol.	Per cent. by vol.*
Ol. Cassiæ	3	65
Ol. Cinnamomi acuti . . .	3	65
†Ol. Caryophyllorum . . .	2·7	60
Ol. Caryophyllorum venale .	2·4	60
Ol. Salviæ	3·1	65
Ol. Cajeputi	2·5	65
†Ol. Majoranæ	1·45	78
†Ol. Rosmarini	1·4	78
†Ol. Lavandulæ	2·3	65
†Ol. Menthæ crispæ	2·7	65
†Ol. Menthæ piperitæ . . .	2·2	70
†Ol. Carvi	0·8	84

Of those oils which cannot be tested with alcohol or oil of turpentine, but probably might for copaiba oil, the quantity and strength of alcohol required to dissolve 1 c.c. is—

Name of Oil.	Cub. cent. of Alcohol.	Per cent. by vol.
Ol. Aurantiorum dulcium .	0·9	94
Ol. Aurantiorum amarum .	0·9	94
” ” ” .	2·0	93
Ol. Bergamottæ	1·15	78
Ol. Citri destillatum . . .	4·0	91
Ol. Citri expressum . . .	2·8	92
†Ol. Sabinæ	1·3	80
†Ol. Juniperi baccarum . .	3·0	93

† Copaiba oil, prepared according to Ader's method required 4 c.c. of 98 p.c. alcohol to dissolve 1 c.c.; he oil obtained by direct distillation required 3·5 .c. alcohol of the same strength to dissolve 1 c.c.

Ten different kinds of oil of turpentine were examined. Most of them required 3·5 to 3·75 c.c. of 92 p.c. alcohol to dissolve 1 c.c.

The method used by me for testing the oils and their mixtures with copaiba and turpentine oils was conducted after the manner of a titration experiment. A quantity of from 1 to 2 c.c. of the oil to be tested was exactly measured off, and to this alcohol of the suitable strength was added from a burette until a clear mixture was obtained. The method, carried out in this way, ensures a satisfactory accuracy. Often about 0·1 c.c. sufficed to produce a completely clear mixture from a turbid one. That this occasionally again became turbid after standing, especially after cooling, was not taken into account; on the contrary, it was thought advisable to bring the experiment to an end quickly. But I would here draw attention to one source of error which must be avoided. If the oil be brought into contact with alcohol in a test-tube, the strong adhesion between alcohol and glass should be remembered, and, where possible, the alcohol should be allowed to drop directly into the oil. If it comes first into contact with the sides of the glass, fresh alcohol should not be added until care has been taken by vigorous agitation that the alcohol clinging to the upper part of the glass has become uniformly mixed with the oil.

I have examined in this way a large number of mixtures of oils with the oil of turpentine and copaiba oil prepared by myself, and the results were communicated in the before-mentioned memoir. I give here briefly some of them, in order to show how far the exactness of the test may be trusted.

The following were the results obtained with mixtures of copaiba oil or turpentine oil with various oils, 1 c.c. of the mixture being used in each experiment:—

Description of Mixture. Pts.	Pts.	Result.
5 Ol. Copaibæ	95 Ol. Cassiæ . .	Remained turbid with 3 c.c. 68 p.c. alcohol.
10 Ol. Copaibæ	90 Ol. Cassiæ . .	Remained turbid with 10 c.c. of same.
10 Ol. Copaibæ	90 Ol. Cinn. acuti.	Similar result.
10 Ol. Copaibæ	90 Ol. Caryophyll.	Remained turbid with 10 c.c. 60 p.c. alcohol.
10 Ol. Copaibæ	90 Ol. Salviæ . .	Turbid with 10 c.c. 65 p.c. alcohol.
10 Ol. Terebinth.	90 Ol. Salviæ . .	Behaved similarly.
10 Ol. Terebinth.	90 Ol. Cajeputi .	Behaved similarly.
10 Ol. Terebinth.	90 Ol. Majoranæ	Remained turbid with 6 c.c. 78 p.c. alcohol.
10 Ol. Terebinth.	90 Ol. Rosmarini .	Clear first with 4·5 c.c. 78 p.c. alcohol.
10 Ol. Terebinth.	90 Ol. Lavandulæ	Not quite clear with 5 c.c. 65 p.c. alcohol.
10 Ol. Terebinth.	90 Ol. Menth. crisp.	Almost clear with 4·5 c.c. 65 p.c. alcohol.
10 Ol. Terebinth.	90 Ol. Menthæ pip.	Remained turbid with 3·25 c.c. 70 p.c. alcohol.
25 Ol. Terebinth.	75 Ol. Menthæ pip.	Behaved similarly with 10 c.c.
10 Ol. Copaibæ	90 Ol. Menthæ pip.	Ditto ditto.
10 Ol. Copaibæ	90 Ol. Carvi . .	Almost clear with 3·8 c.c. 85 p.c.* alcohol.
10 Ol. Terebinth.	90 Ol. Carvi . .	Not quite clear with 0·8 c.c. of same.
25 Ol. Terebinth.	75 Ol. Carvi . .	Not quite clear with 3·0 c.c. of same.

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* The strength of the spirit used in the various experiments is indicated in the author's MS. according to Tralle's lcoholometer, which gives the percentage volume for the emperature of 60° F.

† All the oils before which the sign of a dagger is placed were prepared in my laboratory.

* Pure oil requires 0·6 to 1·0 c.c. of this alcohol to become clear.

Description of Mixture. Pts.	Pts.	Result.
10 Ol. Copaibæ	90 Ol. Bergamottæ	Clear with 10 c.c. 78 p.c. alcohol.
10 Ol. Citri. .	90 Ol. Bergamottæ	Not clear with 3·3 c.c. 88 p.c. alcohol.*
10 Ol. Aurantii	90 Ol. Bergamottæ	Not clear with 5·0 c.c. 78 p.c. alcohol.
10 Ol. Copaibæ	90 Ol. Citri. . .	Almost clear with 3·3 c.c. 92 p.c. alcohol.
10 Ol. Terebinth.	90 Ol. Sabinæ. .	Clear with 3 c.c. 80 p.c. alcohol.
10 Ol. Juniperi	90 Ol. Sabinæ. .	Not clear with 5 c.c. 80 p.c. alcohol.

Where possible these experiments were made with oils prepared in my own laboratory.

To the foregoing I now wish to add some supplementary results, based upon some experiments conducted more recently in my laboratory. I propose to state them in the following order:—

(I.) To refer to a series of oils, which, in consequence of not possessing undoubtedly authentic specimens, I did not deal with in my former communication.

(II.) To discuss the question how far the solubility of essential oils in alcohol becomes altered by keeping, and how far this occurs when the oil has been freed from resinous substances by redistillation.

(III.) To demonstrate that in many cases the oils met with at present in commerce do not agree with those prepared by myself.

(I.) I begin with the description of the oils of which I had specimens prepared by myself at my disposal. These oils were examined with respect to their solubility, and except where otherwise stated, were freshly prepared when their solubility was tested. Part of the experiments were made by Herr Provisor Marquis. Some of these oils I was able to compare with samples liberally placed at my disposal from the chemical manufactory of Herr Zeise in Altona, for the purity of which I can myself vouch; but unfortunately these were already several years old.†

1. *Oil of Cubebs.*—The sample marked *a* was prepared by myself; that marked *b* by Herr Zeise, and that marked *c* had been obtained several years through a German drughouse. 1 c.c. mixed with alcohol of different strength behaved as follows:—

Strength, alcohol per cent. by vol.	*a*	*b*	*c*
100	. . . . .	. . . . .	0·1 c.c. clear; 0·2 c.c. turbid.
97	. . . . .	. . . . .	0·1 c.c. clear; 0·2 c.c. turbid; began to clear with 4 c.c.; not quite clear with 6 c.c.
94·5	. . . . . .	Clear in all proportions.	6 c.c. quite clear.
91	. . . . . .	0·2 c.c. clear; became turbid with 2 c.c.	Not quite clear with 12 c.c.
90		Clear with the first drop; 0·1 c.c. turbid; 0·4 c.c. again clear (at 18 to 20° C. clear with 0·2 c.c.).	
87		. . . . . .	0·75 c.c. clear; with more, turbid.
85		1 to 3 drops clear; 0·1 c.c. turbid; 7·5 c.c. again clear.	8 c.c. quite clear.
80		1 to 3 drops clear; 0·1 c.c. turbid; not quite clear with 10 c.c.	

The least concentrated alcohol which can be used for the detection of admixture with copaiba oil is therefore 90 per cent. by vol.

2. *Oil of Bitter Almonds.*—The oil prepared by myself mixed with 80 per cent. and stronger alcohol in every proportion; with 63 per cent. alcohol, 1 c.c. required 1·7 c.c. to form a clear mixture. Oil of bitter almonds from a pharmacy in this town required for each c.c. 1 c.c. of 63 per cent. alcohol, and 2·6 c.c. of 54 per cent. alcohol, but did not form a clear solution with 12 c.c. of 40 per cent. alcohol.

Nitrobenzine did not give a clear mixture with ten times its quantity of 63 per cent. alcohol, and only gave a clear mixture with four volumes of 80 per cent. alcohol; 1 c.c. of a mixture of oil of bitter almonds with 10 per cent. of nitrobenzine required 1·9 c.c. of 63 per cent. alcohol to become clear, but upon standing it rapidly became turbid again. 1 c.c. of this nitrobenzine mixture was clear with 3·3 c.c. of 54 per cent. alcohol.

The adulteration of oil of bitter almonds with nitrobenzine can, therefore, be detected by means of alcohol.

3. *Oil of Bitter Almonds distilled from Peach kernels* presented exactly the same properties as the ordinary oil: 1 c.c. dissolved in 1·7 c.c. of 63 per cent. alcohol.

4. *Oil of Mustard.*—*a*, prepared by the author; *b*, prepared by Zeise; *c*, obtained from Germany, and kept for some years. 1 c.c. made a clear mixture with—

	a	*b*	*c*
85 p.c. Alcohol . .	1·3 c.c. . . .	1·2 c.c. . . .	1·3 c.c.
80 „ „ . . .	3·0 c.c. . . .	1·2 c.c. . . .	—

Here also adulteration with turpentine and copaiba oils and petroleum could be detected by the alcohol test.

5. *Oil of Fennel.*—With this and the oil next mentioned it is necessary to be more exact as to the temperature at which the experiment is carried out. The oil prepared by myself is soluble in 93 per cent. alcohol in every proportion. 1 c.c. of the same oil required to make a clear mixture of—

90 p.c. Alcohol . .	At 22° C. . .	0·45 c.c.
85 „ „ . .	At 21° C. . .	2·9 c.c.
85 „ „ . .	At 25° C. . .	2·5 c.c.
85 „ „ . .	At 27° C. . .	2·3 c.c.
85 „ „ . .	At 29° C. . .	1·8 c.c.

All these mixtures quickly became again turbid. A specimen of fennel oil obtained from Leipzig was likewise clear at 22° C., with 2·5 volumes of 85 per cent. alcohol.

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* Pure oil requires from 0·2 c.c. to 1 c.c. of 88 p.c. alcohol to become clear.

† In consequence of the prices having been so greatly reduced by some manufacturers, Herr Zeise finds the distillation of essential oils to be no longer remunerative. The conscientious manufacturer is thus by competition temporarily brought to the alternative either to sell essential oils of bad quality or to give up the preparation.

6. *Oil of Anise.*—1 c.c. of oil prepared by myself required of—

93·5 p.c. Alcohol	At 22° C.	0·3 c.c.
90 „ „	At 23° C.	2·4 c.c.
85 „ „	At 27° C.	4·6 c.c.
85 „ „	At 17·5° C.	6·3 c.c.

If, therefore, the temperature be observed, the conditions for detecting an addition of oil of turpentine, and especially of copaiba oil to either fennel or anise oil, are not unfavourable.

7. *Oil of Roses.*—The finest oil that I could obtain in commerce, of the purity of which I am convinced, although naturally I can offer no guarantee, behaved in the following manner. 1 c.c. was with—

Alcohol p.c.	Temperature.	Behaviour.
93·5	23° C.	Miscible in every proportion.
91	30° C.	With 1·8 c.c. clear; with more, slightly turbid; with 8·4 c.c. again quite clear.
90	30° C.	With 0·6 c.c. slightly turbid; with 1·0 c.c. very turbid; with 10 c.c. not again quite clear.
85	30° C.	With as much as 1·4 c.c. clear; with more turbid; still turbid with 10 c.c.

All mixtures of rose oil with alcohol deposit stearoptene, partly at 26° C., and completely at 25° C. An adulteration with copaiba oil, at any rate, might be detected.

8. *Oil of Orange Flowers.*—This oil also was obtained through commerce, as fine as it could be had. 1 c.c. was with—

Alcohol p.c.	Temperature.	Behaviour.
90	17° C.	With 0·4 c.c., and more, clear.
86	17° C.	With 0·5 c.c. clear; with 4·2 c.c. turbid.
86	20° C.	With 9 c.c. clear.
85	16·5° C.	With 0·2 c.c. turbid; with 0·6 c.c. clear; with 3·8 c.c. a faint turbidity commenced, which did not entirely disappear with 10 c.c.

Here, also, mixtures with copaiba or cheaper orange oils were to be detected by 90 per cent. alcohol.

9. *Oil of Melissa.*—Two samples obtained in commerce were used. 1 c.c. of each was with—

Alcohol p.c.	*a*	*b*
90	In all proportions clear.	With up to 1·6 c.c. clear; with more, turbid, becoming again clear with 7·2 c.c. at 22° C.
85	With 0·4 c.c. clear at 18° C.; with 2·2 c.c. a slight turbidity that did not disappear with 10 c.c.	With 0·6 c.c. clear at 17·5° C.; with 1·4 c.c. a slight turbidity, which at 25·5° C. with 8 c.c. again disappeared.
82	With 0·6 c.c. clear at 18° C.; with 2·8 c.c. a turbidity which was not dissolved with 10 c.c.	With 1·2 c.c. clear; with 1·6 c.c. 1·6 turbid; not clear with 10 c.c.; temp. 19° C.

With respect to these experiments it will be necessary to ascertain whether the fresh oil after mixing clearly with a little alcohol becomes turbid with more. Should this, as I anticipate, not be the case, we might hope that by means of 82 per cent. alcohol an admixture of turpentine oil or copaiba oil could be detected.

10. *Oleum Chamomillæ Citratum.*—With this oil, a very good sample of which was examined, the chances of detecting an admixture of foreign oils, are, as might be expected, not very favourable. It was found that 1 c.c. gave with alcohol—

93·5 p.c.	A clear mixture in all proportions.
90 „	A clear mixture with 4·6 c.c. at 19° C.
85 „	Not clear with 10 c.c.

11. *Pure Oil of Chamomile.*—Hitherto I have not been able to experiment upon an undoubtedly genuine specimen of this oil. One obtained from Leipzig, of a beautiful deep blue colour, the purity of which I cannot guarantee, did not give a quite clear mixture with 87, 93·5, or 96 per cent. alcohol. Treated with ten times its volume of alcohol it deposited a flaky crystalline mass. In this case, however, I do not think it likely that good results can be obtained with the alcohol test; but it may be that an important evidence of purity lies in the deposition of the above-mentioned flaky substance.

12. *Oil of Ginger.*—I have examined two specimens of this oil prepared by Herr Zeise; (*a*) was distilled from African, the other (*b*) from Bengal ginger. 1 c.c. was with—

Alcohol p.c.	*a*	*b*
100	Clear in all proportions.	
97	With 0·2 c.c. clear; with more, turbid; again clear with 2·8 c.c.	Clear in all proportions.
94·5	With 5·7 c.c. almost clear.	With 0·2 c.c. clear; with more, turbid; with 4·5 c.c. again almost clear.
91	With 10 c.c. almost clear.	

A third older specimen, obtained from Germany, remained clear with a little absolute alcohol; became turbid with 1·5 times its volume; and gave only a turbid mixture with 97 per cent. alcohol.

13. *Oil of Sandal Wood.*—Of this oil, also, Herr Zeise supplied me with two samples: (*a*) distilled from South Sea sandal wood; (*b*) from South American sandal wood. I was enabled to compare them with two samples obtained several years before from Germany: (*c*) West Indian, and (*d*) East Indian sandal wood oil. 1 c.c. was with—

Alcohol p.c.	*a*	*b*	*c*	*d*
91	Clear in all proportions.	. . .	. . .	Clear in all proportions.
87	. . .	. . .	. . .	0·7 c.c. clear.
85	. . .	. . .	0·8 c.c. clear.	7 c.c. greater part dissolved.
80	1·2 c.c. clear.	1·8 c.c. clear.	1·6 c.c. clear.	11 c.c. not clear.
77	1·5 c.c. clear.	11 c.c. not quite clear.		
73	2·7 c.c. clear.	12 c.c. not quite clear.		

Here, also, it is probable that an admixture would be recognizable, but further experiments with fresh oil are required.

14. *Oil of Pinus Cedra*, prepared by Herr Zeise. 1 c.c. was with alcohol—

94·5 p.c.	Clear in all proportions.
91 „	3 c.c. clear; with more, turbid; with more, again clear.
87 „	8 c.c. almost clear.
85 „	10 c.c. not clear.

Here, also, it is probable that with fresh oil a more satisfactory result is to be obtained.

15. *Oil of Galanga.*—This oil, which appears still to be used in the manufacture of liqueurs, frequently comes into commerce adulterated. I regret the more, therefore, that at present I have only examined one not quite fresh specimen, for which I am indebted to Herr Zeise. This mixed with 97 per cent. alcohol in all proportions, with 0·2 to 2 volumes of 94 per cent. it was clear, and with more, turbid. With 0·5 volumes of 91 per cent. it was clear; with 1 volume turbid, and not quite clear again with 7·5 volumes. The adulteration appears to be effected principally with oil of pimento and perhaps oil of cloves, both of which are soluble in dilute alcohol. An adulterated commercial oil was clearly miscible with 77 per cent. alcohol in all proportions. With 0·7 volumes of 73 per cent. alcohol it was clear, but with from 2·5 to 12 volumes of the same it was turbid. It is probable, therefore, that in this particular case the ready solubility of an adulterated oil can be taken s a sure proof of the adulteration.

16. *Oil of Pimento* (Zeise).—1 c.c. mixed with—

87 per cent. alcohol.	In all proportions.
73 „ „	1·1 c.c.
69 „ „	1·5 c.c.
63 „ „	2·8 c.c.

It comes near, therefore, to oil of cloves, and the admixture of copaiba oil is easily detected.

17. *Oil of Nutmeg.*—I place beside the results obtained with a sample of oil supplied to me by Herr Zeise (*a*), those yielded by an older German oil. 1 c.c. was with—

Alcohol p.c.	Sample *a*	Sample *b*
91	Clear in all proportions.	2 c.c. almost clear.
87	3 c.c. almost, 3 c.c. quite clear.	7 c.c. almost clear.
85	5 c.c. greater part dissolved; 8 c.c. quite clear.	

18. *Oil of Pepper.*—An oil distilled by Herr Zeise from Batavian pepper required 4·75 volumes of 94·5 per cent. alcohol, and 8·5 volumes of 91 per cent. alcohol; in 83 per cent. alcohol it was insoluble. A sample previously obtained from Germany, not agreeing in smell or other properties with that of Zeise, was soluble in all proportions of 85 per cent. alcohol, and was almost clear in 5 volumes of 80 per cent. I presume that the latter oil was adulterated, and would in this case also take the more easy solubility as an indication of adulteration.

19. *Rectified Oil of Cajeput.*—A good specimen gave almost similar results with the oil already mentioned. 1 c.c. was miscible with 2 c.c. of 69 per cent. alcohol, and 2·6 c.c. of 66 per cent. alcohol.

(*To be continued.*)

DYEING THE HAIR AS A METHOD OF DISGUISE.

In the first of a course of lectures on medical jurisprudence, by Dr. Ogston, now publishing in the *Medical Times and Gazette*, the author makes the following remarks on dyeing as a method of disguising personal identity:—

"A question has occasionally arisen in criminal prosecutions whether a certain individual be actually the person who committed the offence with which he stands charged; or, once more, whether, when a prisoner after conviction escapes and is retaken, he is the same person who was convicted. In this case the time which has elapsed since the parties were previously seen is usually too short to allow for those changes to have occurred which age, diseases, or prolonged sufferings are capable of producing in the personal appearance. These are effected by change of dress, shaving the head, altering the style of adjustment of the hair, allowing the whiskers and beard to grow, or removing them when previously worn, or by varying the previous carriage and deportment. With this, however, the medical jurist has nothing to do. Another mode of disguise it behoves us to notice: we mean the changing the colour of the hair, as this will fall to be investigated by him. The attention of the profession to this subject was first prominently called for by the occurrence in Paris of the following case:—

"A man named Benoit was suspected of having committed a murder. Certain witnesses deposed to having seen him in Paris at two o'clock in the afternoon of the day in question with *black* hair, and others to having seen him in Versailles with *fair* hair at five or six o'clock the same evening. The man's hair was naturally *jet-black* (and it does not appear that he wore a wig). The question in consequence proposed to Orfila by the law authorities was *whether black hair could be dyed fair.* One of the first hairdressers of Paris who was consulted declared that it was *impossible*; but M. Orfila stated that it was not only *possible*, but that it had been done twenty-six years before by Vauquelin by means of chlorine. (We shall see presently that this decision of Orfila's has been called in question.) We notice—

"1st. The means of *darkening* the hair. There are various methods in use for altering the colour of the human hair. In general, the object is to change red or sandy hair to a darker hue—*i.e.*, *brown* or *black*.

"Preparations of *lead*, *silver*, or *bismuth* are employed for the purpose, *lime* or *ammonia* being first used to remove the fatty matter of the hair. A very common agent is a mixture or compound of *lime* and *oxide of lead* in equal parts, or three parts of litharge to two of lime; the litharge being sometimes replaced by the *carbonate* of lead. The mixture, made into a paste with hot water, is applied to the hair for four or five hours. The lime combines with the fatty matter of the hair, while the lead forms with the sulphur of the hair a black sulphide of lead.*

"The use of bismuth—at one time employed in place of lead—appears latterly to have been abandoned, if we may trust the investigations of Chevalier, who recently studied the subject. This author mentions that in Paris the hairdressers and perfumers who keep articles of this sort for sale trust to the use of litharge or *nitrate of silver*, which last they dissolve in about nine parts of water, and vend under the names of Parisian, Egyptian, Cyprian, or ebony water, with a solution of the same strength of sulphide of potassium to be used to removed the grease previously to the application of the silver salt.

"It should be known that the above preparations for darkening the hair are not unfrequently attended with dangerous consequences to the individual employing them, such as erysipelas, excoriation of the skin, inflammatory swellings of the face, cerebral disturbances, and even permanent insanity.† In one instance in which severe effects followed the dyeing of the hair and beard, the powder which had been made use of for this purpose was found to contain one part of quicklime, three of red-lead, and one of carbonate of iron.‡

"But in the case of dyeing the hair of a dark colour, as it is not difficult to attain the desired end, so neither is it difficult, by means of *close inspection*, or by *chemical reagents*, to detect what has been done. The metallic sulphides thus formed can be decomposed, and the metals extracted for testing; the *lead* and *bismuth* by hydrochloric acid, and the *silver* in the form of chloride by chlorine. When, on the other hand, the object is to render *dark* hair of a *lighter* colour, the end is attained by the employment of *chlorine*—first washing the hair with ammonia to remove the greasiness. One part of strong liquid chlorine, diluted with four parts of water, will change in the course of two hours, according to Orfila, *black* hair to *dark chestnut*. By successive immersions in a solution of the same strength it will be brought to a *bright chestnut*. If the same hair be brought to a *deep blonde* colour, it may ultimately be brought to a *bright yellow*, or a *white* with a *yellowish tinge*.

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* *Medical Gazette*, vol. xix. p. 215; vol. xviii. p. 312.

† *Annales d'Hygiène*, January, 1860, pp. 119—22.

‡ *Ibid.*, p. 121.

"Devergie differs from Orfila thus far, that he has never been able in his trials to produce the full effect of *whitening* in less than twelve, fifteen, or twenty hours; further, he has noticed that chlorine does not destroy the colour very uniformly.*

"This last circumstance might enable us to decide, in most cases, whether or not the hair had been artificially changed, independently of chemical experiments. Besides, as the hair grows the new growth will be of the previous colour."

OBSERVATIONS AND EXPERIMENTS ON ERGOT.†

BY A. STEPHEN WILSON, OF NORTH KINMUNDY.

(*Continued from page* 526.)

What the cause of projection may be is conjectural. The conceptacles and the papillæ seem to be filled with a brown jelly. Now, the rising of these papillæ from a previously flat surface shows that a growth is going on, and a consequent pressure increasing in intensity. So that when the ripe heads are exposed to a certain heat, the tension is brought to a crisis, and the spores are projected by elastic pressure. Necessarily when this pressure begins to abate by the relief consequent on a continuous discharge, the spores are not acted upon by so great a force as at first, and this seems to explain why the last spores, instead of being shot into the air, are merely pushed slowly to the surface and fall over. Indeed, it is almost certain that a good many spores are never ejected at all, but perish with the decaying fungus.

There is a certain analogy between the discharge of these spores, and the discharge of the pollen in grasses, In both cases the first discharge appears to result from an internal pressure producing sudden rupture.

Relation to Climate.—It will now be seen that as the spores which produce ergot are thrown out copiously in bright, warm weather, and are carried by the air, lifted up from the damp places where they grow, by atmospheric motions caused by ascending vapour, a dry season at the time of sporing is favourable to the production of ergot. Damp weather is necessary for the ripening of the *Claviceps*, and dry weather for the dissemination of the spores. But a whole season is not involved; a bright day now and then, while the grasses are opening and these sphæri sporing, is sufficient for the production of ergot. The notion that a wet season is requisite to the development of ergot has perhaps usually contained the implication that ergot is a disease, or a kind of rotting of the grass ovary. It is neither the one nor the other, but the first form of a parasitic plant.

That there may be a large crop of ergot in any year, it is necessary that a considerable quantity of ergot should retain its vitality from the previous autumn; but, although in July and August there may be numerous spores in the atmosphere, yet, if the season has not been sufficiently damp to make the grasses tiller and throw up late spikes, there will be fewer florets to be ergotized. A season which is at once favourable to the *Claviceps*, and to the production of late-flowering grasses is, in this country, demanded for the largest development of ergot; but the quantity of ergot which may be gathered almost any autumn on the various grasses in Scotland would probably be equal to the home demand. The smaller ergots are more compact and less fractured than those of cereal rye, and contain fewer of the eggs of flies, and would probably better preserve whatever qualities they possess. If these smaller ergots have not been tested in medical practice, they seem to be worth a trial.

Various Forms of Ergot.—The form and size of the ergot of each grass are peculiar to that grass. It would be easy to tell that this ergot grew upon *Nardus stricta*, and that upon *Anthoxanthum*. The heavier spurs on rye weigh from 3 to 5 grains, coming up to ten times the weight of the rye kernel. But many ergots on rye and other grasses do not project beyond the pales, nor show themselves to a cursory inspection. The weight of a kernel of vernal grass is ·011 of a grain. The weight of the ergot of this grass is sometimes, even when very dry, ·4 of a grain, or 36 times the weight of the kernel. The seed of *Glyceria fluitans* weighs ·036 of a grain, while its ergot will sometimes weigh 1·02 grains, being twenty-eight times the weight of the ripe seed. On *Poa pratensis* the ergot is about one-hundredth of a grain in weight.

Mode of Action.—The ergotizing of a grass floret takes place at or a little after the time of fertilizing. It has been stated that the ergot often carries on its apex a cap formed of the agglutinated anthers and stigmas. This would imply that ergotizing may take place before fertilizing; because the moment that fertilization takes place, the anthers are pushed up by the filaments beyond the possibility of ever being involved in the ergot. The filaments are usually longer than ever the ergot grows, and the anthers are usually broken off before the ergot emerges from between the pales. That the stigmas are sometimes involved there can be no doubt; but I have never seen a case in which the anthers were retained. In many cases there is a contracted grey point on the mature ergot, having the appearance of agglutinated anthers; but if these ergots are observed at an early stage, when they are only just coming from between the pales and are still a soft white mass, nothing like anthers or stigmas project from the apex. The contracted points shrivel up, apparently because they are not fully injected with spermatia.

Soon after the spore has planted itself in whatever part of the floret it selects or falls on, the glitter of a fluid on the pales points out where the young ergot is in deadly conflict with the living cells of the ovule. Gradually the fluid increases to a drop and a "blob." At the bottom of this blob a deposit of spermatia accumulates, exuded from the growing ergot. But it seems a mistake to suppose that the fluid also is exuded from the ergot. The quantity is so large and continuous that absorption from the air seems the true explanation.

On Artificial Ergotizing.—Some spikes of newly flowered rye were inserted and turned round and round in a test tube containing many ripe heads from the ergot of *Glyceria fluitans*. Probably thus inoculated in a few days drops began to appear. The ears were then tied to a stake and inserted in a clear bottle, through the neck, with the bottom partly out. This protected the ears from wind and rain, and so allowed the drops to attain their full size before being carried down by gravity. They were collected, however, every morning with a dropping tube and put into a small phial.

It is stated by Mr. Carruthers that the striking of one ergoted ear in the early stage upon another will communicate the disease, and that this has been experimentally tested by Bonorden and confirmed by Rose. In this operation I have not yet been successful, although carrying part of a drop to newly fertilized flowers none of them were ergotized. If the matter of these drops is capable of producing ergot, why does it often happen that a single floret on the upper part of a spike is alone ergotized, the drop running down producing no effect on the lower florets?

Still I am not in a position to deny that the granule in these drops may be a vital spermatium. The drops on the spikes of rye in my bottle were persistently visited by about six species of diptera, for which they seemed to have a great attraction, the strong smell of these drops bringing flies I had never observed in the place before. Other two spikes of rye close beside, but not in the bottle, now showed drops upon them. Perhaps it is possible these had been inoculated by the flies. It would be altogether unwarranted to affirm that spermatia carried by the flies produced ergot. All that is yet certain is that the flies went constantly in at the neck of the bottle, or at the openings of the paper which covered the broken bottom, and sucked or drank part of the fluid on the ears. Three barley florets which I had ergotized by applying the spores of the *Claviceps* of *Glyceria fluitans*, and which stood in the house in pots, were also, when in the fluid stage, constantly visited by the house-fly. During this time a fly fell dead on the paper before me, and others I found dead about the windows. I do not know that they died from the ergot fluid, I only know that they drank it. A question is thus opened bearing upon the facts of fungi in flies.

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* *Medical Gazette*, vol. xix. p. 215.

† Read before the Botanical Society of Edinburgh, and reprinted from the *Gardeners' Chronicle*.

Two of the florets of barley which were probably ergotized artificially produced large spurs, while one which showed the drop for six or eight days seemed to have simply been killed without producing an ergot—suggesting the notion that possibly the production of an ergot requires a certain amount of growth in the grass embryo to give it that start which shall eventuate in a complete ergot. None of the spurs on the rye in the bottle was of large size, although the blobs of fluid were enormous and renewed night after night as they were removed. Perhaps the removal of these every morning was inimical to the growth of the ergot. In various of the florets which produced drops, no ergot followed.

Several methods were tried of producing ergot. Little bits of the ripe heads of the fungus were placed on newly opened florets. In two cases these killed the ovule, producing red drops, but no ergot. In other cases the young embryo was thus killed without producing any drop or any ergot. Various wheat embryos were killed, but no ergot produced. Probably the quantity of spores was too great, or the rotting of the bits of the fungus interfered with the expected result. I believe I succeeded in ergotizing half a dozen florets of *Glyceria fluitans* with spores from its own *Claviceps*, on an isolated tuft, and on which there had not before been any ergot. Many florets were tried with the spermatia from the drops, and although in this case one can be quite sure that the granules are actually applied to the floret, no ergot was thus produced. Reserve is prudent in any assertion of artificial inoculation. I do not know in any case how certainty can be attained, that a floret which has had spores applied to it may not also have been naturally acted upon by sporules from the air. The grey matter or spermatia which exudes from the young ergot and runs down the spike, seems to give rise to fungi of the mould tribe; but I have not seen a case where it thus produced ergot.

(*To be continued.*)

TESTING COFFEE.*

BY G. C. WITTSTEIN.

Such is said to be the adulteration of coffee, that frequently the coffee beans, as offered to the public, have nothing but the name to recommend them! Coffee beans also occasionally appear which are composed of hardened flour paste (dough); these, however, usually have sharp edges, not rounded like those of the genuine article, and are easily crushed to a yellowish-grey powder. By boiling with water a pasty mass is obtained, coloured blue by iodine. The smaller kinds of coffee bean are also made to assume the appearance of the better kinds by a process of artful colouring effected in a variety of ways. One method consists in rolling hither and thither a barrel containing the beans, together with a quantity of small leaden balls, a certain amount of the metal, sufficient for the colouring effect, being communicated to the exterior of the beans by the friction. This fraud is detected by treating the beans with dilute nitric acid (sp. gr. 1·10), and, after contact for an hour, decanting, diluting with thrice the bulk of water, and passing hydrogen sulphide through the solution. A green powder is also used, which, according to Löhr, contains in 100 parts, 15 parts of Prussian blue, 35 of lead chromate, 35 of a mixture of clay and gypsum, and 15 of water. This mixture differs from the Chinese colouring for tea, inasmuch as the former contains the injurious lead chromate, the latter turmeric. The tea-colouring matter occasionally consists also of indigo, turmeric, and gypsum. The lowest power of a microscope or a good lens will reveal the single constituents of this composition. For more exact determination a quantity of the coffee beans is treated with a considerable quantity of warm distilled water. After two hours this is poured off, and tested for gypsum with barium chloride. Prussian blue is recognized by its change of colour in contact with potash; no alteration if indigo is present. In the latter case nitric acid is found to destroy the colour. The potash solution more or less decomposes and dissolves the lead chromate (turmeric is merely turned brown). Blackening with ammonium sulphide leaves no doubt as to the presence of lead chromate. By roasting, the beans are brought into a condition in which every experiment as regards adulteration is almost rendered futile; grinding makes adulteration an easy matter. When material is scarce for making chicory-coffee, beetroot, carrot, and carrot-like roots are made use of, and in the south of Europe the fig, of which the roasted product is called "fig-coffee." Other substitutes are met with in the shape of "corn-," "malt-," "oak-coffee," and as they are all of a deep brown tint when roasted, their resemblance to the genuine article is considerable. It will easily be seen how, by roasting, most of the constituents of the above coffee adulterants are either altered or destroyed so as to be almost beyond recognition, empyreumatic oils and bitter substances being produced, whereas the raw materials, such as beet, figs, corn, possess no bitter taste.

A simple method of testing coffee is to shake it with water; if pure it remains floating for an hour together, whereas chicory sinks. There are, however, occasionally exceptional cases in which pure coffee has been known to sink after a quarter of an hour's standing. The author has never observed an exceptional case. An infusion of burnt chicory, diluted with much water, and treated with potassium bichromate, undergoes no visible change. In the case of coffee, a deep brown tint is assumed, causing a resemblance to porter. This reaction is owing to the presence of tannic acid, and is observed therefore in the case of either raw or roasted coffee. It will be observed, however, that the test is valueless as regards the detection of chicory in coffee.

To detect chicory in coffee, the decoction is diluted with eight times its bulk of water, filtered, and the dilution increased to twelve parts. If the decoction contains pure coffee, on adding to thirty drops of it two drops of concentrated hydrochloric acid, boiling for a few seconds, then adding fifteen drops of a solution of one part of potassium ferrocyanide in eight parts of water, and boiling as before, the solution becomes first green, then dark green. Six drops of potash are next added, and the whole is boiled for two minutes, the solution becoming first brown and finally clear pale yellow, with a slight dirty yellow precipitate. With chicory alone, the solution finally remains brown and turbid, and after long standing a precipitate falls, the supernatant fluid retaining its brown colour. With a mixture of 24 drops of coffee and 6 of the chicory decoction, a final brown turbid solution is obtained. A decoction of coffee of average strength contains 1 per cent., and of great strength barely 2 per cent., of the dry soluble matter. The evaporation residue consists of a deep brown, shining, varnish-like mass, feeling quite dry to the touch after two days. If the ordinary substitutes are present, however, this residue becomer sticky after one or two hours' standing, and quite damp in twenty-four hours.

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* Dingl. Polyt. J., ccxv., 84—89; from *Journ. Chem. Soc.*

The Pharmaceutical Journal.

SATURDAY, JANUARY 8, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

THE COUNCIL PRIZES.

THE Committee appointed in December to consider the future disposition of the Council prizes, made its report on Wednesday last, and, as will be seen on reference to the proceedings of the Council, the report has been adopted.

The immediate necessity for the revision of the prize regulations arose from the discontinuance of the classification in two divisions of the successful candidates at the Society's examinations. Until now one of the conditions of eligibility to compete for the Pereira medal and the prize of books has been that candidates should have passed the Major or Minor examinations respectively in the first division. Further, the Hills prize—books of the value of £1—was given to the candidate at each Minor examination who passed highest in the first division of the pass list.

These conditions being now impracticable the following arrangements have been made:—The interest on the Pereira fund and the amount given annually by the Council for the prize of books is to be expended in three medals, to be offered for competition in July in every year by pharmaceutical chemists who have passed the Major examination during the session terminating in that month, and who were, at the time of passing the examination, Associates of the Society. The first prize is to be the silver Pereira medal; the second, a silver medal to be called the Pharmaceutical Society's Medal; the third, a bronze medal, from the same die as the second prize. The first prize is to be supplemented by a present of books of the value of about £5; the second, by a similar present, of the value of about £3; and the third, by a similar present, of the value of about £2, all given by Mr. THOMAS HYDE HILLS. The questions will be set by the London Board of Examiners. The answers will be written on the same day and at the same hour in London and Edinburgh, and the value of the answers will be assessed by the London Board. The award of the prizes will be made by the Council upon the report of the Board of Examiners. It will be observed that by this arrangement no prize is offered to those who pass the Minor examination; but it is considered that the honours of the Society should be borne not by those who have passed only a compulsory examination, but by those who have voluntarily submitted themselves to a second ordeal, and who have in their own persons done what they could to carry out the original object of the Society, which was established, to quote the words of the Charter, "for the purpose of advancing chemistry and pharmacy."

THE REGISTRATION OF TRADE MARKS.

THE numerous inquiries that have reached us from correspondents respecting the registration of trade marks under the Act passed last session betoken that the subject is one of considerable interest to chemists and druggists. Moreover, the fact that the first three divisions in the classification of goods are for "chemical substances," whilst the illustrative forms are filled in with the name of an imaginary "pharmaceutical chemist," curiously indicates the anticipation of the administrators of the Act as to one quarter at least from which it will receive patronage. For these reasons it has been thought advisable to reproduce in another portion of this Journal those parts of the Act itself, and the Rules issued under it by the LORD CHANCELLOR, which relate to the ordinary procedure for effecting the registration of a trade mark. It may be also useful to refer here more briefly to the principal steps to be taken.

Any person desiring to register a trade mark must make an application addressed to the Registrar of Trade Marks, at his office, Quality Court, Chancery Lane. The application may be delivered personally or forwarded by post, and may be in writing or in print, or partly in writing and partly in print. The application, which is called the "statement," and for which a form is given, must bear a date and the signature of the applicant, and must give his name, address, and calling, and also a description of the trade mark to be registered; and must mention the class or classes of goods (of which there are fifty), and the particular description or descriptions of goods in such class or classes, with respect to which it is desired that the trade mark should be registered. In the case of a trade mark used before the 13th of August 1875, a description of the goods in respect of which it has been so used, and the length of time during which it has been used, must be added. The "statement" must be accompanied by a "declaration," made in a specified form before a justice of the peace or commissioner, or other person authorized to administer oaths, verifying the statement, and declaring that to the best of the applicant's knowledge and belief he is lawfully entitled to use the trade mark. At the same time a fee of £1 must be sent with an application to register one trade mark for one or more articles included in one class; and an additional sum of 10*s*. for each additional trade mark after the first; and an additional sum of 2*s*. for every class after the first to which such trade mark is to be extended. The "statement" and the "declaration" must be written or printed on foolscap paper, 13 inches by 8 inches, with a margin of not less than 1½ inch on the left hand side, and a description of the trade mark is to be given in writing, accompanied, when practicable, by a drawing or other representation in duplicate not less than 3 inches square.

On receipt of the application the Registrar will send an acknowledgment thereof, and as soon after as may be will require the applicant to insert an advertisement in the official paper, during such time and in such form as he may think desirable. For such purpose the applicant may be required to furnish a wood-block or electrotype of the trade mark.

Should any person wish to object to the registration of a certain trade mark so advertised, notice of opposition in duplicate, written on foolscap and stating the grounds of opposition, may be sent to the Registrar, together with a fee of £2. The Registrar is then to send one copy of this notice to the applicant, who must forward, within three weeks after receiving it, a counter statement of the grounds upon which he relies for his application, or he will be deemed to have withdrawn his application. Should the "counter statement," however, be forwarded, the person giving notice of opposition is to be required to give security for costs within fourteen days, or the opposition falls to the ground.

Three months after the first appearance of the advertisement in the official paper, the Registrar may, upon receipt of the prescribed fee, register the trade mark, and the applicant as the proprietor thereof, in respect of the description of goods for which the Registrar is satisfied that the applicant is entitled to be registered. The fee for registration of one trade mark is £1; but where the same person is registered at the same time for more than one trade mark, the fee for each additional mark is 10*s.*; and where the same person is registered at the same time for the same trade mark in respect of goods in different classes, the fee for each additional class is 2*s.* An alteration in the registered address of the proprietor may be effected by giving notice to the Registrar, accompanied by a fee of 5*s.*

In the event of conflicting claims with respect to the use of a trade mark, the Registrar has a discretionary power of registering it upon the introduction of such variations as he may think fit, or to require that the disputants should submit their claims for the judgment of the Chancery Division of the High Court of Justice. But after a trade mark has once been registered in respect of goods of a particular class, one identical with it, or so nearly resembling as to be calculated to deceive, is not, without leave of the Court, to be registered in the name of another person with respect to any goods in that class. Neither is a similar mark for similar goods to be registered in two classes.

At the expiration of fourteen years after the registration of a trade mark a fresh fee of £2 must be paid, or in default the Registrar may remove it from the register. But provision is made for notice being given to the proprietor of the approaching expiry of the time; and in the event of the lapse of the time without the necessary payment the mark may, within certain limits, be restored upon payment of extra fees.

Provision is also made for alteration, by the leave of the Court, on the application of the registered proprietor, of non-essential portions of a trade mark, and also for other rectifications of the Register, the details of which will be found on another page. When several persons claim a joint interest in a trade mark, all, or any of them with the consent of all, may be separately registered as separate proprietors of such trade mark.

A registered trade mark may be assigned or transmitted from one person to another, but only in connection with the goodwill of the business in the goods to which it refers, and the person to whom it is so assigned or transmitted may be registered as the proprietor upon payment of a fee of £1. The register is to be open to the inspection of the public on not less than three days in the week, on payment of 1*s.* for each quarter of an hour, and office copies of entries are to be supplied at the rate of 2*d.* per folio, but never for less than 1*s.*

The Act is simply one for providing for the registry of trade marks, and does not refer to the way in which a proprietor's rights are to be enforced. But after the 1st of July next, no person is to be entitled to institute any proceedings to prevent the infringement of a trade mark that has not been registered under the Act.

EXAMINATION IN MARCH.

It will be remembered that the Council at its meeting in December decided that the Board of Examiners in London should meet six times a year only, instead of ten, as heretofore, the number of candidates at some of the meetings of the Board last year having been very small. It was ordered that this regulation should come into operation immediately; but representations have since been made that from want of sufficient notice of the regulation some inconvenience would be felt by candidates who had made arrangements to present themselves for examination in March, in which month no examination was to be held.

The Council at its meeting on Wednesday last determined, therefore, that to meet this difficulty an examination should be held in March next in addition to those already announced.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, January 13, at eight o'clock, when the following papers will be read: "John Dalton," by Mr. THOMAS SLATER, jun., and "Reminiscences of Session 1871–2," by Mr. R. W. HOUGHTON.

PUBLIC ANALYST FOR LANCASHIRE.

AT a recent meeting of the Lancashire county magistrates at Preston it was decided to appoint a Public Analyst for the county of Lancaster under the Sale of Food and Drugs Act. The salary is to be £300 per annum, with an additional fee of 6*s.* for every certificate of an analysis, such salary to include all charges and expenses incurred by the analyst in the performance of his duties, except travelling expenses when he is required to give evidence personally in support of his certificate. The analyst appointed is not to hold a similar appointment for any other county, or for any borough or place not within the county of Lancaster.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, January 5, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Atherton, Betty, Brown, Cracknell, Greenish, Hampson, Robbins, Sandford, Savage, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

THE EXAMINATIONS.

The Secretary read a letter and petition which had been received from some students in the School of Pharmacy, asking that the resolution for holding the examinations on six occasions only during the year should not come into operation immediately, and that at any rate an examination should be held in March next, in which month many students had intended to become candidates. A letter from the Professors on the same subject was read.

Mr. **WILLIAMS** said he had consulted Professor Attfield on this matter, and he believed the best way to get over the present difficulty would be to have an additional examination, in March, for the present year only, provided that a sufficient number of candidates presented themselves. He would therefore move the following resolution:—

> "That an Examination for Major, Minor, and Modified Candidates be held in March next, in addition to those already advertised."

Mr. **SHAW** suggested that the examination in February might be held at the end of the month, which would perhaps answer the desired purpose.

Mr. **WILLIAMS** said he had inquired of Professor Attfield if such an arrangement would not meet the difficulty, but had been informed that students who were preparing for March could not satisfactorily prepare themselves by the end of February.

Mr. **SANDFORD** feared that if a special examination were appointed for March it would be said that it was done for the convenience of students in the Society's own schools. He should much prefer that the examination should be held in March regularly, instead of in February.

Mr. **GREENISH** agreed that any alteration made should be permanent, because the same difficulties would recur every year.

Mr. **HAMPSON** thought it rather difficult to make any alteration in the advertised arrangements, and if any were made it should be for the current year only. The present scheme might inconvenience some students in the Society's school but a different one might be equally inconvenient to students in the country or in the colonies.

Mr. **ATHERTON** took the same view and seconded the resolution as moved by Mr. Williams.

Mr. **BROWN** also supported the proposal, which was then carried unanimously.

The following being duly registered as "Pharmaceutical Chemists," were respectively granted a diploma stamped with the seal of the Society :—

Baldock, James Thomas.
Beale, James Hawkins Tizard.
Bumpstead, Robert George.
Clarke, Isabella Skinner.
Coleman, Alfred.
Ellis, Henry.
Eminson, Thomas.
Keer, Thomas Henry.
Palmer, William Joseph.
Perry, George Edward.
Princep, Philip.
Sharpe, Leonard George.
Williams, William Thomas.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

Baldock, James Thomas	Yarmouth.
Edward, William Wales	Haslar.
Ellis, Henry	Sawley.
Eminson, Thomas	Scotter.
Perry, George Edward	Clapham.
Senier, Alfred, jun.	Finsbury Park.
Sharpe, Leonard George	Notting Hill.
Slater, Thomas, jun.	Stone.
Thompson, George Alfred	Tunbridge.

Chemists and Druggists.

Brunt, Thomas Henry	Hyde.
Dixon, John	Maryport.
Gillett, John	Liverpool
Hall, John Thomas	Blackburn.
Jones, Kenrick Lloyd	Connah's Quay.
Jones, William	Birmingham.
Long, William	Birmingham.
Smith, Samuel Allen	Leamington.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations, were elected "Associates in Business" of the Society :—

Minor.

Butler, Edward D. Barry	Forest Hill.
Clarke, Cornelius John	Ipswich.
Cleghorn, Alexander	Cupar.
Collins, Thomas Robert	Lowestoft.
Cooper, Anthony Vincett	Birmingham.
Edwards, Frank Dunn	Usk.
Garth, John	Preston.
Lett, Arthur Joseph	Liverpool.
Luke, Richard Samuel	Plymouth.
Young, Horatio Thos. Barmby	Ilkley.

Modified.

Abbot, Joseph	Scarborough.
Bowen, Joseph William	Criccieth.
Giles, John James	Folkestone.
Howes, Henry	Birmingham.
Moir, David	Dumfries.
Richardson, Richard	London.
Tijou, Tom	Rotherhithe.

ASSOCIATES.

The following having passed their respective examinations were elected "Associates" of the Society :- -

Minor.

Baker, William Horsman	Liverpool.
Holdcroft, George	London.
Hunter, Frederick William	Newbottle.
Loney, Thomas Slade	London.
Mackinna, John	Dumfries.
Macintosh, John	Elgin.
Thom, Robert	Glasgow.

Modified.

Blood, Charles	Bootle.
Boutall, George Squire	Ramsgate.
Lincoln, Nathaniel	Norwich.
Scaife, Samuel	Manchester.
Stanton, Henry Samuel	Rock Ferry.
Tweedie, John Jackson	Carriden.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination, were elected "Apprentices or Students" of the Society:—

Allan, James Henry	Stockton-on-Tees.
Barnett, John Arthur	Salisbury.
Betts, George	Norwich.
Bolton, Joseph Hook	London.
Brown, Hedley Oliver	Barrow-on-Humber.
Bull, Edward Samuel	Liverpool.
Burton, Walter	Mansfield.
Charlick, Alfred John	London.
Collitt, William	Gainsborough.
Driffield, Robert	Spilsby.
Duncan, James	Aberdeen.
Dunn, John Henry	Hull.
Edwards, James John	Coventry.
Fell, John James	Lancaster.
Forster, Arthur William	Norwich.
Freeman, Frank	West Dulwich.
Gibson, Atkin Brewster	Grantham.
Glover, William Kensit	Aberdeen.
Griffin, Joseph Thomas	Oldbury.
Hebblethwaite, George Arthur	Hull.
Hislop, Robert	Preston Kirk.
Hogg, James Edmund	Worcester.
Illingworth, George S. Kene	Aberdeen.
Jackson, Wm. Hodgkinson	Crediton.
Marriss, Wm. Jas. Graburn	London.
Massingham, Hugh Mortimer	Royston.
Pavey, Henry John	London.
Place, Frederick William	Knutsford.
Price, Rees	Shepherds' Bush.
Ramsey, William	Pocklington.
Rice, John William	Winchester.
Robinson, William Prior	Waterloo.
Saunders, James Warnes	Hackney.
Seward, George Halifax	London.
Snartt, Frederick Marcham	Horncastle.
Thomson, Andrew	Selkirk.
Verdon, Levinous Henry	Knighton.
Wallis, George	Ryde.
Willis, Joseph George	Bristol.

Several individuals were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The proposed list of Pharmaceutical Chemist Members originally included the name of Miss Isabella Skinner Clarke, but before the names were put to the vote,

The VICE-PRESIDENT drew attention to the presence of a lady's name on the list, and asked that reference should be made to the minutes of a former meeting when a similar question arose, the result of which was that the matter was referred to the decision of the next annual meeting, which decided, by a large majority, that ladies should not be admitted to the Society. Under these circumstances he did not think it would be becoming in the Council to reverse that decision without again consulting the members at large.

Mr. SANDFORD said it was in 1873 a lady applied, and the question was referred to the annual meeting, previous notice of the dicussion of the question having been given, when the feeling was decidedly against the admission of ladies. He thought the Council would be breaking faith with the Society if it now elected this lady.

Mr. HAMPSON remarked that it was some time since the annual meeting in 1873, and though the decision of a general meeting was no doubt of value, it was not always the best test of the feeling which prevailed throughout the country. He thought the Council was fully entitled to act on its own judgment, and considering that the lady now applying for election had passed the Major examination, and intended to begin business in the usual way, he certainly thought she ought not to be refused her rightful privilege. The Council was constantly regretting that Major students did not enter the Society: here was an opportunity of adding a member, and he did not see how the faintest injury could accrue to the Society by the election. He was not prepared to say that any great advantage would be derived from the addition of one member, but as a matter of justice and fair play he thought the lady should be elected.

Mr. SAVAGE doubted whether the lady could not compel the Society to admit her, but at the same time he felt bound by the previous decision of the general meeting. Ladies were now being admitted to the medical profession very generally, and he regretted that they were refused admission to the Pharmaceutical Society.

Mr. SHAW said he should have voted for the admission of the lady, if it had been open to him to do so, but after what had passed he thought the matter had better be again brought before the members.

Mr. BROWN regretted that the Council had on a former occasion, as the easiest way of getting out of the difficulty, referred this question to the general meeting, which was always an unsatisfactory tribunal for the decision of such matters. It was not as if a large body of ladies were likely to apply for admission, but here was a person who had passed the highest examination enforced, and, to his mind, that ought to be held sufficient to ensure her election. He did not think it probable that so many ladies would have sufficient energy and perseverance to pass the Major examination as to occasion any danger of the male members' votes being swamped.

Mr. SANDFORD moved as an amendment:—

"That the persons proposed for election be elected with the exception of Isabella Skinner Clarke."

He said the Council did not expect a dozen women to come up at once, but if it admitted one it must admit all, and he did not think it was for the interest of the Society to do so. The lady in question had all the trade privileges which her having passed the Major examination entitled her to, but he did not see why ladies should be admitted to membership or they might some day make their appearance at the Council table.

The amendment was seconded by the VICE-PRESIDENT.

Mr. BETTY said he did not see how the Council could elect this lady without again submitting the question to a general meeting. If it had now been brought forward *de novo*, it would have been a different thing, but under the circumstances he must support the amendment.

Mr. BROWN thought the present case not at all parallel to the former one, seeing that this lady was the first who had passed the Major examination, and if the sentiment was so strongly against the admission of ladies to membership it was not very likely that such a revulsion of feeling would take place as would lead to the election of female members of Council. He considered the Council quite competent to settle the question.

Mr. SUTTON was sorry to find so many members afraid of what passed more than two years ago at a general meeting, which according to his experience did not represent the feeling of the country so well as the Council did. If he thought he was compelled to do exactly what he was told by people outside he should be very sorry to hold the position he did, for he considered the Council was authorized to use its own judgment on such matters as came before it. He thought the lady who had passed the Major examination was entitled to membership.

Mr. GREENISH said he had voted against the admission of ladies on the former occasion; but he had re-considered the matter, and now thought that ladies who had passed the severest examination should be admitted members of the Society if they so desired.

Mr. ATHERTON felt sure that the general feeling throughout the country was against the admission of ladies as members. The question having been settled in 1873 he thought it a pity it should have been brought forward again.

Mr. ROBBINS felt bound by the decision of the general meeting to vote in favour of the amendment, though otherwise he should have been glad to support the election of the present candidate.

Mr. Williams very much agreed with what had fallen from Mr. Brown, but he felt bound by what had occurred before, and should therefore abstain from voting.

The President having stated that he also felt bound by the decision of the annual meeting, and,

Mr. Hampson having briefly replied, a vote was taken on the amendment, with the following result:—

For the amendment—Messrs. Atherton, Betty, Bottle, Cracknell, Hills, Robbins and Sandford.

Against—Messrs. Brown, Greenish, Hampson, Savage, Shaw and Sutton. Mr. Williams did not vote. The amendment was therefore carried and Miss Clarke was not elected.

Committees.

Finance.

The report of this Committee was received and adopted, and various accounts were ordered to be paid. The Council also resolved that a statement be prepared analysing the solicitor's bill of costs, showing for what purposes the money had been expended, and how far the costs recovered from parties prosecuted for breaches of the Pharmacy Acts met the expense to which the Society had been put.

Benevolent Fund.

The report of this Committee, included a recommendation of the following grants:—

£10 to a former member of the Society, who had been in business for many years, but was now in distressed circumstances from continued ill health. Applicant had had two previous grants of the like amount.

£15 to the widow of a registered chemist and druggist, with nine children, the eldest being 13.

£10 to the widow, aged 76, of a registered chemist and druggist.

£10 to a registered chemist and druggist, aged 77, who had previously received two grants of like amount, and one of £5.

Several applications had been made which the Committee could not entertain, and one was referred for further inquiry.

The report and recommendations were adopted.

The Secretary asked authority to send to each chemist and druggist on the register a copy of a circular calling attention to the Benevolent Fund, and to the fact that while there were 14,000 persons registered as chemists and druggists not 1700 are subscribers to the Fund. One great advantage of sending out these circulars would be that it would enable him to verify the register.

After some discussion the authority asked for was given, the whole cost to be met by the Benevolent Fund.

Library, Museum and Laboratory.

The Librarian had reported the average attendance in the library during the previous month as follows:—Day, nearly 33; evening, 12·5. In the conversation room, 2·27; the highest number being 15. The issue of books had been, to town members, etc., 153; country, 32. The Librarian had also reported that he had visited various public libraries with the view to ascertain what measures were adopted to prevent the loss of books, and the Committee now recommended that a notice be posted in the library that readers requiring books should apply to the Librarian, to whom they should return them when done with.

The Committee recommended the purchase of the following books:—

Hughes' 'Pharmacodynamics,' 3rd ed.

Miller's 'Chemistry,' 5th ed., part 3.

Phillips's 'Materia Medica and Therapeutics.'

Supplement to M'Culloch's Dictionary of Commerce and Commercial Navigation.

The Committee had ordered that the following works be marked with a star in the catalogue.

'Encyclopædia Britannica.'

Storer's 'Dictionary of Solubilities,'

Professor Bentley had reported that fifty-five students were attending his class.

Professor Attfield had reported that he had had seventy-three entries since the commencement of the session, and that there were sixty-seven students then at work, every bench in the laboratory being occupied. Owing to this circumstance he found the ventilation defective, and asked permission to introduce a pipe to remedy the defect. This the Committee recommended should be given.

The Committee then detailed the inquiries they had made with reference to the separation of the professors' lecture specimens from the museum generally. The Curator had reported that the average attendance in the museum had been during the day, 29; evening, 4.

The report of the Committee concluded with its recommendations with regard to the future disposition of Council Prizes, which were embodied in the following prize scheme:—

> "That pharmaceutical chemists who were Associates of the Society at the time of passing the Major examination shall be entitled to compete for the following prizes at the end of the session in which they passed the Major examination:—

"*First Prize.*—'Pereira Medal' in silver, and a present of books value £5, or thereabouts, given by Mr. T. H. Hills.

"*Second Prize.*—'The Pharmaceutical Society's Medal' in silver, and a present of books value £3, or thereabouts, given by Mr. T. H. Hills.

"*Third Prize.*—'The Pharmaceutical Society's Medal' in bronze, and a present of books value £2, or thereabouts, given by Mr. T. H. Hills.

"The competition for these prizes to take place in July of every year, after the ordinary meetings in that month of the Boards of Examiners in London and Edinburgh.

"The Registrar shall communicate with each person entitled to compete, requiring not less than ten days' notice of his intention to present himself for examination.

"No person shall be admitted to compete unless he shall have given the required notice.

"The questions shall be set by the Board of Examiners in London, and the answers written by the candidates under the supervision of the Boards of Examiners, or such members of the boards as may be appointed by the whole boards respectively in London and Edinburgh. The written answers, duly sealed by these supervisors, shall be submitted to the Board of Examiners in London for adjudication.

"The decision of the Board of Examiners shall be submitted to the Council, and no publication of their report shall be previously made."

Mr. Sandford said it would be necessary to sink a die for the medals to be given as second and third prizes, which should be called "The Pharmaceutical Society's Medals," both being struck from the same die. The cost of the die would be perhaps £40 or £50; but towards meeting the expense there were balances amounting to about £30 in hand, the Pereira Medal fund income not having been all expended, and the Minor examination prizes not having been given during the last year. There would still be a small balance of income left, which it was proposed to dispose of in the shape of books to the Bell scholars. It would be observed that under the present scheme Scotch candidates would be placed on exactly the same footing as English.

Mr. Betty said the proposal with regard to the prize of books to the Bell scholars took him rather by surprise

Mr. Sandford said it was quite a separate matter from the prize regulations.

Mr. Williams said the scheme had been well considered in Committee and he thought it might now be very well agreed to.

Mr. Greenish was glad to find that the subject of prizes had received the attention of the Council, but he had hoped that when the question was discussed an entire re-arrangement as to the mode of distributing them would have been adopted. Hitherto, the prizes had been awarded as a result of the examinations, but the Board of Examiners had stated that an examination was a very fallacious test of the relative abilities of the candidates, and he thought the time had now arrived when the Council ought to award the Pereira medal, the highest honour conferred by the Society, in acknowledgment of original research.

Mr. **Hampson** thought the Council was scarcely prepared to come to an immediate decision on this question, and suggested that it should be deferred until next month, and that in the meantime the proposed regulations should be printed, and a copy supplied to each member of the Council.

Mr. **Greenish** quoted from the resolution passed at the time of the institution of the Pereira medal, showing that the intention was to award the medal for original research and not for proficiency as evidenced by the result of an examination.

Mr. **Williams** said it was very difficult to find a way of disposing of any fund intended to promote research. This was found to be the case even in the Pharmaceutical Conference.

Mr. **Sandford** objected to postponing the matter, because it was necessary to insert the new regulations in the calendar.

Mr. **Sutton** said the matter had been well considered in the Committee, and it ought not to be postponed without some very good reason.

Mr. **Betty** thought Mr. Greenish was slightly confusing a pass examination and one for honours.

Mr. **Cracknell** said that from his experience as an examiner, he did not think there was the slightest difficulty in awarding prizes after an examination. The difficulty of distinguishing between the merits of candidates only arose when the questions were of a different character, and were put by different persons. It would be very difficult indeed to award a medal for research.

A resolution approving the scheme above given was then adopted unanimously, as was also the report and other recommendations of the Committee.

On the motion of Mr. **Sandford**, seconded by Mr. **Williams**, it was also resolved,—

> "That inasmuch as the books to be given for prizes wil not exhaust the amount of income arising from the Russia bonds presented to the Society by Mr. Hills, books of the value of about £5 be presented to the holders of the Bell scholarships, as nearly as possible in equal proportions annually."

House.

The report of this Committee was received and adopted. It referred only to the supply of gas fittings to the museum.

Parliamentary.

The report of this Committee was read. It included the following letter from the Pharmaceutical Society of Ireland:—

[Copy.]

"Pharmaceutical Society of Ireland,
"6, Kildare Street, Dublin.
"2nd December, 1875.

"Sir,—Referring to your letter of 22nd ultimo, addressed to the President of the Pharmaceutical Society of Ireland, I am directed to state that in it you refer to two circulars, one alleged to have been issued by Messrs. McMaster and Hodgson, the other by Mr. Hayes, 'both of which refer to regulations for examination said to have been issued by the Council of your Society.' As your letter did not contain a copy of either of the circulars referred to, the Council decline to give any opinion upon them; but I am to add that the Council have not given any directions to Mr. Hayes or Messrs. McMaster and Hodgson to issue any notice or circular on behalf of he Council. With regard to other questions in your letter as to proceedings of the Pharmaceutical Society of Ireland, I am to inform you that under Clause 17 of the Pharmacy Act of Ireland, it is provided that any resolutions and arrangements made under the said Act shall be laid before Parliament, and the Council hope you will find in such Parliamentary Report all the information you may require.

"I am, Sir,
"Your obedient Servant,
"Hugh James Fennell,
"Clerk to the Council, Phar. Soc. Irel.

"Elias Bremridge, Esq.,
"Secretary Phar. Soc. Gt. Britain."

The Solicitor had reported the proceedings which he had taken on behalf of the Society, including the sheep-dipping case at Ludlow, which has been already reported in the Journal. The report also included a lengthy correspondence with reference to the duties of district registrars of births and deaths to transmit to the Registrar of the Pharmaceutical Society notice of the deaths of any chemists and druggists in their districts. A letter having been sent to the registrar at York, calling attention to an omission to send notice of the deaths of five chemists in that city, the superintendent registrar of York had sent up five certificates for which the usual charge of 2*s.* 6*d.* was made, and also a charge of 1*s.* each for search. This latter charge being disputed, the superintendent registrar threatened a County Court summons, and this led to a correspondence with the Registrar-General, who supported the view of his subordinate, and also appeared to misunderstand the language of the Pharmacy Act itself, inasmuch as he gave it as his opinion that the Act only required registrars to forward certificates of death of "pharmaceutical chemists and druggists." The correspondence had been submitted to the Solicitor with a view to ascertaining what course could be adopted to ensure the issuing of proper instructions by the Registrar-General to his subordinates throughout the country. The Solicitor had made several suggestions, one of which was that he should have an interview with the Registrar-General to lay before him the correct interpretation of that provision of the statute. After considerable discussion this suggestion was adopted, and the President and Registrar were requested to accompany the Solicitor.

In deference to the wish of the judge who gave judgment in the sheep-dipping powder case, the Council decided not to press for payment of the penalty, but that costs should be recovered.

Applications for grants were received from the Manchester Chemists and Druggists' Association, and the Leicester Chemists' Assistants and Apprentices' Association. Both applications were referred to the General Purposes Committee.

Report of Examinations.

December, 1875.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major	15	11	4
Minor	40	17	23
	55	28	27

SCOTLAND.

	Candidates.		
	Examined.	Passed.	Failed.
Major	2	2	0
Minor	9	4	5
Modified	2	2	0
	13	8	5

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

The second of a series of three discourses on the Influence of Physical Laws in some of the Processes employed in Pharmacy, was given by Mr. W. W. Stoddart, F.C.S., F.G.S., on the evening of Friday, December 17, at the Bristol Museum and Library. Mr. Stoddart selected for consideration—

The Physics of Filtration and Evaporation.

The object of the lecture was to show to the students connected with the Bristol Association that most, if not all, the operations of pharmacy were only practical elucidations of determinate physical laws. After alluding to the difference between molar and molecular divisions of masses, the lecturer proceeded to prove by ocular demonstration that it was possible to separate molecules from molecules without disturbing their atomic arrangement. It was then demonstrated that these molecules may again be subdivided into atoms. Five of the natural properties of atoms were selected for the purpose of the evening's lecture, viz. :—

1. Their shape.
2. Their size and weight.
3. Their constant motion.
4. Their specific heat.
5. Their specific affinity.

The important distinction between density and specific gravity was explained. The well-known but curious fact that the weight of a substance as weighed by the ordinary method with scales and weights was not the true weight, was proved by a very pretty and decisive experiment.

The attention of the students was especially directed to the advantage arising from a correct knowledge of the physical laws to which allusion had been made, and their special application to ordinary pharmacy. In fact, pharmacists make use of these properties of atoms, though oftentimes unconsciously, when they collect and separate those molecules or atoms, or, as we familiarly term them, chemicals and preparations of the materia medica. It is undoubtedly the province and duty of the pharmacist to know how to produce the insulation of these molecular masses in the best possible way, and with the least possible loss.

The results of a good or bad application of physical laws was exemplified by the formation of hydrargyri iodidum rubrum, ferri iodidum, and potassæ tartras acida. By an extensive series of experiments the effects of physical forces were shown by production of precipitates in varied forms, from an impalpable powder to the most exquisite and glistening crystal.

The elective affinity of molecules was demonstrated by an exceedingly beautiful experiment, in which two solutions of two different soluble salts were superposed in the same glass cylinder, and only separated by the difference in their specific gravity. When a crystal having the same nature as the lower solution was carefully passed through the upper, not the slightest change took place, but immediately that it touched the lower, a mass of crystals was the result. At the same time, by the action on a Nobili's galvanometer, the fact was demonstrated that a fluid possessed a greater specific heat than a solid. As the solution crystallized, a sufficient quantity of heat was evolved to deflect the needle. The application of specific gravity to pharmaceutical purposes was restricted to the valuation of spirits and other liquids, and the easy and immediate determination of a gallon of any liquid by weight instead of measurement, thus preventing waste when dealing with large quantities.

The power of specific heat was exemplified by the great difference in the evaporating and boiling point of various fluids when contained in dishes of porcelain, glass, copper, iron, or zinc.

The apparatus for evaporation in vacuo was exhibited, and a small quantity of ext. gentianæ made during the progress of the lecture. Faraday's simple substitute for an air-pump was recommended, which is nothing more than a ground glass receiver used as a cupping glass, the vacuum being produced by the action of a spirit lamp.

In concluding, the lecturer earnestly exhorted his hearers to study the effects and evidences of the presence of physical forces, as shown by the most every-day occurrences. Such observations will always be a delight and relief, as well as a material increase to the store of knowledge expected from every pharmacist, helping him in many puzzling situations, and often enabling him not only to benefit himself, but also those around him.

The whole subject undertaken for the lecture was fully illustrated by a large number of unusually select experiments with apparatus and diagrams.

BURNLEY CHEMISTS AND DRUGGISTS' ASSOCIATION.

The annual dinner in connection with the above Association, was held on Thursday evening, December 16, at Rawlinson's Hotel. The attendance of the members was not so large as anticipated, but quite up to the average of previous years. The chair was taken by Mr. E. Crawshaw, Mem. Phys. Soc. Lond., the President. Mr. R. Thomas, occupied the vice-chair.

The Chairman, after a short introduction, briefly referred to the Irish Pharmacy Act, which had been passed during the last session of Parliament. He noticed the very low standard of the examinations required for the title of "Irish Pharmaceutical Chemist," which he was sorry to see was so much inferior to that of the examination for "Chemist and Druggist," in this country. Attention was also drawn to the fact that the Council of the Irish Society had decided to admit women to their examinations, on the same conditions as men; such being the case the young chemists were required to look to their laurels or they might very probably be carried away by the wise and intelligent of the fair sex. The members were appealed to for a better attendance at the monthly meetings during the coming year, so as to encourage (by their presence) the objects of the Association, which sought by mutual protection the benefit of all legitimately engaged in the business of a chemist and druggist, who were in any way connected with this Association. In conclusion the speaker proposed "The Health of Her Majesty the Queen, and all the Royal Family," to which the company responded in a very hearty manner.

Mr. R. Hitchin proposed "Prosperity to the Burnley Chemists and Druggists' Association," coupled with the name of Mr. R. Thomas, the vice-president.

Mr. Thomas, in responding to the toast, thanked the members present for the hearty manner in which it had been received, and briefly alluded to the Association, his connection with it, and his continued adherence to the objects and interest of the Association.

The "Health of the President," was afterwards proposed by Mr. T. Hirst and Mr. J. W. Wright, and drunk with musical honours, the President briefly replying in a slightly humourous speech. Other toasts and songs were given until a late hour, when the company separated, after having spent a most agreeable evening.

Parliamentary and Law Proceedings.

Registration of Trade Marks.

In the last session of Parliament an Act was passed to establish a Register of Trade Marks. Besides the subject dealt with in the Act itself, section 7 provided that general rules as to notices, registrations and classification should be drawn up by the Lord Chancellor. These rules having now been issued, it is proposed to abstract from the Act and the Rules the principal provisions as to the way in which the right to the use of a trade mark may be established. The Registry was opened on Saturday last, the 1st of January, in Quality Court, Chancery Lane; the first Registrar being Mr. H. R. Lack, late of the Board of Trade.

Section 1 of the Act provides that a register of trade marks as defined by the Act, and of the proprietors thereof, shall be established under the superintendence of the Commissioners of Patents, and from and after the 1st of July, 1876, no person shall be entitled to institute any proceeding to prevent the infringement of any trade mark unless such trade mark is registered in pursuance of the Act.

According to section 2 trade marks must be registered as belonging to particular goods, or classes of goods; and when registered are to be assigned and transmitted only in connection with the goodwill of the business concerned in such particular goods or classes of goods, and are determinable with such goodwill.

In the first Schedule to the Rules "goods" are divided into fifty classes, of which the following are those that specially interest the readers of this Journal. Goods are mentioned under the various classes by way of illustration, but not as an exhaustive list of the contents of a class.

Class 1.—Chemical substances used in manufactures, photography, or philosophical research. Such as—acids (including vegetable acids), alkalies, artists' colours, pigments, mineral dyes.

Class 2.—Chemical substances used for agricultural and horticultural purposes. Such as—artificial manure, sheep washes.

Class 3.—Chemical substances used in medicine and pharmacy. Such as—tinctures, extracts, barks, patent medicines, cod-liver oil.

Class 4.—Raw vegetable and animal substances used in manufactures. Such as—resins, oils, dyes, tanning substances, fibrous substances (*e.g.* cotton, hemp, flax, jute), wool, silk, cork, seeds, glue, bone, sponge.

Class 8.—Philosophical instruments, instruments and apparatus for useful purposes, or for teaching.

Class 11.—Surgical instruments and apparatus.

Class 15.—Glass. Such as—window and plate glass, painted glass, glass mosaic, glass for optical purposes.

Class 18.—Engineering, architectural, and building contrivances. Such as—diving apparatus, warming apparatus, ventilating apparatus, filtering apparatus, lighting contrivances, drainage contrivances, electric bells.

Class 20.—Explosive substances. Such as—gunpowder, gun cotton, dynamite, fog-signals, percussion caps, fireworks, cartridges.

Class 40.—Goods manufactured from India-rubber and gutta-percha not included in other classes.

Class 42.—Substances used as food. Such as—cereals, pulses, oils, hops, malt, dried fruits, tea, spices, sago, salt, starch, sugar, preserved meats, honey, confectionery, biscuits, oil cakes, etc., pickles, vinegar.

Class 43.—Fermented liquors and spirits. Such as—beer, cyder, wine, whisky, liqueurs.

Class 44.—Mineral and aërated waters, natural and artificial.

Class 45.—Tobacco, whether manufactured or unmanufactured.

Class 46.—Seeds for agricultural and horticultural purposes.

Class 47.—Candles, illuminating oils, matches, and common soap.

Class 48.—Perfumery (including perfumed soap).

Class 50.—Miscellaneous, including—(1) Goods manufactured from ivory, bone, wood, not included in other classes; (2) Goods manufactured from straw or grass, not included in other classes; (3) Goods manufactured from animal and vegetable substances, not included in other classes; (4) Tobacco pipes; (5) Umbrellas; (6) All goods not included in the foregoing classes.

General Note.—Any wares made of mixed materials (for example, of both cotton and silk) are to be included in such one of the classes appropriated to those materials as the registrar may decide.

Rules 3 and 4 provide that if any doubt arises as to what class any particular description of goods belongs to, the doubt shall be determined by the registrar; and that a trade mark or trade marks may be registered in pursuance of the same application by the same person in respect of all or any goods, subject to the payment of additional fees.

By section 3, the registration of a person as first proprietor of a trade mark is to be *primâ facie* evidence of his right to the exclusive use of such trade mark, and after the expiration of five years from the date of such registration, is to be conclusive evidence of his right to the exclusive use of such trade mark, subject to the provisions of the Act as to its connection with the goodwill of the business.

By section 4, every proprietor registered in respect to a trade mark subsequently to the first registered proprietor is to stand as respects his title to that trade mark, in the same position as if his title were a continuation of the title of the first registered proprietor.

By section 5, if the name of any person who is not for the time being entitled to the exclusive use of a trade mark in accordance with the Act or otherwise in accordance with law, is entered on the register of trade marks as a proprietor of such trade mark, or if the registrar refuses to enter on the register as proprietor of a trade mark the name of any person who is for the time being entitled to the exclusive use of such trade mark in accordance with this Act, or otherwise in accordance with law, or if any mark is registered as a trade mark which is not authorized to be so registered under this Act, any person aggrieved may apply in the prescribed manner for an order of the court that the register may be rectified; and the court may either refuse such application, or it may, if satisfied of the justice of the case, make an order for the rectification of the register, and may award damages to the party aggrieved. The court for the purposes of the Act is declared by Rule 42 to be the Chancery Division of Her Majesty's Court of Justice. Where each of several persons claims to be registered as proprietor of the same trade mark, the registrar may refuse to comply with the claims of any of such persons until their rights have been determined by the court, and the registrar may himself submit or require the claimants to submit in the prescribed manner their rights to the court. The court may, in any proceeding under this section, decide any question as to whether a mark is or is not such a trade mark as is authorized to be registered under this Act, also any question relating to the right of any person who is party to such proceeding to have his name entered on the register of trade marks, or to have the name of some other person removed from such register, also any other question that it may be necessary or expedient to decide for the rectification of the register. The court may also direct an issue to be tried for the decision of any question of fact which may require to be decided for the purposes of this section.

By section 6, the registrar is not, without the special leave of the court, to register in respect of the same goods or classes of goods a trade mark identical with one which is already registered with respect to such goods or classes of goods, and the registrar is not to register with respect to the same goods or classes of goods a trade mark so nearly resembling a trade mark already on the register with respect to such goods or classes of goods as to be calculated to deceive. Neither is it to be lawful to register as part of or in combination with a trade mark any words the exclusive use of which would not, by reason of their being calculated to deceive or otherwise, be deemed entitled to protection in a court of equity; or any scandalous designs.

Section 7 provides for the establishment of a register office with the necessary officers, and for the issue by the Lord Chancellor of general rules as to the registry of trade marks, notices to be given by advertisement before the registration of trade marks, classification of goods for the purposes of this Act, registration of first and subsequent proprietors of trade marks, fees to be charged for registration and for the continuance of a trade mark on the register, as to the removal from the register of any trade mark, persons entitled to inspect the register, and to any proceedings to be taken to obtain the judgment or leave of the court in any matter in which the judgment or leave of the court is required to be obtained under this Act, and generally for the purpose of carrying the Act into effect. Any rules made in pursuance of this section are to be laid before both Houses of Parliament if Parliament be then sitting, or if not then sitting, within ten days of its next assembling. In these Rules the following provisions are made as to registry :—

Application for Registry.—A person, whether a British subject or an alien, desiring to register a trade mark is to apply to the registrar by sending to him a statement accompanied by a declaration and the prescribed fee.

The statement is to contain the following particulars:—

(A) The name and address and calling of the applicant: and

(B) The description or reference to a description of the trade mark to be registered: and

(C) The class or classes of goods (being some one or more of the classes mentioned in the first schedule), and the particular description or descriptions of goods in such class or classes, with respect to which he desires the trade mark to be registered: and

(D) In the case of a trade mark used before the passing of this Act, a description of the goods in respect of which it has been used and the length of time during which it has been so used. The following are the forms of statements :—

Form of Statement on Application for Registration of One Trade Mark.

I, [*John Jones, of Moon Street, in the city of Birmingham, pharmaceutical chemist*], apply to be registered as proprietor of a trade mark [*being a goat's head and neck with a gold collar attached thereto*], and which is represented in the paper annexed hereto.

I desire that the said trade mark may be registered in respect of the description of goods following, contained in [*Class 1, that is to say, acids, including vegetable acids, alkalies, artists' colours, pigments, mineral dyes*].

I have used the said trade mark in respect of the said goods for [*ten*] years before the date of this statement. [*This paragraph may be omitted if the trade mark was not used before the 13th of August, 1875*].

The day of , 187 .

(Signed) *John Jones.*

Form of Statement on Application for Registration of more than one Trade Mark.

I, [*John Jones, of Moon Street, in the city of Birmingham, pharmaceutical chemist*], apply to be registered as proprietor of the following trade marks, numbered from "1" to .

The trade marks are described as follows; that is to say,

No. 1 is [*here insert in writing description of trade mark*], and is represented on paper 1 annexed hereto.

No. 2 is [*here insert in writing description of trade mark*], and is represented on paper 2 annexed hereto [*and so forth*].

I desire that the said trade marks may be registered in respect of the description of goods following; that is to say,

As to No. 1, in respect of the following goods contained in class [*here insert description of the goods and the class or classes under which the applicant desires to have them registered*].

As to No. 2, in respect of the following goods contained in class [*and so forth*].

I have used the trade marks numbered [*respectively*] and in respect of the goods for which I desire them to be registered for years before the date of this statement. [*This paragraph may be omitted if the trade marks were not used before the 13th of August, 1875.*]

The day of 187 .

(Signed) *John Jones.*

The above statement must bear a date and be signed by the applicant. Subject to any other directions that may be given by the registrar, the statement sent to the registrar is to be upon foolscap paper of a size of thirteen inches by eight inches, and is to have on the left-hand part thereof a margin of not less than one inch and a half. Subject to any other directions that may be given by the registrar, a description of a trade mark is to be given in writing and accompanied, when practicable, by a drawing or other representation in duplicate not less than three inches square, on foolscap paper of the size aforesaid, or by pasting or otherwise fastening on such paper a specimen of the trade mark. Where a drawing or other representation or specimen cannot be given a specimen or copy of the trade mark may be sent either of full size or on a reduced scale, and in such form as may be thought most convenient. But the registrar may, if dissatisfied with the representation of a trade mark, require a fresh representation either before he proceeds with the application or before he registers the trade mark. The registrar may also, in exceptional cases, deposit in the Patent Museum a specimen or copy of a trade mark which cannot conveniently be placed on his register, and may refer thereto in his register in such manner as he thinks advisable.

The declaration referred to above must be on foolscap paper of the above mentioned size, and must verify the statement, and declare that, to the best of the applicant's knowledge and belief, he is lawfully entitled to use the trade mark, and must be made and subscribed as hereinafter mentioned. The following is the form provided :—

Form of Declaration to accompany Statement on Application for Registration of one Trade Mark.

I, *A. B.*, of

do hereby solemnly and sincerely declare, to the best of my knowledge and belief, as follows :—

(1) The statement signed by me and dated the day of , and marked with the letter "A," and shown to me at the time of making this declaration is true:

(2) The description of the trade mark in such statement is a true description of the trade mark for the registration of which I apply:

(3) I am lawfully entitled to the use of the trade mark of which the said description is a true description.

Signed *A. B.*

Declared before me

NOTE.—*The above Form will require to be altered so as to suit an application for the registration of more than one trade mark.*

Where an application for the registry of a trade mark is made by or on behalf of a corporate or *quasi* corporate body of persons, the statement and declaration is to be made by the secretary or other principal officer of the body of persons; and the registrar may require such proof as he thinks fit that the application made is duly authorized by such body of persons.

On receipt of the application the registrar is to send to the applicant an acknowledgement thereof. As soon as may be after the receipt of a proper application the registrar is to require the applicant to insert an advertisement of the application in the official paper, during such time, and in such form, and generally in such manner as the registrar may think desirable, and distinguishing whether the mark has or has not been used before the 13th of August 1875.

The official paper for the purpose of these Rules is to be some paper published under the direction of the Commissioners of Patents, or such other paper as such Commissioners, or any one of them, may from time to time direct. For the purposes of such advertisement the applicant may be required to furnish the printer of the official paper with a wood block or electrotype of the trade mark, of such dimensions as may from time to time be directed by the registrar, or with such other information or means of advertising the trade mark as may be allowed by the registrar.

In the event of any person wishing to oppose the registration, a notice of opposition may be given by sending to the registrar, together with the prescribed fee, a written notice in duplicate, on foolscap paper of such size as aforesaid, stating the grounds of the opposition, and the registrar has to send one copy of such notice to the applicant. Within three weeks after the receipt of such notice, or such further time as the registrar may allow, the applicant may send to the registrar, on foolscap paper of such size as aforesaid, a counter statement of the grounds on which he relies for his application, and if he does not do so shall be deemed to have withdrawn his application. If the applicant sends such counter-statement the registrar is to require the person who gave notice of opposition to give security for such costs as may be awarded in respect of such opposition; and if such security is not given within fourteen days after such requirement was made, or such further time as the registrar may allow, the opposition is to be deemed to be withdrawn.

Registration of Trade Marks.—On the expiration of three months from the date of the first appearance of the advertisement in the official paper, the registrar may, if he is satisfied that the applicant is entitled to registration, register the trade mark in respect of the description of goods for which he may be entitled to be registered, and the applicant as the proprietor thereof, on payment of the prescribed fee.

Where each of several persons claims to be registered as proprietor of the same or a nearly identical trade mark, in respect of the same goods or goods belonging to the same class, the registrar shall use his discretion as to registering all or any of such trade marks, either unconditionally or on the condition of the introduction of such variations (if any) or otherwise as he thinks fit, or the registrar may, if in any case he thinks it expedient, submit or require the claimants to submit their rights to the court.

Where a trade mark has been already registered in respect of any goods or description of goods belonging to one particular class or where goods may be considered as belonging to two or more classes, and the trade mark has been already registered in respect of such goods as belonging to one particular class, a trade mark identical with such trade mark, or so nearly resembling the same as to be calculated to deceive, shall not, without leave of the court, be registered in the name of another person as proprietor thereof with respect of any goods in that class or to the same or similar goods as belonging to another class.

Upon registering a trade mark the registrar is to enter in the register the date on which the statement relating to the application for registry was received by him (which day is to be deemed to be the date of the registry) and such other particulars as he may think necessary, including the name and address of the proprietor, and is to send notice to the applicant of the registration of his trade mark.

Registration of Subsequent Proprietors.—The person to whom any registered trade mark has been assigned or transmitted may apply to be registered as proprietor thereof. Where the trade mark has been assigned the person claiming as assignee to be registered is to send to the registrar, with his application, an assignment by deed executed both by the assignor and assignee, and a declaration verifying such assignment. The following are the forms for this purpose:—

Form of Assignment of Trade Mark.

Trade mark, class [*here enter number or other means of identifying trade mark in register*].

Name
Place of business

I [*alter as necessary if there be more than one proprietor*] *A. B.*, of in the county of being registered proprietor of the trade mark above particularly described, in consideration of pounds paid to me by *E. F.*, carrying on business at in the county of under the firm of *F. and Co.*, hereby assign the said trade mark to the said *E. F.*, together with the goodwill of the business concerned in the goods with respect to which the trade mark is registered.

In witness whereof I have hereunto subscribed my name and affixed my seal, this day of 18 .

(Signed)

Executed by the above-named *A. B.*,
in the presence of
[*Insert description and place of residence*].

Executed by the above-named *E. F.*,
in the presence of

Declaration by Transmittee applying to be Registered as Proprietor.

Trade mark, class , No. [*Here enter number or other means of identifying trade mark in register*].

Name of owner
Firm
Place of business

(1) I, the undersigned *A. B.*, of in the county of , [*alter accordingly, if more than one person makes the declaration*] carrying on business at in the county of declare as follows:

I declare that *A. B.*, the registered proprietor of the trade mark above described [*alter according to circumstances*], [died at in the county of , having first made his will, dated the day of whereby he appointed me executor and I proved [*or* confirmed] his said will on the day of in the Court of], *or* [died at in the county of on the day of intestate, and letters of administration of his estate and effects were [confirmation as executor of the said was] on the day of duly granted to me by the Court of]:

Or,

I declare, that [the estate of] *C. D.*, the registered proprietor of the trade mark above described, was, on the day of duly [*alter according to circumstances*] [adjudged a bankrupt] [sequestrated], and that I was on the day of appointed trustee of the [sequestrated] estate of the said *C. D.*, and I am by law entitled to be registered as proprietor of the said trade mark in place of the said *C. D.*:

Or,

I declare, that on the day of I intermarried with and am now the husband of *C. D.*, the registered proprietor of the trade mark above described; and I [*alter according to circumstances*] declare that on such marriage the interest of the said *C. D.* in the said trade mark and in the goodwill of the business concerned in the goods with respect to which the trade mark is registered became by law vested in me, and that I am entitled to be registered as owner of the said trade mark in place of the said *C. D.*, and I declare that *C. D.* is the person referred to in the annexed certificate.

(2) I am lawfully entitled to the goodwill [*if the declarant is entitled only to some share in the goodwill, the share must be specified*] of the business concerned in the goods with respect to which the trade mark so transmitted to me is registered.

And I make this solemn declaration believing the same to be true.

(Signed)
Dated at the
day of 18 .
Made and subscribed by the above-named
A.B. in the presence of me,
(Signed)
Name of registrar [*or* justice of
the peace acting in and for
or, etc.]

Where a trade mark has been transmitted by the death of the registered proprietor, the legal personal representative of such proprietor is to be recognized as having the title to the mark. Where the trade mark has been transmitted by marriage, bankruptcy, or otherwise by operation of law, the person applying as the transmittee to be registered is to send to the registrar, together with his application, a statement of the manner in which such trade mark has been transmitted, and a declaration verifying such statement. Any transmittee may assign his interest in the mark, notwithstanding that he has not been registered as proprietor thereof.

Where the person applying to be registered claims as the transmittee of any registered proprietor, or as the assignee of a transmittee, there is to be produced to the registrar the following evidence :—

(1) If the business concerned in the goods with respect to which the trade mark is registered is carried on in England or Ireland, then

A. If such transmission has taken place by the death of any person, the probate of the will of such deceased person, or the letters of administration of his estate, or an official extract therefrom ; and

B. If such transmission has taken place by the marriage of the female proprietor, a certified copy of the register of such marriage, or other legal evidence of the celebration thereof, and a declaration to the identity of such female proprietor ; and

C. If such transmission has taken place by the bankruptcy of the registered proprietor, or otherwise by operation of law, evidence as may, for the time being, be receivable as proof of the title of the applicant ; and

(2) Where the said business is not carried on in England or Ireland,—

There shall be produced similar evidence to that hereinbefore prescribed, or such evidence as would be received as sufficient evidence in the courts of justice of the country or place at which the proprietor carries on business.

Every deeclaration made by an assignee or transmittee is to state his name and address, and that he is entitled to the goodwill of the business concerned in the goods with respect to which the trade mark is registered, or to some part of such goodwill.

Where two or more persons are registered as joint proprietors of the same registered trade mark, those proprietors, or the survivors or survivor of them, or their or his assignee or transmittee, are alone recognized by the registrar as having any title to the mark.

Where divers persons claim to be severally entitled to the goodwill of a business concerned in the goods with respect to which a trade mark has been registered, such persons, or any of them, may, if they all consent thereto, and on the production of the proper evidence, and on payment of the prescribed fee, be registered separately as separate proprietors of such trade mark. If all of such persons so entitled do not so consent, the registrar is not, without leave of the court, to register any of them as separate proprietors of such trade mark.

Continuance of a Trade Mark on the Register.—At a time not being less than two months nor more than three months before the expiration of fourteen years from the date of the registration of a trade mark, the registrar is to send a notice to the registered proprietor that the trade mark will be removed from the register unless the proprietor pays to him before the expiration of such fourteen years (naming the date at which the same will expire), the prescribed fee, and if such fee be not previously paid, he shall at the expiration of one month from the date of the giving of the first notice send a second notice to the same effect, and if such fee be not paid before the expiration of such fourteen years the registrar may, after the end of three months from the expiration of such fourteen years, remove the mark from the register, and so from time to time at the expiration of every period of fourteen years. If before the expiration of the said three months the registered proprietor pays the said fee, together with the additional prescribed fee, the registrar may, without removing such trade mark from the register, accept the said fee as if it had been paid before the expiration of the said fourteen years. Where after the said three months a trade mark has been removed from the register for non-payment of the prescribed fee, the Commissioners of Patents, or one of them, may, if they are satisfied that it is just so to do, restore such trade mark to the register on payment of the prescribed additional fee and compliance with such conditions as they may think just. Where a trade mark has been removed from the register for non-payment of the fee or otherwise, such trade mark is nevertheless for five years after the date of such removal to be deemed for the purpose of section six of the Act, and not for any other purpose, to be a trade mark which is already registered.

The court may, on the application of any person aggrieved, remove any trade mark from the register on the ground, after the expiration of five years from the date of the registry thereof, that the registered proprietor is not engaged in any business concerned in the goods with respect to which a trade mark is registered.

Alteration and Rectification of Register.—The registered proprietor of any registered trade mark may, by leave of the court, alter such trade mark, so that he do not alter any one or more of the "essential particulars" in such mark, and the registrar, on payment of the prescribed fee and compliance with the requisitions as to the deposit of representations of the trade mark as altered, is to alter the register accordingly. Where due notice of an order of any court rectifying the register has been given to the registrar, the registrar is forthwith, upon a copy of so much of the order as relates to such rectification being left with the registrar, and payment of the prescribed fee, to rectify the register in accordance with the order.

Whenever the register is rectified or altered in any particular in respect to any trade mark, the registrar may, if he thinks that such rectification or alteration should be made public, publish at the expense of any person interested, by advertisement or otherwise, and in such manner as he thinks just, the circumstances attending the rectification or alteration of the register.

Any person may send, with the prescribed fee, notice to the registrar of his desire to oppose the registration of any assignee or transmittee, or any alteration of the register. The registrar is to give to the applicant for such registration or alteration the like notice, and may require security for costs in like manner as in the case of a notice of opposition to the original registration of a trade mark.

The registrar in such case may, if he think fit, require the parties interested to submit their claims to the court.

Alteration of Address, etc., in Register.—If the registered proprietor of a trade mark send to the registrar, together with the prescribed fee, notice of an alteration in his address, the registrar is to alter the register accordingly.

Inspection of Register.—On such days and during such hours as the registrar may from time to time determine, not being less than three hours on three separate days in a week, any person may, on paying the prescribed fee, inspect the register of trade marks; and may, on paying the prescribed fee, obtain an office copy of any entry in the register.

The registrar when required for the purpose of any legal proceeding or other special purpose to give a certificate as to any entry, matter, or thing which he is authorized by this Act, or any of these rules to make or do, may, on payment of the prescribed fee, give such certificate, and is to specify on the face of it the legal proceeding or other purpose for which such certificate is granted.

The declarations required by the rules are to be made and subscribed in the United Kingdom under the authority of the Act of 5 and 6 William IV. c. lxii., and may be made and subscribed before any justice of the peace, or any commissioner or other officer authorized by law in any part of the United Kingdom to administer an oath for the purpose of any legal proceeding.

Notices.—Applications, statements, notices, and documents required by the Act or by the Rules to be served or sent are to be in writing or print, or partly in writing and partly in print, and may be delivered personally, or served and sent by post, and if sent by post are to be deemed to have been served and received respectively at the time when the letter containing the same would be delivered in the ordinary course of post; and in proving such service or sending it is to be sufficient to prove that the letter containing the notice was prepaid and put into the post properly addressed.

Any application, statement, notice, and document to be served or sent on or to the registrar is to be deemed to be properly addressed if addressed to the registrar of trade marks at his office; and if required to be served on or sent to the proprietor of any trade mark is to be deemed to be properly addressed if addressed to the registered proprietor at his registered address.

Fees.—The following fees are to be payable to the registrar on or for the following occasions or purposes:—

	£	*s.*	*d.*
1. On application to register one trade mark for one or more articles included in one class	1	0	0
2. On application to register more than one trade mark for one or more articles included in one class, for each additional trade mark after the first	0	10	0
3. On application to register a trade mark in respect of goods in different classes, for every class after the first to which such trade mark is extended, an additional fee of	0	2	0
4. For registration of one trade mark	1	0	0
5. Where the same person is registered at the same time for more than one trade mark, for registration of each additional mark after the first	0	10	0
6. Where the same person is registered at the same time for the same trade mark in respect of goods in different classes, for the registration of one mark in each class after the first an additional fee of	0	2	0
7. For entering notice of opposition	2	0	0
8. For registering subsequent proprietor	1	0	0
9. For altering address on the register	0	5	0
10. For every entry in the register of a rectification thereof or an alteration therein, not otherwise charged	0	10	0
11. For continuance of mark at expiration of fourteen years	2	0	0
12. Additional fee where fee is paid within three months after expiration of fourteen years	1	0	0
13. Additional fee for restoration of trade mark when removed for non-payment of fee	2	0	0
14. For certificate	1	0	0
15. For inspecting register, for every quarter of an hour	0	1	0
16. For office copy of documents, 2*d.* per folio, but never less than	0	1	0
17. Settling a special case by registrar	2	0	0

Note.—If a copy of a trade mark is required for any purpose, such copy shall be supplied by or at the expense of the applicant.

Section 8 of the Act provides that the certificate of the registrar as to any entry, matter, or thing which he is authorized by this Act, or any general rules made thereunder, to make or do, is to be evidence.

By section 10, for the purposes of this Act:

A trade mark consists of one or more of the following essential particulars; that is to say,

A name of an individual or firm printed, impressed, or woven in some particular and distinctive manner; or

A written signature or copy of a written signature of an individual or firm; or

A distinctive device, mark, heading, label, or ticket;

and there may be added to any one or more of the said particulars any letters, words, or figures, or combination of letters, words, or figures.

The Right to a Medical Prescription.

At the Croydon Petty Sessions, Mr. Gill, of George Street, Croydon, has been summoned by Mr. Hugh Marcus Hobbs, insurance broker, of Thornton Heath, for detaining from him two medical prescriptions. Mr. Edgar Swan, solicitor, was for the complainant. It appeared that, some time since, the complainant consulted Dr. Fleury concerning his wife's health, and the doctor agreed to make three visits for a guinea. He afterwards received from him two medical prescriptions. These were handed to Mr. Gill for the purpose of the medicine being made up, and he retained possession of them. Mr. Hobbs several times demanded the prescriptions. On one occasion, Mr. Gill said it was not his practice to give up prescriptions, and, on another, he said they were destroyed. He offered to give Mr. Hobbs a copy of them; but the complainant considered that he had a right to the original prescriptions, and that he was not bound by Mr. Gill's custom. The defendant, on being sworn, stated that he destroyed the prescriptions on the day that they were given in. He recollected Mr. Hobbs calling on him in November, and he then told him that the prescriptions were destroyed. He also stated that he was dispenser to Dr. Feury, who would not allow him to give up his prescriptions. Mr. Swan said the defendant had written a letter to the complainant, in which he stated that there was no legal power to compel him to give up a prescription contrary to his wish. The Bench dismissed the case, as the complainant was unable to prove that the prescriptions were in existence when he applied for them.—*British Medical Journal.*

Poisoning by a Liniment.

On Wednesday, January 5th, Mr. Humphreys held an inquest in the Hackney Road, on the body of Elizabeth Harbridge, aged two years.

John Harbridge, a bookbinder, the father of the deceased, said that the child with other members of the family had been ailing, and were in consequence attended by Dr. Simpson, of the Hackney Road. Witness was in the habit when returning home from work of calling at Dr. Simpson's for the medicine, and on Friday evening the 31st ult., received two bottles from his assistant. One of the bottles labelled "poison" given witness was here shown him, but he said he could not read.

Jane Harbridge, the mother, said she gave deceased on Saturday morning a spoonful of the contents of a bottle which, together with a bottle containing medicine for another of her children, she received from her husband the night previous. About forty minutes afterwards the deceased died.

Dr. Thornton Gerald Simpson, L.R.C.P., Hackney Road, said he had attended the deceased and two other children for malignant scarlet fever, one of whom had succumbed to that malady. He prescribed the medicines intended for the deceased. He was called in after death, and from an examination he made he was of opinion that death was due to exhaustion from scarlet fever, hastened by a diluted liniment of belladonna which was intended for another person.

William Pearce Jago, assistant to Dr. Simpson, said he gave the father of the deceased two bottles, one containing a liniment and the other a mixture. The liniment was intended for another person, and was marked on the label for Mrs. Brooks. He had placed in the afternoon the two bottles of medicines, which were similar in size to that containing the liniment, together, and in the evening when the father called he, as he thought, placed them in a parcel and gave him them. He supposed the bottles had become displaced by the porter in cleaning the surgery. It was the custom of witness to place bottles of medicine together when intended for the same family, and he never before knew the arrangement to be put out. In answer to the jury the witness said it was clearly his duty to look at the labels on the bottles of medicine to be distributed, but he neglected to do so in the present instance.

The jury returned a verdict that the deceased died from being accidentally poisoned, and that the assistant was greatly to blame.—*Times.*

Accidental Poisoning of the Queen's Commissioner at Balmoral.

A feeling of excitement pervaded Braemer on New Year's day, when it became known that the Queen's Commissioner on the Balmoral estates, Dr. Profeit, had been accidentally poisoned. The doctor had by mistake for a simple medicine taken a quantity of vegetable poison. The result was immediate prostration for a time, and fatal consequences were apprehended. Dr. Haldane, of Braemer, was sent for, and by his efforts Dr. Profeit was soon so much relieved that any cause for alarm was at an end. In consequence of the unfortunate occurrence the annual dinner at Balmoral and other festivities were postponed.—*Standard.*

Poisoning by Prussic Acid in an Infirmary.

A patient named John Dunnigan died in the Dundee Royal Infirmary on Wednesday afternoon. Deceased, who was a middle-aged man, was suffering from a severe cough and chest affection, and the visiting physician ordered for him a mixture containing a minute dose of prussic acid This medicine has been in use in the Infirmary for many years and is often prescribed. The dispenser, therefore, had it prepared, so that it could be got speedily when wanted. The regular dispenser has for some time past been very ill, and had to resign his situation in consequence. For the past two or three days a young man has been acting until a permanent dispenser should be appointed. On Wednesday afternoon the assistant was instructed to prepare a dose of this mixture, but instead of taking it from the bottle containing it he took the bottle containing prussic acid alone. The dose—about a tablespoonful—was given to Dunnigan, and immediately thereafter he showed alarming symptoms. The Assistant Medical Superintendent was at once informed, and he applied the stomach pump, and every restorative means were resorted to, but without effect, as the man died in about twenty minutes. The Procurator-Fiscal has been informed of the unfortunate occurrence, and is making a full investigation into the circumstances.—*From a Dundee Local Paper.*

Alleged Poisonous Sweets.

At the Wandsworth Police Court, on Tuesday Jan. 4, Philip Tunesi, of Church Place, Old Town, Clapham, was summoned by the Inspector appointed by the Board of Works for the Wandsworth District, under the Adulteration of Food Act, 1872, for selling certain sweets which were mixed or coloured with chromate of lead.

Mr. Corsellis, clerk of the Board, attended in support of the summons, and said it was taken out under the third section of the Sale of Food Act, passed last Session.

The Inspector said that on the 30th of November last he purchased at the defendant's shop half a pound of sweets, which he called French pears. Witness sealed them up, and asked the defendant if he would have a sample. He said he had plenty, and declined to have a sample. Witness then took the sweets to Dr. Muter to be analysed.

Mr. Corsellis produced Dr. Muter's certificate, stating that the sweets contained one-tenth of a grain of chromate of lead in an ounce, and would not be poisonous unless eaten frequently. In the case of young children they were especially dangerous.

The defendant said he was not the maker of the sweets. He bought them of a traveller as pure, and he gave a good price for them.

Mr. Bridge said the fact of the defendant buying the sweets from some one else did not relieve him of responsibility unless he bought them under a written warranty.

The defendant said he did not have a written warranty.

Mr. Bridge looked at the certificate, and said it was not a proper one. He adjourned the summons for the attendance of Dr. Muter.—*Times.*

Alleged Adulteration of Tobacco.

The appeal of the Board of Inland Revenue in the case against Mr. Anthony Cassidy, tobacco manufacturer, for alleged adulteration by admixture of gum arabic, was heard on Tuesday before the Chairman of Quarter Sessions (P. J. Blake, Esq., Q.C.), and eleven magistrates at Enniskillen. Several analysts from Somerset House were examined, who swore to finding gum arabic in samples of manufactured tobacco, entered tobacco leaf and juice, which had been forwarded for chemical analysis, by a process only known to the Inland Revenue chemists, whereas in portions of the samples which had been supplied, at the request of Mr. Cassidy's solicitor, to Professor Cameron, Dublin, and two eminent Irish analysts, no trace of gum could be discovered. The appeal was decided in Mr. Cassidy's favour, and the result was received with applause in court.—*Standard.*

Review.

YEAR-BOOK OF PHARMACY: comprising Abstracts of Papers relating to Pharmacy, Materia Medica, and Chemistry contributed to British and Foreign Journals, from July 1, 1874, to June 30, 1875. With the Transactions of the British Pharmaceutical Conference at the Twelfth Annual Meeting, held in Bristol, August, 1875. London: J. and A. Churchill, 11, New Burlington Street. 1875.

At a meeting of the Executive Committee of the British Pharmaceutical Conference, held in Bristol on Monday, August 23, 1875, Mr. Siebold, the editor of the 'Year-Book of Pharmay,' laid on the table the MS. of of that work. The MS. included the 'Abstracts of Papers' and the Introductory Chapter, and is represented by 404 pages of the volume before us. The 'Transactions,' edited by the Senior General Secretary of the Conference, are given in 240 pages, and include the lists of members, which have swollen to the gratifying total of some 2750 names. The increase in the number of members of the Conference is, doubtless, as much due to the energy of the executive as to the growing interest of pharmacists in all things pertaining to their profession and trade. That much of the latter results from the former it would be idle to deny, yet it goes without question that the whole of the energy springs from the interest.

The present volume forms a very complete record of recent labours in pharmaceutical chemistry, materia medica, and pharmacy at home and abroad. The home work illustrates to a certain extent the national character, in so far as it includes no startling discovery of hypothetical value, concluding a train of experiments instituted on speculation, and of which the result seemed dim in distance and import: but places before us with sufficient clearness and brevity valuable productions of a practical tendency. These comprise the work of Attfield and Holmes on Chrysarobine; Beckett, Wright, and Moss on Japanese Oil of Peppermint; Benger on the Applications of Salicylic Acid; Bentley on a False Chiretta; Blyth on Pepper; Brownen on the Sulphocarbolates; Cleaver and Symes on Carnauba Root; Tilden on the Aloins and on Essential Oil of Cherry Laurel; Darby on Extract of Meat; Gerrard, Holmes, and Martindale on Jaborandi; Greenish on Arrowroot; Haselden on the Adulteration of Scammony; Holmes on Brazilian Drugs, and on Senna, and, in conjunction with Leared, on Morocco Drugs; Howard on Cinchonas; Kingzett on the Oxidation of the Essential Oils, and on Calcium Hypochlorite; Pocklington on the Microscopical Characters of Drugs; Stiles on Bromide of Iron and on Cod Liver Oil and Quinine; Umney on Citrate of Lithium, on Lead Plaster, and on *Rhamnus Frangula*; Williams on Hydrocyanic Acid and on Salicylate of Methyl; Wright on the Opium Alkaloids and their Derivatives; and numerous others of importance.

Abroad, pharmaceutical research is not less active than heretofore. The subject of salicylic acid has been approached from all sides, by Godeffroy, Salkowsky, Thiersch, Kolbe, Rautert, and Neubauer; for contributions to our knowledge of Jaborandi we are indebted to Robin, Byasson, and Planchon; the combat of the Cinchonas is continued with undiminished ardour on the part of the champions—De Vrij and Hesse; the preparation of Monobromated Camphor has been further elucidated by Gault—so the history of Croton Chloral by Engel; the Alkaloidal Compounds of Iodine form the subject of an exhaustive paper by Bauer; the chemical knowledge concerning coca leaves is collated by Shuttleworth, who adds formulas for preparations of them; Boldo gives rise to an instructive treatise by Claude Verne; and Moore discusses on the Manufacture of Medicinal Extracts, with special reference to the Extracts of Guarana. All these matters, and many more, will be found appropriately noticed in the Year-Book. A perusal of them gives point to the opening proposition of the editor in his introduction—"the scientific literature of the past year affords evidence of a healthy activity both at home and abroad in the various departments connected with pharmacy."

The introduction is an excellent *résumé* of the year's work in pharmacy and the sciences which bear directly upon it, and when Mr. Siebold favours us with his own appreciation of the value of the work, of its adaptability to the object for which it is intended, or its bearing upon the hypothesis to be strengthened or resolved, it is more than this. Such occasional loosening of the strands in an otherwise compactly twisted string of free abstracts, is helpful to pharmacists who hold the cord with less familiar hands than those of the editor, and the assistance would be greater for more frequent treatment in the same sort. Doubtless, Mr. Siebold is trammelled by the consciousness that it is undesirable to lengthen the introductory chapter beyond the sixteen pages which appear to have become conventional. The existence of this consciousness is evident as we approach the close of the chapter, where many important papers are merely mentioned by name. In the main we acquiesce in Mr. Siebold's remarks, but there is at least one instance regarding which we feel constrained to place on record our want of agrement with him, and that is, with reference to Messrs. Angell and Hehner's method of estimating foreign fat in butter. This method, he says, "deserves to be strongly recommended" (p. 15). We do not think that a process based on the fact that pure butter fat yields 85·4 to 86·2 per cent. of insoluble and non-volatile fatty acids, and which may give only 86·4 per cent. of these acids when 10 per cent of other fats are present "deserves to be strongly recommended."

The timely appearance of this very complete report on the year's pharmacy, seems to assure us of the re-established health of the esteemed editor, and is cause for congratulation to the members of the Conference, who will cordially endorse the action of their committtee in more adequately rewarding the labour which is so productive of information and instruction to themselves.

Our remarks would be incomplete did we not draw attention to the immense good to be derived from the making of grants for special researches in connection with pharmacy. Several such grants have been recently made by the Conference, and we anticipate with confidence the beneficial results of the labours of those who have received them.

A. D., and *G. Breeze*.—There is no English edition of Dr. Wittstein's Pocket Book of Nostrums. The German edition is published by C. H. Beck, of Nordlingen, and may, we presume, be obtained through Williams and Norgate, Trubner and Co., or any foreign bookseller.

Sem. Alb.—(1) An answer will be given next week. (2) See preceding paragraph.

"*Henricus.*"—The eligibility for the office of Local Secretary is only limited by connection with the Society.

J. Summers.—Any article that is recommended on the label, or on a handbill, or by any public advertisement, as a remedy for the cure or relief of any disorder, is liable to stamp duty.

W. L. F.—We cannot suggest any other way of makin the preparation than that of following the official formula.

J. P. J.—There must, we think, have been something wrong with one or more of the preparations, as no change should take place.

J. Russell.—We are much obliged to you for the paragraph and the additional information respecting it. As, however, the case is still under investigation, we are unable to make use of the latter at present.

E. J., W. S. L., are referred to the rule respecting anonymous communications.

"*Caution.*"—The yield will be about 20 per cent., or a little over 3 ozs. from one pound of dry poppy capsules.

⁂ **We are compelled to defer the publication of several communications until next week.**

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Howards and Sons, Mr. W. B. Hemsley, Mr. Kerr, Dr. Lackersteer, "One who has known the Drug Trade more than Thirty Years." A. E. I.

TELLURIUM AS A PROBABLE IMPURITY IN BISMUTH.

BY GEORGE BROWNEN.

As Mr. Giles and (more particularly) Mr. Ekin have called attention to my discovery of tellurium in a sample of bismuth, it is but just and necessary I should give the facts of the case and the reason for withholding the publication of results until now.

Last April a sample of bismuth nitrate was given me. I was told it was "horrid and beastly;" on requesting further information, I was told it was not "the taste," but "the stinking breath afterwards." . . "worse than bad onions." I thought directly this was due to arsenicum, and although I was not sure that all arsenical preparations evolved the odour of arsenicum, I thought it quite possible some reduction might have occurred, either in the mixture or stomach.

The bismuth nitrate was made into a paste with pure potassium hydrate and water, boiled, dried, mixed with charcoal, and reduced by heat. The slag obtained was extracted with water, and yielded a pinkish solution; to this solution was added a little ammonium sulphide, and from the filtrate acetic acid precipitated the brown tellurium sulphide, instead of the yellow arsenicum sulphide I expected to obtain.

This sulphide I have now as tellurium in powder by Stolba's method, viz., by boiling the potassium salt of tellurous acid with grape sugar.* Of course, tellurium was blamed for causing the bad odour of the bismuth preparation, especially as I recollected reading somewhere that somebody (Bunsen, I think) had personally experimented with a tellurium compound to find out its physiological action, and as a result had to absent himself from company until the effluvia was gone. I cannot now remember the journal in which this was published, and should feel obliged if any reader could give me the reference. Other matters claimed my attention, so the bismuth question was put aside until some other time, and was nearly forgotten. Mr. Ekin's request appeared, and I then sought a further sample, but was told "all had been returned."

These are the facts; they are not all I could wish. A further examination of telluric bismuth salts is necessary to find the reason why tellurium is left in such preparations, in what state or combination it exists, and whether it is associated with bismuth oxychloride, as Frenzel states† that tellurium is thrown down in the bismuth oxychloride made from the telluric bismuth of Banat.

Although speculation is perhaps premature, and hardly in accordance with exact scientific research, yet it seems to me that tellurium and bismuth oxychloride, as contaminations of officinal bismuth salts, may point to crude and imperfect methods of manufacture. For instance, there is the plan of Wohler for separating lead and silver from bismuth by means of hydrochloric acid: these metals are dissolved in nitric acid, and a proportionate quantity of hydrochloric acid added to the solution; after the subsidence of the insoluble lead and silver chlorides, the supernatant bismuth solution may be removed, containing excess of hydrochloric acid, arsenic, and tellurium, provided those undesirable associates of bismuth were also present in the mineral used, and it would be a curious and confirmative proof of the process if bismuth oxychloride and tellurite (?) can be found together in a sample of bismuth nitrate.

Bismuth has a wide distribution, so also has tellurium, but in smaller quantites, and these metals are oftentimes together, helping to form the minerals bornite, tetradymite, montanite, etc. The analysis of Hungarian tetradymite, as given by Thompson, is as follows:—Bi 59·84, Te 35·24, S 4·92, sp. gr. 7·5, and closely resembles the American mineral noticed in Mr. Ekin's paper.

Analyses of telluric bismuth are also reported from other quarters; thus, Frenzel* gives Banat bismuth as Bi 59·23, Te 25·92, S 4·26. An analysis of a Brazilian mineral, given in 'Watt's Dict.,' vol. v., p. 708, is remarkable for containing both tellurium and selenium, viz., Bi 79·1, Te 15·9, S 3·1, Se 1·5. Castello reports† a Mexican mineral as Bi 65·4, Se 16·7, Zn (?) 2·8.

Talpalpite, another Mexican mineral, is given by Rammelsberg as $Ag_2S + 2 Bi Te$, and Roessler gives as the formula of montanite $BiS_3 2 Bi Te_3$. Tellurium, on the other hand, has been found native (with traces only of iron and gold) in the Loretto Mine, in Transylvania, in combination with gold and silver (petzite, hessite, etc.), and as tellurium arseniosulphide among pyrites.‡

As bismuth salts capable of producing fetid breath are not now easily obtained, it is most likely the manufacturer has discovered the flaw in his process, and the pharmacist and patient are rid of an unwelcome guest.

Laboratory, 143, *New Bond Street.*

GELSEMIUM SEMPERVIRENS.

BY E. M. HOLMES.

Curator of the Museum of the Pharmaceutical Society.

(*Continued from page* 482.)

Medicinal properties and uses.

In this country Gelsemium has been used principally in the form of tincture. It has been found effectual in relieving neuralgic pain in the teeth and jaws, particularly when arising from decayed teeth.§ According to Dr. Mackey, it is especially beneficial when the pain occurs in parts of the face supplied by branches of the fifth nerve.|| Similar results have been obtained in Germany.¶ In America it is largely used as a remedy in fevers, particularly those arising from malaria; in such cases it is often given in alternation with quinine. In minute doses it has been recommended in inflammatory and irritable conditions of infant life.** It has also been used with success in dysmenorrhœa, in after pains, in spasmodic stricture of the urethra, in hysteria, and spasmodic croup.†† In traumatic tetanus it has been tried with the result of the death of the patient in six hours afterwards from paralysis of the muscles of respiration.‡‡

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* 'Polytech. J. v. Ding.,' 1870.

† 'Jahr. f. Min.,' 1873.

* 'Jahr. f. Min.,' 1873.

† 'Jahr. f. Min.,' 1874.

‡ Hannay, Jour. Ch. Soc, 1873, p. 989.

§ *Lancet*, 1873, I. p. 731; 1875, II. p. 660.

|| *British Medical Journal*, 1874, I. p. 576.

¶ *Centralblatt f. d. Med. Wiss*, No. 32, 1875.

** *Lancet*, 1873, II. p. 475.

†† Hughes 'Pharmacodynamy,' I. p. 372.

‡‡ *New York Medical Journal*, May, 1875, p. 512.

Gelsemium appears to be chiefly valued in America for its power in controlling nervous irritability in fevers, in which it is said to excel any other known agent.

An excellent account of an experimental investigation of its physiological action, by Dr. Bartholow, is given in the *Practitioner*,* in which he states that it corresponds more nearly in its action to conium than to any other agent, and points out in what particulars it differs. He also shows that the action of gelsemium is not practically antagonistic to that of strychnia or calabar bean, and that the dilatation of the pupil caused by gelsemium is due to a paretic state of the circular fibres, and not to contraction of the radial fibres of the iris as is the case with atropia, and that it is not overcome by the application of extract of calabar bean. From this it appears possible that gelsemium may prove of some service to the oculist in the form of a local application.

That this drug is a powerful poison there can be no doubt. The dose which has proved fatal, however, appears to vary with the age and constitution of the individual. Some idea of the quantities which have been sufficient to produce fatal results may be gathered from the following items of cases on record:—

In the *Lancet*,† Dr. J. N. Freeman, of New York, mentions the following: fifty minims of a tincture consisting of 4 ounces of the root to a pint of diluted alcohol, proved fatal in two hours to a boy three years of age; another boy three years old died in five hours, having taken in that time two doses of 10 minims of the tincture; in a third case in which 2 drachms of the tincture were given to a girl nine years of age, death ensued in two hours. In the last two cases the strength of the tincture used is not recorded, and in the second case each dose was given with 1½ grains of sulphate of quinine. In the *American Journal of Pharmacy*,‡ a case is recorded in which a single dose of 3 drachms of the fluid extract proved fatal to a female adult in 7½ hours. In another case alluded to in the *Practitioner*, of October, 1870,§ the administration of the drug proved fatal in 2½ hours.

The above notes are here inserted with a view to serve as a guide as to what may be considered a dangerous dose of the tincture or fluid extract.

The symptoms produced in cases of poisoning by this drug are minutely described by Fredigke,‖ as follows:—

"The symptoms by which its effects manifest themselves in the animal economy seem to indicate that its energy is primarily exerted on the cerebro-spinal centres, and secondarily on the respiratory apparatus and the heart, the functions of the former ceasing before those of the latter. The motor nerves of the eye are attacked first, objects cannot be fixed, dodging their position, the eyelids become paralysed and drop down, and cannot be raised voluntarily, the pupils largely dilate, there is a feeling of lightness in the tongue, it ascends gradually to the roof of the mouth, pronunciation becomes slurred, then the extremities refuse to support the body and erect motion becomes impossible. The pulse gradually becomes more frequent, rises to 120—130 and more beats per minute, is small but regular, respiration then becomes laboured, the mind, however, remaining clear. This state will set in about an hour and a half after the administration of the drug.

"Formidable as these symptoms appear, they are effectually counteracted by diffusive stimulants, such as strong cognac or whisky, given in doses of two ounces or less every hour, according to circumstances. All the symptoms will disappear after about two hours, leaving no unpleasant effects or derangement of the system."

Antidotes.—The antidotes which have proved successful in cases of poisoning by this drug have been, galvanism,* aromatic spirits of ammonia,† carbonate of ammonia, and brandy.‡ Tincture of prickly ash bark (*Xanthoxylum fraxineum*, Willd.) has been suggested as an antidote.

Medicinal Preparations.

The preparations which are used in medicine are the tincture, fluid extract, and gelsemin. Only one of these preparations has official sanction.

Fluid extract.—This is the only preparation official in the United States' Pharmacopœia. It is made in the following manner:—

Take of—

Gelsemium root in very fine powder	16 oz. (troy).
Alcohol (sp. gr. 0·835) . .	a sufficient quantity.

Moisten the powder with four fluid ounces of alcohol and pack it in a suitable percolator. The surface of the powder is then to be covered with a disc of paper, and the remaining portion of 16 fluid ounces of menstruum is to be poured upon it. When the fluid begins to drop from the percolator, close the lower orifice with a cork, and having closely covered the percolator to prevent evaporation set it aside in a moderately warm place for four days. The cork is then to be removed, more menstruum is to be gradually poured on, and the percolation continued until 24 fluid ounces have been obtained; of these, the first 14 fluid ounces are to be reserved, and the remainder, having been carefully evaporated to 2 fluid ounces, is to be mixed with the reserved portion and filtered through paper, if necessary.§ From this formula it will be seen that each ounce of the fluid extract represents an ounce of the root.

It may here be remarked that it is almost impossible to reduce the drug to *fine* powder without grinding under edge runners. The long pieces of root are more easily reduced to coarse powder than the compact masses of short pieces of the root as prepared by the Shakers.

Tincture.—There is at present no recognized formula for the tincture. The one given in the 'American Dispensatory' consists of 4 ounces (troy) of the fresh root, cut into small pieces, to one pint of dilute alcohol. It is obvious that this formula is a very inconvenient one, and not admissible in this country, since the fresh root is not obtainable. It must be borne in mind that the pint used in the United States is officially only 16 fluid ounces, hence this tincture is of the strength of one in four, nearly. As the root probably loses nearly half its weight in drying, the quantity of fresh root ordered will be about equivalent to 2 ounces of the dried root, or one part in eight of proof spirit.

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* October, 1870, p. 208.

† *Lancet*, 1873, II. p. 475.

‡ *American Journal of Pharmacy*, 1870, p. 14.

§ *Journal of Medical Science*, 1867, p. 271.

‖ 'Proc. Amer. Pharmaceutical Association,' 1873, p. 656.

* *Boston Med. and Surg. Journal*, April, 1869.

† Hale's 'New Remedies,' p. 390.

‡ *American Journ. Pharm.*, 1871, p. 226.

§ United States' Pharmacopœia, pp. 151, 159.

Dr. J. N. Freeman, of New York, in a letter to the *Lancet*, speaks of a tincture of the strength of 4 ounces of the root to a pint of dilute alcohol. Drs. Sawyer and Mackey, of Birmingham, in a communication to the *British Medical Journal*, recommend a tincture made of the strength of 2 ounces of the dried root in coarse powder, to two pints of rectified spirit. In London, three of the leading houses in the drug trade prepare it in three different strengths, one using 4 ounces, another 2½ ounces, and another 2 ounces of the dried root to the pint (20 ounces) of proof spirit.

At University College Hospital, 4 ounces of the dried root to 20 ounces of proof spirit are used, and at St. Bartholomew's Hospital, 2 ounces to 16 ounces of proof spirit have been used in making the tincture. The "mother tincture" of the homœopathic pharmacopœia is also prepared from 2 ounces of the dried root to 20 ounces of proof spirit.

The above facts show the great necessity for a definite published formula. It is evident that the use of tinctures of various strengths can only lead to danger to the patient, who may have a prescription containing the tincture made up at different establishments,—to disappointment to the physician prescribing it in case of a tincture of less strength than he has been accustomed to being used,—and to conflicting statements with regard to the effective and poisonous doses of the tincture. The universal adoption of one formula for the tincture is obviously the only remedy for preventing disappointment to the physician and risk to the dispensing chemist, for it has already been shown that the tincture is a poison almost as powerful as tincture of opium to young children, and in overdoses dangerous or even fatal to adults.

From a comparison of the above formula it will be observed that a tincture of the strength of 2 ounces (avoir.) of the dried root to 16 ounces or 20 ounces of proof spirit is that most generally used in this country.

A formula that shall reconcile the differences in the various formulæ used, that will not interfere with the one used by the majority of chemists, and that will enable those who use a stronger tincture to reduce it to a strength uniform with that generally used is evidently the object to be attained. With this view the following formula is proposed:—

Take of—

Gelsemium root (dried) reduced to coarse powder	2 ozs. (avoir.)
Proof spirit	20 fluid ozs.

Make the tincture by percolation, by the general process ordered in the British Pharmacopœia for preparing tinctures. The process of percolation is here recommended as yielding a product of more uniform strength, if properly conducted. An ordinary funnel answers very well as a percolator if a small plug of cotton wool be placed in the tube and covered with a layer of silver-sand about one inch in depth, and if another layer of sand about half an inch in depth be placed on the top of the substance to be operated on. The passage of fluid is thus made much more uniform and in some measure counterbalances difference in density of different parts of the drug operated on.

Besides being of a strength to which it is easy to reduce tinctures made from 4 and 2½ ounces to the pint, the above formula has the following advantages:—There is, so far as I am aware, no record of a case of poisoning from the use of a tincture of 2 ounces to the pint, but a case has been recorded of death from a tincture of 4 ounces to the pint. It will contain those active principles of the drug which Kollock has shown are contained in an aqueous extract,* but will not contain so large a proportion of the resin, of the active properties of which we have at present no proof. In order that the results which are expected may be obtained from the drug, it would be advisable for medical men in all cases to state the strength of the tincture intended to be used.

Gelsemin.—This is a preparation which is used chiefly by the eclectics. It is prepared, according to Dr. Bartholow, in two ways, either by evaporating the tincture or by precipitating it with water. It must, therefore, evidently consist of the resin of the root with varying proportions of the active principle.

Doses.

Of the powdered root, according to Dr. Sawyer 1—2 grains is the dose.† According to Dr. Tully 10 to 15 grains have proved fatal to a child twelve years of age.‡

Of the dose of the fluid extract there is not any official statement in the U. S. Pharmacopœia. Judging, however, from the statement that the dose of the powder is 1—2 grains, and from the fact that the fluid extract represents an equal quantity of the root, and also from disagreeable symptoms having been produced by 10 minims,§ the dose of the fluid extract may perhaps be fairly estimated at 5 minims. For children the tincture is a much safer preparation

Of the tincture the doses which are reported to have proved successful have been 20 drops of a tincture composed of 2 ounces of the root to 16 ounces of proof spirit, given every three hours to adults; and of the tincture made from 2 ounces of the root to 20 ounces of spirit, 15 minims administered in the same way. These doses have been given chiefly in neuralgic pain in the jaws and teeth, which have been cured within twenty-four hours.

It yet remains to be shown, however, whether larger doses would give relief in a shorter period, without causing unpleasant symptoms, and also whether external applications of the drug are as effectual as the internal administration of it. Dr. J. N. Freeman, of New York, recommends the tincture to be given to infants in doses of one-quarter to 1 minim.‖

The dose of gelsemin is stated by Dr. Grover Coe, to be from one-half to 1 grain.¶

Chemical Composition.

According to an analysis made by Kollock, in 1855, the root contains gelseminia, dry acrid resin, one-half per cent. of a volatile oil heavier than water, fatty resin, fixed oil, yellow colouring matter, gallic acid, starch, albumen, gum, pectic acid, extractive matter, lignin, and 3·7 per cent. of mineral matter consisting chiefly of salts of potassium, calcium, magnesium, iron, and silica.* In 1869, the root was again examined by Eberle, who states that after careful experiments he found the woody portion of the root to contain no alkaloid.† The leaves and flowers, however, are stated by Kollock, to contain the same ingredients as the root, although in much less quantity. In 1870, the root was further examined by Dr. Wormley, who succeeded in isolating a new substance possessing acid properties which he named gelseminic acid. The physiological action of this substance and of the acrid resin does not appear to have been examined by Dr. Wormley, who found that gelseminia produced all the symptoms usually observed in cases of poisoning by the drug. His results were afterwards confirmed by Dr. Bartholow.‡

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* *American Journal of Pharmacy*, 1855, p. 202.

† *British Medical Journal*, 1874, I., p. 576.

‡ Hale's 'New Remedies,' p. 391.

§ *British Medical Journal*, 1874, p. 576.

‖ *Lancet*, 1873, II., p. 475.

¶ 'Positive Medical Agents,' p. 114.

(*To be continued.*)

OBSERVATIONS AND EXPERIMENTS ON ERGOT.§

BY A. STEPHEN WILSON, OF NORTH KINMUNDY.

(*Concluded from page* 546.)

In order to grow the *Claviceps*, the ergots may either be thrown upon earth in a saucer and half covered with withered leaves, watering occasionally, or be placed on a damp cloth between plates. Some of them will soon get covered with mould, and will never produce the *Claviceps*. Perhaps these are dead, for others close beside them will remain untouched by mould, black and shining, till they burst into a crop of the true fungus.

Is there more than One Species?—But the identity of ergot, says Berkeley ('Introduction to Cryptogamic Botany,' p. 282), with *Cordyceps* has been called in question by Cesati, because two species occur occasionally on the same kind of ergot, in deprecation of which, says Berkeley, it is very possible that the same grass may be ergotted by more than one *Cordyceps;* and even should a single ergot be found to produce two species at once, it is possible that the sporidia of the two species may have concurred in its production. The writer and others have submitted to Mr. Berkeley ergots with the *Claviceps* upon them, which he has found to be of the species not usually growing on these ergots—*purpurea* where it should have been *microcephala*, and the converse. The truth seems to be that there is only one species of ergot fungus. Tulasne's definition of *purpurea* includes a villous base. An ergot of oat grass is before me in which two stipes beside each other are very hairy at the base, while five others on the same spur are entirely without hairs.

Growth of the Ergot.—All through the winter below the rotting grass on which they grow the ergots lie black and free from mould, subject only to ants and other unpoisonable enemies, which scoop out cavities in them or bore holes through them. Swarms of black ants I have seen visiting the ergot while it still remained on the grass. The least bit of an ergot will produce a fungus. The first sign of vitality is the rupturing of the black cuticle of the ergot. Generally the half-formed head pushes aside the black skin, and shows its whitish purple above the surface. The fungi grow out from all sides of an ergot, while the number which one ergot may produce is indefinite. Sometimes only one is produced; sometimes two, three, four, or other numbers. A home-grown rye ergot produced twenty-three, all from one side—the upper side as it lay on the surface of the damp earth. In growing these thin-stalked fungi incline towards the light, perceiving very well through a plate, on which hand the window lies. The stems are of all lengths up to rather more than an inch and a half. Tulasne seems to have attained only a length of from 15 to 25 millimetres: some of mine have been 40 millimetres, and frequently they are longer and thicker on the ergot of *Glyceria fluitans* than on that of cereal rye. Sometimes an amorphous mass grows up without stalk or head; sometimes the base of the stalk is villous, and sometimes bare on the same ergot. For the most part they grow solitary; sometimes two or three come out near each other, but the connection seems merely local. Certain points in the mass of of mycelium composing the ergot are more vital than others, and at these points growth takes place, and probably withdraws vegetating force from points immediately around it. The fungi are of various sizes on the same ergot. The stipe is sometimes $\frac{1}{12}$ of an inch in diameter and sometimes half as much, or less. The heads where twenty-three grew together were about $\frac{1}{16}$ of an inch in diameter, and the stems about half as much. I have grown the *Claviceps* on the ergots of eleven species of grass, and the most delicate of them is that on *Aira cæspitosa*; the head being $\frac{3}{100}$ and the stem $\frac{1}{100}$ of an inch in diameter, with a stalk rather less than half an inch in length.

Looking at hundreds of them growing naturally in the sides of a ditch, it is seen that various shades of colour characterize them; apparently referable to age and exposure to light. The *Claviceps* which grows in a hole is less ruddy than that which grows from the ergot of the same grass on a ledge having less moisture and more light.

If, as some have conjectured, the spores were carried up the plant with the sap, no obvious reason exists why wheat and barley which are ergotizable grasses should not everywhere be as frequently ergotized as cereal rye. But if the spore attacks the floret from the atmosphere, then the character of the floret will be a determining element in the frequency of inoculation.

Relation to Structure of Flower.—The structure of many grass florets and their mode of fertilization render them specially liable to the floating spores of the ergot fungus. When a ripe floret opens for fertilization, the feathery styles are thrown outside the pales on both hands, and are seldom retracted, while in many cases the pales remain slightly ajar after fertilization has taken place. It is the same with many other grasses—some do not close again after opening for several hours, and in many the feathery stigmas remain permanently exposed till they wither off. In vernal-grass the mode of fertilization is peculiar; this grass (in the locality always referred to) never opens out its pales at all, the stigma is exposed before the corresponding anthers, and these anthers are pushed out from between the points of the closed pales. The part, therefore, of this highly ergotizable floret which is attacked would appear to be the upper end of the stigma or the styles. I have observed a very small fly, like the saw-fly, in great numbers pushing out and in between the close pales of this grass, and it is possible that spores may be thus conveyed to the ovary. The pales of *Glyceria fluitans* open wide for fertilization, while the feathery styles spread out on both sides. It is the same with others of the more ergotizable grasses.

In the wheats again, and in most of the barleys, the florets are open for a very short time and to a very slight extent, while the feathers are scarcely ever exposed outside the pales to the flying enemy. These grasses fertilize themselves and immediately shut their doors to intruders. It can hardly be, however, that mere mechanical exposure to the spores is all the explanation, because the exposure of the cultivated and wild oats presents an open floret hanging downwards as if ready to be entered by any spores which may be rising on an eddy of vapour beneath them, and yet none of the oats are ever ergotized; still, there is

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[*] *American Journal of Pharmacy*, 1855, p. 203.

[†] *American Journal of Pharmacy*, 1869, p. 38.

[‡] *Practitioner*, October, 1870, p. 202.

[§] Read before the Botanical Society of Edinburgh, and reprinted from the *Gardeners' Chronicle*.

reason to suppose that greater mechanical exposure is a large part of the explanation of greater liability to ergot. The species of *Bromus* which grow here open very little for fertilization, and soon close very tightly, and are never ergotized.

Effects produced by the Ergot.—The question of the effects of ergot upon cattle does not fall to be here considered; besides not a single fact bearing upon it has come under my notice.

But another question suggests itself: What is the effect of ergot upon the grasses? Of course, one immediate effect is, to prevent the growth and ripening of a certain proportion of the seeds, and thus to hinder the seminal propagation of the plant; but it is a fact that the ripening of the seeds and culms of the cereal grasses tends to make these grasses more strictly annual. They are not absolutely annual, even when a few spikes on a stool are fully ripened, but grow occasionally, producing ripe spikes from the same stool for two or three years. Now, if before rye was cultivated, it was so closely ergotized as to prevent all but a few seeds from maturing, the plant may at that time have been a perennial grass; and the present effect of ergot on the grasses may be, while diminishing their seed-bearing capacity, to give a larger term of duration to the roots and lower nodes, than if all the seeds were allowed to exhaust the plant by going to maturity. Probably the balance of the natural grasses is somewhat different from what it would be were there no ergot. The vernal-grass, which is highly ergotizable, is perhaps encroached upon by the Crested Dog's-tail, which is not ergotized at all; or, if the ergot conserves vitality in the lower nodes, the vernal-grass may thus hold its own.

APPENDIX.

No. 1. *List of Ergotized Grasses referred to.*

1. Wheat. *Triticum sativum*, L.
2. Wheat-grass. *T. repens*, L.
3. Rye. *Secale cereale*, Will.
Rye. *Secale cereale*, artificially ergotized.
4. Barley. *Hordeum distichum*, L.
Barley. *Hordeum distichum*, artificially ergotized.
5. Vernal-grass. *Anthoxanthum odoratum*, L.
6. Mat-grass. *Nardus stricta*, L.
7. Foxtail-grass. *Alopecurus pratensis*, L.
8. Reed Canary grass. *Phalaris aurundinacea*, L.
9. Catstail grass. *Phleum pratense*, L.
10. Turfy hair grass. *Aira cæspitosa*, L.
11. Waved hair grass. *Aira flexuosa*, L.
12. Creeping soft grass. *Holcus mollis*, L.
13. Meadow soft grass. *Holcus lanatus*, L.
14. Oat grass. *Arrhenatherum avenaceum*, Beauv.
15. Smooth meadow grass. *Poa pratensis*, L.
16. Annual meadow grass. *Poa annua*, L.
17. Floating sweet grass. *Glyceria fluitans*, R. Br.
18. Cocksfoot-grass. *Dactylis glomerata*, L.
19. Tall fescue grass. *Festuca elatior*, L.
20. Meadow fescue grass. *Festuca pratensis*, Hudson.
21. Rye-grass. *Lolium perenne*, L.
22. Darnel-grass. *Lolium temulentum*, L.

No. 2. *Grasses referred to on the Ergots of which the Claviceps has been grown.*

Wheat-grass. *Triticum repens*, L.
Rye. *Secale cereale*, Will. (twenty-three fungi on one spur).
Vernal grass. *Anthoxanthum odoratum*, L.
Mat-grass. *Nardus stricta*, L.
Turfy hair grass. *Aira cæspitosa*, L.
Creeping soft grass. *Holcus mollis* (also found growing naturally, 1874).
Oat grass. *Arrhenatherum avenaceum*, Hud.
Floating sweet grass. *Glyceria fluitans*. R. Br. (also gathered growing naturally in great numbers in 1874 and 1875).
Cocksfoot grass. *Dactylis glomerata*, L.
Tall fescue grass. *Festuca elatior*, *F. gigantea* (?), L.
Rye-grass. *Lolium perenne*, L.

PILOCARPINE AND THE ESSENTIAL OIL OF JABORANDI.*

BY E. HARDY.

The author finds that the best method of preparing pilocarpine, the alkaloid to which the physiological action of *Pilocarpus pennatifolius* is due, is to make an infusion of jaborandi leaves, evaporate to a syrupy consistence, mix with an excess of magnesia and evaporate to dryness. This mixture is then treated with chloroform and afterwards with water; the chloroform is evaporated in a vacuum, the water also evaporates and the pilocarpine is obtained free, as a syrupy mass, which is soluble in water and in alcohol, and forms crystallizable salts with hydrochloric, nitric and sulphuric acids.

When the leaves of *Pilocarpus pennatifolius* are submitted to distillation with water they yield an essential oil that may be easily collected. Ten kilograms of leaves gave 56 grams of the crude oil. This essential oil has a complex composition; it contains a hydrocarbon boiling at 178° C.; a substance passing over at 250° C., and a third product which distils at a still higher temperature, and forms after a time a colourless and transparent solid mass. The latter two bodies have not yet been studied by the author.

The hydrocarbon boiling at 178° C., which the author calls pilocarpene, is a colourless transparent mobile liquid, having a peculiar and rather agreeable odour. It is rather lighter than water, its specific gravity being 0·852, and it deviates polarized light to the right, its rotary power being $+1{\cdot}21$.

The composition of this body corresponds with the formula $C_{10}H_{16}$. It forms with hydrochloric acid a solid and a liquid bihydrochlorate, $C_{10}H_{16}, 2\,HCl$. These are obtained by passing a current of dry hydrochloric acid into pilocarpene free or mixed with ether. The solid hydrochlorate is a colourless transparent crystalline body, melting at 45·5° C. It crystallizes immediately upon the addition to its saturated solution of a crystal of hydrochlorate of turpentine. With solution of perchloride of iron it gives the successively rose, red and blue coloration characteristic of bihydrochlorates. The author has ascertained that the monohydrochlorate, or artificial camphor, is not produced in the reaction. The essential oil of pilocarpus is very analogous with the essential oil of citron. It does not appear to have any physiological action. [illegible]

THE CULTIVATION OF USEFUL PLANTS IN INDIA.†

Two reports have recently been received from Calcutta, both dated in June last: one treats of the progress and general utility of the Botanical Gardens at Calcutta, and the other gives us some details and statistics of the capabilities of the cinchona plantations in British Sikkim. From the first report—that on the Botanical Gardens—we learn a good deal of what has actually been done in the diffusion of really useful plants, and from Dr. King's remarks we may also learn what more might be done, if the Government were ready to grant a small outlay for the collection in and proper transit from the native countries, of valuable plants which have been introduced and proved to be suitable for cultivation in Indian soil. Thus the mahogany tree (*Swietenia Mahogani*), for instance, the wood of which is always in most extensive demand, realizing good prices, has been proved to grow well in Bengal, so that its diffusion in India is not difficult, and is really a matter of great importance. Of this valuable timber tree, however, we are told no seeds, except a few from Indian grown trees, were received during the year. So important does Dr. King consider the cultivation of this tree in India that he expresses an opinion that a collector should be sent from India to Honduras or Jamaica, or engaged in those countries for the express purpose of collecting the seeds and transmitting them to India.

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* *L'Union Pharmaceutique*, vol. xvi., p. 365.

† From the *Journal of the Society of Arts*.

On the subject of caoutchouc or india-rubber plants, Dr. King thinks that the *Hevea brasiliensis*, or Pararubber tree, which has been introduced into India, and which furnishes the best commercial caoutchouc, will not thrive in that part of India. He says, "It appears to suffer here equally from the damp cold of December and January, and from the high temperature of the hot weather and rains. Plants have been tried at a low elevation in the cinchona plantation under a slightly more equable climate, but with similar results. *Hevea* is a thoroughly tropical plant, it lives naturally in a climate remarkable for uniformity of temperature and for regular supply of moisture." The Andamans and Ceylon, as well as Malabar and the southern part of Burmah, are suggested as being likely to prove more suitable for the cultivation of the *Hevea* than any part of the Bengal Presidency. On the other hand the caoutchouc plant of Madagascar (*Vahea madagascariensis*), promises to thrive, and there are many plants of this kind in India; considering, however, that this plant is a climber, and that rubber furnished by it is of inferior commercial value, together with the fact of its having to contend with the indigenous rubber plant of India (*Ficus elastica*), it is not probable that it will ever be grown for commercial purposes.

On the subject of the acclimatization of ipecacuanha in India, a plant the well-being of which in its new home ranks next in importance to cinchona itself, it may be well simply to reproduce Dr. King's own words. He says "with the view of discovering the most favourable situations for the cultivation of ipecacuanha a number of sets of plants were put out during the early part of the year at different spots at low elevations in the cinchona reserve in Sikhim. Experience having shown that this plant requires essentially tropical conditions, warm, well-sheltered places with good virgin soil were chosen. Some of the plants thus put out were protected by the natural shade of the forest, others by a sloping thatch of grass. Until the arrival of the cold weather all went well, but the unusually low temperature that prevailed during that season was fatal to the majority of the plants, and I am driven reluctantly to the conclusion that it is doubtful whether ipecacuanha can be successfully cultivated as an out-door crop in Sikkim. This is also the opinion of Mr. Gammie, the residing manager of the cinchona plantation. Further trials will, however, be made before finally recommending the abandonment of the experiment in Sikkim. The provinces already mentioned as likely to be suitable for *Hevea* cultivation will also, in my opinion, probably answer for ipecacuanha, and with the sanction of Government I propose to send supplies to these provinces. The plants sent last year to the Botanical Gardens in Ceylon are reported by the director, Dr. Thwaites, to be promising fairly. The propagation of the plant by root cuttings is now thoroughly understood, and there are in the hot-beds at Rungbee more than 100,000 young plants, while two years ago there were rather less than 7,000. The plant is therefore fairly introduced into the country, and a suitable locality for growing it profitably as a crop will doubtless soon be discovered."

In the matter of the paper supply, which continues to occupy a large share of the attention both of commercial and scientific men, it is stated that two acres of ground in the Calcutta garden have been planted with the seedling plants of the baobab (*Adansonia digitata*), with the object of proving whether the tree can be profitably cultivated in India as a paper material, quantities of the bark having been imported into England from Africa, and used in the manufacture of paper with great success. Notwithstanding the fact of the bark possessing all the requirements for making a good and strong paper, it would appear that its comparative slow growth will always prevent it from becoming a recognized article of trade with paper-makers. As in many other tropical countries where fevers are prevalent, the blue gum tree (*Eucalyptus globulus*) has been planted in India, and repeated experience has shown, that although growing with great rapidity and vigour on the Neilgherry and Khasia Hills, at elevations of from 5,000 to 8,000 feet above the sea, it can hardly be got to live even for a year or two in the hot plains. Dr. King endorses the opinion of many other scientific men that there is no satisfactory evidence of any beneficial effects coming from the planting of eucalyptus trees in malarious districts.

Turning to the special report on the cinchona plantations in British Sikkim, it is satisfactory to find that the plants are not only luxuriant in growth, but have also been increased in number to a very large extent. The number of red bark trees (*Cinchona succirubra*) planted out during the year was 310,000, bringing the total number in the permanent plantations up to 2,390,000. Of the yellow bark plants (*Cinchona calisaya*), 60,000 have been added during the year, making a total of 354,000 young trees. These figures represent the number of plants actually in the open plantations, and are exclusive of the stock in the nursery beds, so that in round numbers, these plantations contain three millions of plants of *Cinchona succirubra*, half a million of other sorts, and a nursery stock of about half a million plants.

From experiments made in removing bark under the mossing process, from which so much was at one time expected, it appears that the operation is not in all cases satisfactory, or rather that the results did not promise well. The soft newly forming bark proved highly attractive to ants, which abound in Sikkim, and it was removed by them as fast as it was formed, and in many cases no new bark whatever was formed over the wounds.

The quantity of dry bark obtained from the plantation during the year amounted to 39,405 lbs., 15,160 lbs. of which was placed in the hands of the Government quinologist, who, it is satisfactory to know, has settled on a cheap and efficient method of extracting the total febrifugal alkaloids. The quinologist's preparation consists of an amorphous powder of a pale buff colour, and entirely free from resin; it is readily soluble in water slightly acidulated with sulphuric acid. This febrifugal powder has been used by the Indian medical department, and has also been given to coolies suffering from fever, both in the plantation in Sikkim, and in the Botanical Gardens, Calcutta. In all cases it has proved to be an efficient febrifuge.

GRINDELIA ROBUSTA.*

BY JAMES G. STEELE.

Considerable attention has been directed of late years to the California "Grindelias," specimens of which are to be met with in different parts of the State, and which early attracted the attention of the Jesuit Fathers who established "missions" under the patronage of the Mexican Government, some sixty or eighty years before the conquest of the country by the Americans.

Grindelia robusta seems to exercise a specific effect in cases of poisoning by the famous "Poison Oak" of California. Of late years, its happy effects in reducing the frequency and violence of the spasmodic constrictions of the throat and contiguous organs from asthma and kindred diseases are so well authenticated as to claim for it a new and important place in the United States materia medica.

In the woods and thickets of California, as well as on the dry hillsides—in fact, in every variety of locality—may be found a very venomous shrub, the "poison oak," or "poison ivy," the "hiedra" of the Spanish and native California people, the dread of all those who are acquainted with it. The plant is known to botanists as *Rhus diversiloba*, or *Rhus toxicodendron*, and resembles the poison ivy of the Atlantic States, both in appearance and poisonous qualities. It has a somewhat climbing stem with short, leafy branches, and is easily recognized from the fact of discoloration of many of its leaflets, caused by the oxidation of the green colouring matter of the plant, in this respect differing from other shrubs and climbing plants. As is well known, poison oak is the cause of a vast deal of misery and suffering in California. There is scarcely ever a time in any little town or neighbourhood where there are not one or more persons suffering from it, and it has been estimated that there are in the State near three thousand persons constantly afflicted with the cutaneous disease caused by this dreaded scourge. Not only tourists and occasional visitors into the rural districts from our cities, but even farmers and labourers are liable to this poisoning. The many remedies which have been used for counteracting the effects of the "poison oak" all give way in efficiency and celerity to the *Grindelia robusta*, which like the *Rhus toxicodendron*, is indigenous to the State; it is found in many parts, but grows more luxuriantly in the foot hills of the Sierra Nevada and coast ranges of mountains.

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* Abstract of a paper read before the American Pharmaceutical Association, Boston, September. 1875. From the *Pharmacist*.

Grindelia robusta is a tall, stout perennial, belongs to the composite family, and looks like a small sunflower. It is from one to three feet in height, and has bright yellow flowers in heads one to two inches in diameter, flowering from June to October. Before flowering, the unexpanded heads or buds secrete a quantity of resinous matter, a white and sticky-like balsam, that is finally, after the flower expands, distributed like varnish over the petals of the flower. The whole plant at this season, flowers and leaves, is resinous and viscid. When it grows in dry hillsides it is stiff and rigid, with narrow, thin leaves; but in damp localities it is more robust and succulent, with wide, fleshy leaves. May and June are the months in which *Grindelia* should be gathered for use, as at that time the plant abounds most in the balsamic and resinous juice in which its medicinal properties reside, to which its marvellous effects in the cure of the eruption from oak poisoning and the suppression of asthma are due. For the latter purpose it has been used with surprising effect since the occupation of the country by the Americans.

Dr. C. A. Canfield was the first to call the attention of the medical profession to the therapeutic action of *Grindelia robusta* in cases of oak poisoning. Some twelve years since, he published in the *Pacific Medical and Surgical Journal* a short account of this plant, its botanic features, habitat and medicinal value. The author's attention being thus directed to the plant, he procured specimens and prepared various pharmaceutical compounds containing the virtues of the drug, which he says were prescribed by the medical faculty with sufficient success to warrant him in keeping a supply of the plant. It has been his practice yearly, during the months of May and June, to go into the rural districts and gather and dry in the shade from one to two tons of *Grindelia robusta.*

Since the mention made by Dr. Canfield, as above, however, a new use has been found for this variety of the *Grindelias*. Dr. Q. S. Smith published in the *Pacific Medical and Surgical Journal* for April, 1875, some notes on the efficacy of the *solid extract* of *Grindelia robusta* in several cases of asthma, etc., which had come under his observation. He reported that one patient, to whom pills made of the solid extract were administered, "had suffered from severe and frequent attacks of asthma since childhood, and found no relief from many physicians and divers remedies. He commenced taking the extract of *Grindelia* in pills of three grains each, one three times a day for two or three days, then a pill at bedtime only for eight or ten days longer. Under this mode of treatment the attacks became lighter and more remote, and during the interval between the attacks he gained in flesh and strength, and improved greatly in his general health. More than four months had elapsed without his having felt any symptoms of the approach of his old enemy, and he was then able to climb the rugged mountains of his sheep ranch and the surrounding country with an endurance, agility and speed unsurpassed by any of his neighbours. The author has tried *Grindelia* from all sections of the country, but found that the plants grown in the rolling country or so-called "foot hills" the best for pharmaceutical purposes.

The author reports that he has experimented in different ways to obtain a "fluid extract" which should fully represent the medicinal virtues of the leaves and flowering tops of the plant. The *Grindelia*, even when well dried, contains a large proportion of the sticky "balsam" before mentioned, and repeated experiments have shown the inutility of attempting to proceed with it as in the treatment of the ordinary barks, roots, leaves, etc., by grinding or comminuting in a drug mill or mortar. The method furnishing the most satisfactory results he has found to be that of macerating the carefully picked leaves and tops in a suitable vessel with strong alcohol enough poured over to not quite cover the mass, for a period of twenty-four hours, a strong cover being laid over and pressed down with appropriate weights. At the expiration of this time, the whole is transferred to a percolator with stop-cock attached, and after remaining for five or six hours, the impregnated liquid is drawn off and the residue in the percolator taken, transferred to strong bags and submitted to the action of a powerful press; the liquid from this is now mixed with that from the percolator and set aside. It is generally requisite to repeat the process with one-half the amount of menstruum, and the results being mixed together should measure one pint for every sixteen troy ounces of the drug employed. In case, however, the full measure requisite is not obtained, enough alcohol is added to supply the deficiency, and the whole rapidly filtered and transferred to well stopped bottles. A clear, thin, nice looking *fluid extract* is produced, with a pleasant odour and characteristic aromatic taste, and which can be kept a long time, with the usual precautions, without any deposit. Considerable objection has been made, however, to the strong alcohol in preparing the *fluid extract* for external as well as internal use, and a *hydro-alcoholic fluid extract*, made like the above, save the substitution of one part of water to two of alcohol, is equal in all respects to the former save in appearance, a slight turbidity being apparent when a small quantity is held to the light.

The author thinks it may be presumed that the medicinal virtues of *Grindelia robusta* reside in the sticky, viscid and resinous juice. Confirmatory evidence offers itself in the fact that the plants gathered from the lower and marshy grounds are more robust and succulent, the leaves and stalks longer and coarser in appearance, and devoid almost entirely of the "balsam" before mentioned, and these are of little efficacy in asthma and the eruption from "oak-poisoning."

Experiments made on the freshly-gathered, undried plant with various solvents, have yielded extracts in nowise differing in the therapeutic effects or physical properties from the dried plants, as above. No attempt has been made to investigate the viscid juice; but the author has no doubt that, like the "balsams" or "liquid resins," it contains various constituents, and probably a volatile oil, to which its remedial effects and strong characteristic odour and taste are to be partly attributed.

A solid extract of *Grindelia*, suitable for making pills, to be given in violent and prolonged attacks of asthma, etc., is made by taking the tops and leaves of the plants and operating upon them with a mixture of equal parts of alcohol and water, extracting the soluble elements in the same manner as described in the process for making the fluid extract, distilling off one-half the bulk in a "Procter's still," slowly evaporating the residue to the consistency of a thick syrup, adding a minute quantity of glycerine, and pouring, while yet warm, into suitable jars, when, upon cooling, it will be found to be of the consistence of an ordinary solid extract, and easy of manipulation by the dispenser.

For poison oak eruptions, the method of treatment suggested is, to mix one or two tea-spoonfuls of the fluid extract of *Grindelia* with half a tumbler of cold or tepid water, and apply freely with a sponge or cloths dipped in the mixture to the parts affected. One or two applications will often suffice for a cure; but if the disease has been of long duration, several days may elapse before entire relief is obtained. In severe cases of poisoning, cloths dipped in the solution may be bound upon the parts, and. if necessary, more of the fluid extract added, thus increasing the strength of the application. The most obstinate case of poisoning will give way to this mode of treatment, and immediately after the first application a most surprising relief is experienced.

In cases of asthma, rose cold and hay fever, ten to twenty drops of the fluid extract may be given every half hour, mixed with sweetened water or milk, until relief is obtained, when the amount and frequency of the dose can be lessened according to the measure of relief obtained.

The solid extract is made into pills of three grains each, and given three times a day, one or two of the pills being administered for each dose.

METROPOLIS GAS SUPPLY.

Dr. Letheby, the chief gas examiner appointed by the Board of Trade, has recently reported to the Metropolitan Board of Works and the Corporation of the City on the illuminating power and chemical quality of the gas supplied to London by the Chartered, the Imperial, and the South Metropolitan Gas Companies. In all there are nine testing places where the gas from the several works of these companies is tested every evening between the hours of five and ten o'clock, and the following are the average results for the quarter:—The illuminating power of the Chartered gas at Beckton has been equal to the light of 16·91 standard sperm candles; at Friendly Place, Mile End, is has been equal to 16·63 candles; and at Ladbroke Grove to 16·93 candles. That of the Imperial Company, at Carlyle Square, Chelsea, has been equal to 16·44 candles; at Camden Street, Camden Town, to 16·28; at Graham Road, Dalston, to 15·70 candles; and at Bruce Terrace, Bow, to 16·22 candles; while that of the South Metropolitan Company, at Hill Street, Peckham, has been equal to 16·25 candles. In the case of the cannel gas of the Chartered Company the illuminating power has been equal to 21·02 candles. In all cases this illuminating power is obtained by burning the gas at the rate of five cubic feet an hour from suitable burners, as prescribed by the referees appointed by the Board of Trade. On four occasions during the quarter the gas of the Chartered Company at Beckton was a little below the parliamentary standard.

As regards purity, Dr. Letheby reports that sulphuretted hydrogen was, with two exceptions, at all times absent from the gas of all the companies. The two exceptions were in the case of the gas at Beckton, when, from accidental causes, there was a trace of this impurity present. The average proportions of sulphur in the gas have been as follows:—Beckton, 12·67 grains per 100 cubic feet; Friendly Place, 10·59 grains; Ladbroke Grove, 12·99; Millbank, 17·12; Chelsea, 19·38; Camden Town, 17·91; Graham Road, 13·77; Bruce Terrace, 11·45; and Hill Street, Peckham, 21·99 grains. The proportion of this impurity has been in excess of the prescribed amount (25 grains per 100 cubic feet) on four occasions in the Imperial gas at Camden Street, and on fourteen occasions in that of the South Metropolitan gas. Dr. Letheby states that the excess of impurity in the Imperial Company was accidental. The amount of ammonia in the gas of all the companies has been constantly below the prescribed quantity of two and a half grains per 100 cubic feet of gas. In most cases it has been considerably less than one grain per 100 cubic feet.

EXTRAORDINARY REPORT BY A PUBLIC ANALYST.

The *Sheffield Daily Telegraph* for Monday, January 10, 1876, reports that Mr. A. H. Allen, borough analyst, has transmitted the following report, dated January 3rd, to the Health Committee of the Town Council of the borough of Sheffield:—

"Since the date of my last quarterly report, as your analyst of food, drink, and drugs, I have received and duly examined a total number of 36 samples. Considerable anxiety existing in the minds of some of the inhabitants as to the care and accuracy of the druggists of the town in making up physicians' prescriptions, it has been thought desirable to ascertain the state of the question by analysis. For this purpose the inspectors have presented to the druggists various prescriptions written by qualified medical men, and so arranged that each prescription should include a full dose of some rather expensive remedy capable of ready and accurate estimation in a mixture. The drugs chosen for this purpose were iodide of potassium, sulphate of quinine, and spirit of nitrous ether. The first batch of eight samples, containing but moderate doses of iodide of potassium, proved to have been correctly dispensed—at least as far as the principal ingredient was concerned. Another series of three samples, in which 120 grains of iodide of potassium were prescribed were found on analysis to contain 122, 120, and 76 grains respectively. The last sample, therefore, was made up with hardly two-thirds of the quantity of active ingredient ordered—a grave departure from the prescribed amount. Of three samples which, according to the prescription, should have contained 16 grains of sulphate of quinine, two were found to be correctly made up, while the other contained only 9½ grains, or less than two-thirds of the prescribed amount. Another batch of three samples, each of which should have contained 40 grains of sulphate of quinine, two were pretty accurately made up, while the third contained but 30 grains of the active ingredient, or three fourths of the prescribed quantity. At the same time that the medicines were delivered to the inspectors, samples of glycerine were purchased, the best qualities being asked for in each case. Of twelve samples examined only five were pure and of the standard strength of the British Pharmacopœia. Two other samples were somewhat below the official strength, containing 6 and 8·5 per cent. of water respectively, but were otherwise pure. Two others were adulterated with 11 and 12 per cent. of water, no other impurity being detected. Two were of full strength, but contained lime and some non-volatile organic impurity of indefinite nature. One sample was of full strength, but contained a small quantity of cane sugar. Three samples of citric acid have been received and found to contain a minute trace of lead. In other respects they were perfectly pure. Three prescriptions have been examined, containing a proportion of spirit of nitrous ether. The other ingredients of the mixture have prevented me from successfully ascertaining whether the prescription was correctly dispensed. Of eleven samples of pepper, received towards the termination of last quarter, and not fully examined at the date of my last report, nine were genuine, one was adulterated to a moderate extent with peaflour, and the other to a moderate extent with rice. A sample of flour, received from a private purchaser proved to be unadulterated."

The Pharmaceutical Journal.

SATURDAY, JANUARY 15, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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DISPENSERS AND PUBLIC ANALYSTS.

THE report presented to the Health Committee of the Sheffield Town Council by the Borough Analyst, and published on the preceding page, is, for the most part, of such a nature that we neither wish nor hope that it will fail to command fully as much attention and further inquiry as its author can at all desire. As regards the first result, the daily press has not been slow to avail itself of the opportunity afforded by this report of at least filling its columns with comments of a startling description. Even a paper ordinarily so sensible as the *Pall Mall Gazette* goes so far as to remark that the result of Mr. ALLEN'S investigation of the manner in which physicians' prescriptions are made up is "such as to give just ground for apprehension that druggists are not more troubled with consciences than grocers, and that the effect of the poisons retailed by the latter is often enhanced instead of removed by the adulterated antidotes dispensed by the former." After this it is not surprising to find that the "young lion" turned on to this report by the *Daily Telegraph* should favour the public with his opinion that—

> "It is a horrible and dreadful thing to think of the mother sitting up all night by the cot of her little one, and giving it, with her own tender hand, its nourishment and medicine, trusting—poor thing!—that the potent remedies will do their work, while the whole time the potion is valueless, and the chemist, to make a wretched profit of some twopence or threepence on an ounce bottle, has, with cold-blooded deliberation, sacrificed the little innocent, happy life to his own miserable greed."

Neither can we wonder that the *Morning Advertiser*, after declaring that nothing so serious in the adulteration line (*sic*) has so far been discovered as the facts lately brought to light by the borough analyst at Sheffield, should ask—

> "What, then, can we think of the morality or humanity of an educated tradesman who can deliberately falsify the intent of a medical man and retard the recovery of a fellow-creature, even if he do not hasten his death? The very notion is terrible and shocking; but it may be taken as granted that Sheffield is not the only place where such things are going on, and it is to be feared that it is generally the case."

The peculiar character of these comments is in either case only the expression of the moralizing or sensational refraction which most subjects undergo when viewed through these popular media. The question raised by Mr. ALLEN'S report, however, is one that has a severely serious aspect for that class of the community which, according to the comments above referred to, is placed in the position of the criminal. We use this term advisedly, because there is no room for reticence, and because we are unreservedly in accord with the argument urged by one of the writers that if the publican who fortifies his beer with noxious drugs offends against morality no less than against law, this is still more the case with a chemist who sophisticates his drugs or deliberately dispenses medicines without the proper proportions of the remedies ordered.

But while admitting this much we cannot do otherwise than take exception to the mode in which this question has been raised by Mr. ALLEN in his official capacity as a public analyst. The charge made in the report is virtually a charge against an entire class, not merely against the chemists of Sheffield. It has been so regarded generally by the press, both of Sheffield and of London, and for that reason it acquires a gravity much greater than it would have if confined to the particular locality it really refers to. This we consider as being especially objectionable and unjust. Moreover as regards Sheffield itself it seems unfair that such a charge should have been made public without specifying the names of the delinquents. This will be more evident on examining the details of Mr. ALLEN'S report, from which it appears that in all he sent twenty prescriptions to be dispensed; out of these he found thirteen properly prepared, four that were incorrectly prepared, and three in regard to which Mr. ALLEN was unable to ascertain whether they had been correctly dispensed.

Taking Mr. ALLEN'S statements for granted it appears to us that this is a very insufficient ground for the publication of his report and we consider that the Town Council has been premature in its action in this respect. We are glad to learn that the statement made in most of the London papers as to the decision of the Town Council not to take any proceeding against the druggists whose medicines were found wanting is incorrect. It is scarcely possible to imagine anything more calculated to make local self-government ridiculous than such a proceeding would be. If it were carried out it would be converting a measure intended for protection of the public into an engine for persecution of a class. We trust our information on this point is correct, and that in justice to those who are blameless, as well as out of regard for the responsibility resting on the body which ordered the publication of Mr. ALLEN'S report, the matter will not be left where it is.

At the meeting of the Sheffield Town Council, on Wednesday, the report came up for consideration, and after a long discussion it was adopted. We may therefore assume that adequate evidence exists for substantiating the statements made by Mr. ALLEN, and that further action will be taken. In the course of the discussion an amusing proof was furnished of the kind of estimation in which druggists are held by some, for one of the councillors declared that according to his experience "not one druggist in a hundred knew what were the component parts of iodide of potassium," and that "not many prepared their own quinine; therefore, it was no slight on these individuals but only the honest truth to say that they had dispensed stuff, the component parts of which they did not understand." This worthy councillor's experience seems to have been somewhat singular and we trust he is no more a representative of the class of town councillors than he is fit to gauge the qualifications of pharmacists as a body.

In dealing with Mr. Allen's report, the Sheffield *Daily Telegraph* points out that in the event of the case being proved, it will still remain to be ascertained where the fraud lies, whether with the druggist who actually made up the prescriptions, or with the manufacturers and dealers who supply the retailers of such articles as iodide of potassium and sulphate of quinine. Assuming the perfect accuracy of the statements in the report, either the dispensers of the mixtures found defective must have tried to take advantage of their customers or the wholesale dealers from whom they obtained their drugs have taken advantage of misplaced confidence, or inability to test the purity of such articles. How this may be, we will not attempt to conjecture; but we cordially hope that a thorough and satisfactory prosecution of the inquiry will set all questions at rest and leave the offending parties to bear the punishment they deserve. The same paper expresses some hope that the scandal may be shifted from Sheffield, and is reluctant to believe that any druggists in the town are capable of an act indicating such unspeakable moral degradation as knowingly and designedly putting into a bottle of medicine less than the prescribed quantity of the active agent upon which the efficacy of the medicine depends. It also adds that "he who in making up a medicine keeps back for profit's sake some of that which is both from a medicinal and a pecuniary point of view the most valuable thing in it, must be a sorry knave indeed—a wretch ineffably despicable. Such a man robs at the same time and by the same trick both the physician and the patient—the former of reputation, the latter of health."

No objection can be taken to these condemnatory opinions, and, as the matter stands, we should ill fulfil our duty of having a care for the interests of pharmacy if we attempted in any way to mitigate their force, or frame excuses for such acts as those referred to. At the same time, we do not at all hesitate to deprecate the growing tendency to sensationalism and notoriety seeking which marks at least the mode of procedure of certain public analysts, and is, we think, in some degree manifested in the present instance, quite independently of the real merits of the case. We should much regret to see an Act intended to afford security to the public made use of for exciting periodical panic, and we should be equally sorry to perceive any real ground furnished for the sweeping and venomous attacks that have been made upon public analysts by some of the trade journals.

FRENCH REWARDS FOR SCIENTIFIC RESEARCH.

At the public sitting of the Académie des Sciences on the 27th ult., the President, M. Fremy, made the usual annual announcements with respect to the Academy prizes. The awards are too numerous to recapitulate here, but it may be mentioned that a sum of 5000 francs from the Chaussier prize was allotted to Dr. Gubler, for his 'History of the Physiological Action and Therapeutic Effects of the Medicines included in the French Pharmacopœia,' and a sum of 2000 francs from the same fund to Messrs. Bergeron and L'Hôte for their 'Studies on Slow Poisoning by Metallic Poisons.' From the Barbier prize fund, Messrs. Robin and Hardy have been awarded an "encouragement" of the value of 1500 francs each, for their labours in respect to jaborandi.

M. Robin's experiments on jaborandi appear to have related to the physiological and therapeutic action of the drug, and to have been very numerous. He found that the saliva which flows so freely after ingestion of this drug is viscous, very alkaline, and charged with mineral salts, especially carbonates and chlorides, and that when swallowed it provokes vomiting. He reports that two cases of rheumatic gout and three of muscular rheumatism were promptly relieved by its use.

We confess that we should like to have a little more information respecting the grounds upon which the liberal "encouragement" has been awarded to M. Hardy as the "discoverer of the peculiar alkaloid of jaborandi to which he gave the name of pilocarpine." In this country it has hitherto been understood that Mr. Gerrard was the person who reduced to a certainty the very natural anticipations of chemists as to the nature of the active principle of jaborandi, by his isolation of an alkaloidal substance in sufficient quantity to allow of its being tested and proved to have the marked physiological action of the leaves; also that he was the first to obtain it as a crystalline salt—the nitrate. As M. Byasson is mentioned in M. Fremy's address as being one who was only just beaten in the race by M. Hardy, and as it happens that M. Byasson's description of his alkaloid cannot be said to apply to what is now called "pilocarpine," we feel that the history of this substance will hardly be satisfactorily understood in this country until more is known as to the time when, and the terms in which M. Hardy made his first announcement respecting it. Although tolerably well supplied with French pharmaceutical literature, the earliest published description of pilocarpine by M. Hardy we have been able to find is in a journal bearing date several weeks later than the publication of Mr. Gerrard's announcement.

INDIAN HOME MADE QUININE.

On another page is presented an abstract from a recent report by Dr. King, of Calcutta, in which there is a reference to the fresh experiment now being made by the Indian Government with respect to the manufacture of febrifugal alkaloids. Further information is supplied on the subject in a quotation by *Nature*, from a letter addressed to Dr. HOOKER, by Mr. GAMMIE, the resident manager of the Government Plantation at Darjeeling, upon whom since the appointment of Mr. C. H. WOOD to officiate as Professor of Chemistry at Calcutta the superintendence of the manufacture appears to have devolved. Mr. GAMMIE writes that it is intended to collect about ninety tons of dry bark this season, which can easily be done. The bark is being manufactured on the spot into a cheap febrifuge, which he says is "evidently quite as effectual as quinine," and to which the medical department appear to be taking kindly, having received about 600 lbs. of it during the last three months and still requiring more. About 40 or 50 lbs were being made weekly at the time of writing, and this quantity it was expected would soon be doubled. It is hoped that it will be possible to produce the febrifuge remuneratively at the rate of one rupee an ounce.

PROSECUTIONS UNDER THE PHARMARY ACT.

DURING the past week two suits against unregistered persons for selling poison have been decided in the Liverpool County Court. One case was tried by the Judge, and in the other a jury was empanelled, but in each of them a verdict for the penalty of £5 and costs was obtained. We hope to give a fuller report next week.

THE CHEMISTS' BALL.

WE would just remind those of our readers who intend to be present at the Chemists' Ball, that it is to be held at WILLIS's Rooms, King Street, St. James's, on Wednesday, next, the 19th inst. A list of the Stewards to whom application for tickets, which are limited in number, should be made will be found in an advertisement in the third page of the Advertising Sheet.

CORN SOLVENT AND THE PATENT MEDICINE STAMP.

THE *Globe* reports that on Wednesday the Manchester Stipendiary decided in a prosecution instituted by the Excise, that a corn solvent, "being an article intended for the prevention, cure, or relief of a disorder affecting the human body," is liable to stamp duty. A chemist and druggist, who had sold the "solvent" in unstamped packets, was fined £32 10*s*., being one-fourth the maximum penalty.

FIRE AT A CHEMIST AND DRUGGIST'S.

ON Tuesday last the premises of Mr. FORD, chemist and druggist, Hereford, were completely destroyed by fire. The cause is said in the *Times* to have been the ignition at the taper gas-light of the vapour from some benzoline, which was being poured from one vessel to another.

THE following papers are announced to be read at the meeting of the Chemical Society on the 20th inst.: "On Narcotine, Cotarnine, and Hydrocotarnine (part 4)," by Mr. J. H. BECKETT and Dr. WRIGHT; and "On a Method for Estimating Bismuth Volumetrically," by Mr. M. M. PATTINSON MUIR.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH, EDINBURGH.

The third scientific meeting of the session was held in the Society's Rooms, on Thursday evening, 6th January. The attendance was good.

In the absence of Mr. Gilmour, President of the Branch, from indisposition, the chair was taken by Mr. J. R. Young. After a few opening remarks the chairman introduced Mr. H. B. Baildon, who read a very interesting paper entitled, "Chemistry: Its Relation to Modern Thought," which will be found below.

Mr. Baildon's essay was well received by the audience, and at the close Mr. Tait congratulated him on his very successful effort, and after a few happy remarks, which were appreciated by the meeting, he moved a vote of thanks to Mr. Baildon for his interesting paper; Mr. Ainslie seconded, and the motion was cordially responded to.

The honorary secretary then drew the attention of the Society to the following donations to the Library:—

The 'Year-Book of Pharmacy' for 1875, from the British Pharmaceutical Conference, per Professor Attfield; The 'Canadian Pharmaceutical Journal' for December, from the Ontario College of Pharmacy; the 'Pharmacist' for December, from the Chicago College of Pharmacy; the 'Journal of the Chemical Society,' and the 'Proceedings of the Royal Society,' from John Mackay.

He had also to lay before the meeting a very important addition to the library, made by the Council in London, consisting of 15 of the latest editions of standard works. These included Roscoe 'On Spectrum Analysis'; Scoresby-Jackson's 'Materia Medica'; Attfield's 'Chemistry'; Ganot's 'Physics'; Squire's 'Companion to the Pharmacopœia'; Parke's 'Manual of Practical Hygiène'; Carpenter 'On the Microscope'; Bristow's 'Mineralogy'; Goodeve's 'Elements of Mechanism'; Grieb's 'German and English Dictionary'; Spiers' 'French and English Dictionary'; Smith's 'Latin and English Dictionary'; Macadam's 'Practical Chemistry.'

In addition to these a number of accumulated serial works had been bound so as to be available for use, and these included 5 volumes of the 'Transactions of the Royal Society'; 7 vols. 'Journal of the Chemical Society'; 2 vols. 'Chemist and Druggist'; 15 old and curious 'Pharmacopœias' and other medical works.

He further stated that the missing books had now been reduced to a very small number, the most important of these being Balfour's 'Class Book of Botany,' vol. 2; Chambers' 'English Literature,' vol. 1; Fresenius' 'Quantitative Analysis'; Macaulay's 'Biographies'; and Redwood's 'Supplement to the Pharmacopœias.'

The paper read was as follows:—

CHEMISTRY: ITS RELATION TO MODERN THOUGHT.

BY H. B. BAILDON, B.A. CANTAB.

I feel myself fortunate in being one of a generation of pharmacists who inherit the valuable results of those arduous labours in which our predecessors engaged themselves so victoriously, yet I cannot fail to feel also the responsibility of the new position which we, as a class and as a Society, have attained. I, therefore, am acutely conscious that it is incumbent on me and on all so situated to exert ourselves to secure and fortify the positions won for us, and if possible to extend our conquests. One of those facts which must at once strike the attention of any one reviewing the position of this Society, and more especially this branch of it, is that we are so dependent in the matter of lectures and addresses on the services of those who are not, strictly speaking, members of our guild. Undoubtedly, heretofore, thanks to generous assistance from without and the unsparing efforts of our honorary secretary, whose zeal in this as in other matters, I am sure we all delight to honour, each series of lectures has proved valuable and instructive; at the same time we must all be aware that a position so dependent is not healthful and ought not to continue. We know that we all commence life in a very dependent condition and for the first few years of our existence can do little to satisfy our own wants beyond giving audible signals of distress. But in time we learn to go alone and eventually most of us must gain means of subsistence for ourselves. It is the healthy and robust child that first rebels against being carried and prefers to walk or even creep by himself. Now, if this Society has any independent vitality, it must learn to go alone; it must say to its nursing mothers, "I don't like to be carried," and learn the use of its own limbs even at the cost of a good many tumbles. This, I know, is the view taken by veteran members of this Society and therefore this recruit takes courage to state it. So far it is plain sailing enough, and probably no one will be found to gainsay this view of the matter. The question to which every one here has a right to demand answer from me is, What have you got to say that is worthy of our attendance here, and our attention now we are here? Now let me confess at once that I have nothing new in scientific fact to communicate—I am going to speak of sciences with which many of you are more thoroughly acquainted than I am myself. I trust that at some future time I may have the skill and leisure sufficient to conduct researches which may be scientifically interesting. To night, then, I do not address you as a fellow investigator, but as what I may call an inspector and reviewer. It is a proverb that lookers-on see most of the game, and it is in the capacity of a looker-on that I shall endeavour to report what I see of the great game or work of science, in those departments, at least, with which we are concerned. Before finally launching out on the main current of our subject, it may be well to say that it appears to me a very profitable exercise for one engaged in any study or pursuit to make pause occasionally from one's individual and peculiar course, and look about on the general aspect of affairs. Any special and absorbing study, however useful in its results and generally edifying to those who pursue it, is apt, if pursued too closely and continuously, seriously to warp the mind of the investigator. It is thus that men of science from being too closely addicted to their own subject speak often insolently as well as ignorantly of other explorers. There is another danger also to be guarded against, namely, that of too much abstracting our scientific knowledge from the sphere of practical life, by which we come to live a divided existence, to hold irreconcilable creeds, and to pass into the perilous condition of a house divided against itself. That this is no imaginary evil, I think all who have carefully observed human nature in others and scrupulously examined themselves will admit. The only method of escape from these dangers is every now and then to remove oneself, as it were, to a distance from the subject of one's study, as an artist steps back from the canvas occasionally, to see the relation of the part to the whole. My aim then this evening is to consider one of those sciences which we all have studied or intend studying, from a general and catholic point of view.

As we all know there are three sciences which we must to a certain extent make ourselves acquainted with before we can be qualified to pursue our calling—be it a trade or be it a profession, and I hold it to be a good deal of both,—it certainly is the former. These are botany, materia medica, and chemistry. Botany and chemistry are strictly speaking physical sciences, that is to say they lie entirely in that domain which we call Nature and not in that of Thought or Emotion. At the same time they are alive with facts bearing significantly on the mental and moral worlds. To chemistry (to which I shall confine myself to-night) was entrusted the task of tracking matter back to its simplest forms or form. The result is remarkable so far as present knowledge goes. There are found a considerable number—over sixty—elements, which have hitherto defied all attempts to resolve them into a further simplicity and are also indestructible, passing scatheless and invulnerable through every transformation. There is no apparent tendency on their part to lose their peculiar properties or to pass one into the other; although there are a few apparently anomalous instances of change of property accompanying change of temperature, as in the case of phosphorus. While, of course, it is open to the theorist to hold that these elements are varieties of some ultimate single substance, there seems no prospect that a proof will ever offer itself. No doubt the fact that all the elements have different atomic weights, and the fact that in some case we find elements which bear a family likeness, forming a series in regard to their atomic weights, afford, as it were, a glimpse of the wondrous staircase of creation, yet, as there appears to be no means of further analysis, this theory must apparently remain a theory. Thus brought to bay, for the time at least, by this imperturbable bodyguard of Nature's secret, chemistry proceeds to take them at their word, and treat them as ultimate elements whose mutual relations are to be studied. These relations, through their indefinite variety, from the inorganic to the organic kingdom, with its ever increasing complexity, does chemistry follow up to the very verge of thought and consciousness. A marvellous and a fascinating science truly: teaching the infinity of the universe as emphatically and perhaps even more clearly than astronomy itself. In astronomy one is out of one's depth from the very outset. The lesser distances such as that of the moon from the earth are equally inconceivable with the greater, and the effect is soon lost. In chemistry we can commence with the utmost simplicity and go step by step to ever increasing complexity till imagination and memory pause, impotent to proceed. Like all sciences it is full of unanswered questions. Mature and elaborate as it is, it has not surrendered the keys to its causation. We may talk glibly enough of chemical affinities, though we can give no reason for them. We say, for example, that acids and alkalies combine by reason of their mutual affinity, but by this we merely mean that those substances have a tendency to combine with each other, a tendency which is inherent in them, and which we have chosen to call chemical affinity. But why an atom should attract one kind of atom more than another is a question to which there is no answer; to say that it has greater affinity for the one than for the other is merely another way of stating the fact.

It is possible that at some future time a further step may be made. Some relation between the form of the molecules and the amount of attraction may be discovered; but this, from all previous experience, seems certain, that practically the same question will remain unanswered, a law being found according to which these molecules attract each other but for whose existence no reason can be assigned. With regard to chemistry, then, we see that it tells us broadly, concerning matter, these facts: that there are a number of ultimate elements indestructible, irresolvable, immutable, and that these are controlled by mutual attractions, or by what we call chemical affinity. It may further be noted, the marriage of no two molecules, still less the union of a larger number, need be permanent, as there is always left out of the union some molecule which has a stronger affinity for one of the two than that to which it is united, and can thus set the other free to begin its adventures anew. Thus a complete cycle of change is provided for. This is noteworthy, as it might have seemed at first sight that if molecules united according to affinity, those with the strongest affinity would ultimately get together and change would cease. This is, as we see, provided against by the affinities not being mutually equal. It is like waltzing, the hold you have on the lady is different from that she has on you. As an illustration, suppose we take an atom of free hydrogen, this may after combustion form part of a drop of water; this water may be seized upon by some sulphuric acid. The sulphuric acid coming in contact with some chloride of sodium may give up its hydrogen to form hydrochloric acid. But the hydrogen is not safely caught yet. Add metallic zinc to the hydrochloric acid, and the hydrogen is again set free to begin its adventures anew.

Thus, while the elements themselves are indestructible, their capacity of change of association seems inexhaustible. Of course if, as the physicists say, motion must ultimately cease, so also would chemical change. Now, had this arrangement concerning chemical affinity been the invention of a human mind, it could not fail to excite admiration by its simplicity, ingenuity, and completeness; yet, according to the latest utterance of a modern leader of science, its invention is not to be attributed to a person—nay, not even to a cause. I hope, as this matter has come thus in our course, you will bear with me if I make a short excursion from what may seem the immediate subject to mention explicitly the utterance to which I have just referred—I mean, of course, Mr. Tyndall's article in the November number of the *Fortnightly Review*.

Before entering upon this I would disclaim any feeling of bitterness or rancour against Mr. Tyndall—such as is displayed in some quarters. While thinking him seriously—aye, dangerously—astray in his beliefs and his teaching, I can see no reason to attribute to him anything short of complete sincerity and disinterested desire for truth. A man doubtless well versed in many departments of science, he is not necessarily an able thinker on subjects which are really metaphysical, and, it seems to me, beyond the range of his mental vision. He commences his article by comparing theologians to "squatters," that is to say, people who take possession of and occupy land to which they can show no title. Undoubtedly science has been repressed and even persecuted in the name of religion. It was once considered necessary to orthodoxy to believe that the sun went round the earth, not because it had ever been proved to do so, but simply to believe otherwise was considered inconsistent with Scripture, or the teaching of the church. So, even now, there were those who were very angry with Mr. Darwin and others for the doctrines they promulgate; there are even those who would willingly suppress that gentleman and his works, believing them to be closely connected with a most ancient gentleman and his works. There is, I suppose, no one here who would not repudiate such bigotry and intolerance. In such a matter as the age of the world or the antiquity of man the geologist and antiquarian must be allowed a hearing. To assert *à priori* that unless the result of their researches tallies exactly with the ideas of the Hebrew writers they must be wrong, is of course to beg the question, and is equivalent to a declaration of the futility of all human inquiry. Mr. Tyndall is then right in protesting against this intolerance. He would fain, it seems, establish a rule of the road whereby he and the theologians might pass and repass without collision. What I would complain of is that he is the first to break his own rule. He is not content with his "matter" and its laws, but must needs touch upon theologic questions. Nor does he merely graze the theologic vehicle; he must, if successful at all, demolish that vehicle completely, and leave its late occupants helplessly floundering in the materialistic slough. In handling, as he does, the question of the existence of a Deity, he is not impugning any particular conclusion of the theologians, he is abolishing theology itself. There can, of course, without a Deity be no theology; and Mr. Tyndall declines to acknowledge a Deity. If theologists be squatters, what is Mr. Tyndall? There is no name for him, even in Webster.

There is so far a digression, but when we come to consider the relation of chemistry to Mr. Tyndall's ideas of matter, we find ourselves again on the main line of the subject. In "matter" he asserts that he finds the "promise and potency of all terrestrial life." Very pretty alliteration truly! Though it may seem strange that a leader of a class of men, one of whom denounced poetry as "sensuous caterwauling," should slip into a rhetorical trap. He finds in pure matter the promise of terrestrial life. What does this mean? Does it mean that there is nothing but matter in existence? If so it is contradictory to his admission of the mystery of mind, which would become the mystery of nothing, if mind did not exist. Does it mean that the material universe is material?—which is tautologic—or does it mean that matter traced back to its simplest forms gives promise of its future destiny? If the last it can flatly be denied. Matter in its simplest form consists of a number of separate elements. So long as you keep these apart from each other they exhibit peculiar and distinct properties; but take two whose single properties are known, allow them to combine, and straightway appears what is practically a new creation. The combination possesses qualities different from those of either of its constituents. Neither of these, therefore, could be said to afford the promise of what the combination would be. There is here no process of development, there is but a transformation, wonderful, sudden, complete. There is a performance certainly, and that a marvellous one, but no hint of promise or prediction. In this case Mr. Tyndall indulges in a practice which he would be the foremost to condemn in a theological writer; he takes certain facts which are acknowledged to have come to pass, and says they must have been prophesied because they have come to pass. But, further, he tells us that pure matter contains the "potency of all terrestrial life;" which is to say, we suppose, that it is capable of producing everything we know. Now our materialist distinctly acknowledges the existence of mind; he further admits that between mind and matter there is a gulf no thought can span. He therefore asserts that matter is capable of producing mind—*i.e.*, of producing that from which it is separated by an impassable gulf! This seems absurd enough. The fact is that materialism is upheld by a logical fallacy by means of which any absurd admission can be forced from one. It consists in taking up a position which can be at once freely admitted, and approaching by inconsiderable degrees towards its contrary. Suppose a person says to you that he considers himself a poor man because he has only a few hundreds a year. You may say to him, "I can prove you are a rich man. Do you consider a man with a thousand a year rich?" "Well," he says, "yes." Starting from that admission, and merely lowering the sum by small amounts you must at last force him to admit that his income is sufficient to make him a rich man, although he is not a whit more convinced of the fact than when you began. This is the plan adopted by the materialist. He takes inanimate matter, and proceeding step by step forces you from point to point till he comes to your own brain. But then the metaphysician could do just the same thing for mind. Beginning in the domain of pure thought, as the materialist begins in that of pure matter, he could make you admit that you can be cognizant only of your own sensations, and that, for all you can prove, the physical universe may have no objective existence. The sensible person believes neither of these, but leaves them to knock their respective heads together as long as they choose. He does not believe roast beef and plum-pudding to be a mere chimera of his brain, nor yet does he believe that in pure matter "lies the promise and the potency of all terrestrial existence."

It may be well here to note the significance of chemistry with regard to the doctrine of evolution. This doctrine in its broadest form means merely that as a matter of fact and cosmic history the whole of terrestrial life, whether vegetable or animal, has proceeded as it were from a single seed. It asserts it to be possible, and even holds it the only possible, that all varieties and species we now behold have been developed from a common ancestor. At first sight the theory has to our mind an intense incredibility and absurdity. Differences and disparities are so prominent, decided and immense, that to believe them the result of an original identity is extremely difficult. In studying nature, however, one must never be turned aside by mere antecedent incredibility. Many facts now completely established must have appeared incredible at first, and even now, are practically disbelieved by uncultured minds. We can easily imagine with what contemptuous incredulity the first announcement that it was not the sun that moved round the earth but the earth round the sun would be received. What for example, would seem more insane to the untutored and uninitiated mind than the announcement that the earth was supported on nothing, was suspended in empty space. In like manner the evolution theory must not be summarily dismissed because at the first blush it seems ever so unlikely. It would seem indeed that in this case the men of science had some such theory forced upon them by the facts rather than that they wantonly conceived it. For the sake of vindicating my own consistency, I would here remark that evolution by no means necessarily involves materialism. If proof is wanted I can quote Emerson, who, though certainly no materialist, believes in evolution of a kind. He says, for instance,

"A subtle chain of countless rings,
The next unto the furthest brings;
The eye reads omens where it goes,
And speaks all languages the rose;
And, striving to be man, the worm
Mounts through all the spires of form."

In another passage, though when wishing to verify it, I did not succeed in doing so, he says, so far as my memory goes, referring to the intense sympathy through which the poet becomes *en rapport* with nature—

"He hears the poor grass plot and plan
What it will do when it is man,"

thus going back even to the vegetable kingdom for the origin of man. But the point we wish to get at now is not the general question of the truth or falsehood of evolution, but the bearing that chemical science has on the doctrine. That bearing, we must recollect, can only be one of analogy. Analogies must not be despised, however, though scientific fact cannot be based on mere analogy, for they are often very valuable and significant. In order to furnish an analogy favourable to evolution matter must be resolvable into one simple ultimate element. This it certainly is not, and, as I said before, is not likely to be; indeed it is completely inconceivable that one solitary kind of matter could ever have differentiated itself and assigned to or acquired for its parts new and permanent properties. Hence the chemical analogy threatens continued hostility to the theory of evolution, so long as that theory maintains a unity of source for all life. But, again, were the evolutionists to postulate a certain number of elementary organisms, chemistry would seem to furnish a completely favourable analogy. Such seems to me to be the relative attitudes of chemical science and evolutionist speculation.

Although it is very unlikely that on a subject so long known and so well considered as the laws of chemical combination, I should find anything fresh to say, it presents too tempting a topic to be passed over in silence. What did occur to me, however, when I came to look into the wording of these laws, as it is generally given, was that it is not satisfactory. The law of combination by weight is usually enunciated in the form of four distinct laws. On examining these one finds they give not merely the result of investigation but a plan of its order. They stand thus in Fownes' 'Chemistry':—

"1. All chemical compounds are definite in their nature, the ratio of elements being constant.

"2. When any body is capable of uniting with a second in several proportions, these proportions bear a simple relation to each other.

"3. If a body, A, unite with other bodies B, C, D, the quantities of B, C, D, which unite with A, represent the relations in which they unite among themselves, in the event of union taking place.

"4. The combining quantity of a compound is the sum of the combining quantities of its components."

If it seem to you that it is presumptuous to criticize the mode of statement of these laws, it will, I think, be sufficient to remind you that unlike the three laws of motion, which may be regarded as models of simplicity, these laws are differently stated in different works (Professer Attfield, for example, improves very much on the usual practice by putting the facts in the form of two laws with a third subordinate law or corollary), and to remark that a man may be an excellent chemist and yet not hit upon the most concise and complete formula for his results. For the rest I must trust to your indulgent attention in a matter in which some, if not all, of you are so well competent to draw your own conclusions. Let us recur to these laws in Fownes' enunciation of them; and read over the first three. The first states merely a result arrived at in an early stage of chemical knowledge, viz., that chemical compounds unlike mechanical mixtures are definite and constant in their constitution. The second is meant to convey the rule of multiple-combination. The third shows the steps by which we reach the further condition that a chemical atom has a fixed weight-proportion to the atoms of all the other elements. I submit, and I trust you will agree with me, that these, taken together, do nothing more than complete the notion we have of what the law of combination by weight is. The fourth law so-called must be held as a natural corollary from the other three, as it merely declares, as might be expected, that compounds act in the same way as elements. But it will be said if the law be one, it must be capable of expression in a single sentence. I have endeavoured to express it in a single sentence, and the most satisfactory form I have found is as follows:—

"Every element has a fixed weight, relative to all the other elements, in which alone, or in multiples of which, it combines chemically with other elements."

To this I would attach a corollary to the effect that "compound bodies behave according to the same law as simple ones, their combining weights being the sum of the combining weight of their constituent elements." It is right to give this last its subordinate position, for it is but an extension without change of the principle of the law, and it is difficult, if not impossible, to conceive how the former being true, the latter could fail to be found valid also. This is an important question, the only question of technical importance which I can bring before you tonight. I, therefore, trust that some of you will give your opinion frankly on the subject.

It must seem to the truly reverent mind a species of profanity to extol or pronounce panegyric on a natural law, as though it were in need of our advocacy and our poor tribute of praise and admiration. But there are those who seem to take all the excellencies, beauties and orderliness of Nature as a matter of course, as to be demanded and expected, but in no degree to be rejoiced in or commended, however perfect; they say virtually to Nature, "when thou hast done all thou art an unprofitable servant." They view the wonders of Nature with the same imperturbable apathy with which the haughty barbarian beholds the marvels of civilized life. He is resolved not to be surprised, not to be betrayed into admiration or wonder by anything he is shown; he imagines that to do so would be to confess inferiority: if he succeeds he is aided as much by his ignorance as by his pride. In order to wonder at or admire a thing it is necessary to understand it partly, therefore the more utter his ignorance the more easily he can stifle those feelings. So it is with those who are impervious to the beauty, and order and marvellousness of Nature. They seem to be gifted with no imagination to picture to themselves a different scheme of things that might have been barren of beauty, devoid of order, and marvellous only in the horror of its discord and degradation of its chaotic darkness. Some even consider Nature a bungling dunce. John Stuart Mill denounced certain natural processes as eminently unsatisfactory, and considered that he could have devised something much superior. We may hope, however, that if plans for a new universe should be required that philosopher may have due warning, so as to give the architect the benefit of his advice.

To you who are all, I trust, of a different spirit, it will not be necessary to make exposition of such a law, as that which I have just endeavoured simply to enunciate, to convince you of its fitness and beauty. So fit and beautiful is it that it seems as though nothing else could have been the truth. It is as sublimely simple as the law of gravitation, though applying to matters much more complex, and we may believe it no less universal. Knowing, as we do, that the same chemical substances as those we have experimented with enter into the constitution of the remainder of the physical universe, we cannot avoid the conclusion that the law that works in our little test-tubes is fulfilled in the furthest constellation. Perhaps nothing is more stimulating to the confidence or self-reliance of the human intellect than a reflection such as this; and, if any be inclined to commit the philosophic solecism of confounding mind and matter, let them consider the antithesis between them that such an achievement as the discovery of a universal law reveals. So far as his material existence and mere corporeal frame are concerned man is a prisoner of the closest kind in this inconsiderable planet of an insignificant system. The heights to which we can rise above the earth's surface are infinitesimal compared with inter-planetary spaces; they are but as the leapings of a wingless insect. Without bar, or bond, or fetter, we are confined in this air-bound island without hope of escape: one only door of exit is there, and passing that we must leave our corporeal part still captive in the unrelaxing grasp of gravitation. But the mind—it is born free citizen of the universe; it has a speed mocking lightning and light, a power beside which steam and gunpowder are puny indeed. By its spell, sun, moon, and stars are brought near, are interrogated and compelled to answer, perhaps to divulge their history, to betray secrets which bygone æons had seen and kept silence. By its spell also we can behold those things which were once as much removed from our ken by their minuteness as the stars and planets by their distance. Telescope and microscope are matter too, so are our eyes and hands, the materialist may say truly enough without gainsaying; but their whole power and usefulness arise from their construction and organization, the former owing these to the knowledge, labour, and skill of man, the latter to a knowledge, labour, and skill far higher.

Yet the mind we must remember depends for its possession and acquirement of universal knowledge on what may be called moral qualities in Nature. We hear a good deal of declamation against Nature nowadays, she is between two fires, and is eloquently denounced by the Christian, and roundly rated by the atheist. The poet laureate, unfortunately, I think, says—

> "Nature red in tooth and claw
> With ravin shrieks against our creeds."

and the lines have passed from platform to platform till the author must, one would think, be as sick of the uncouth libel as he deserves to be. There is not time nor fit occasion here for any attempt to vindicate Nature against her accusers. I certainly would never expect to find the chemical elements practising the cardinal virtues or even observing the golden rule. Nor would I anticipate finding among the lower animals a practice of that mercy and justice, often so sadly a-missing amongst men. This is by the way. The point aimed at is to show how powerless the human mind would be, were it not for the fundamental virtue of Nature. Nature as revealed by science displays an inexorable consistence and incorruptible veracity. There is no magic, no jugglery anywhere to be found; a result honestly obtained in the laboratory yields a fact true for uncounted worlds. Nature plays the game fairly throughout; never recants or takes back a move; pays her losses promptly, aye generously. And the qualities she rewards are excellent too. Untiring vigilance and unexhaustible patience, incorruptible fidelity to fact joined with an unclouded cool reason, a lucid strong imagination and an absolutely fearless loyalty to truth are the virtues that win her confidence. No shrieking to be heard hereabouts then. Rather a wonderful and calm process of culture to be witnessed.

It is time we left this subject, so rife with suggestions for reflection, to consider the second great law of chemical combination, that of combination by volume. This law, while not so universal as the former, nor so well established, presents the relations between chemical atoms in a yet simpler form. It is found, as you know, that elements in a state of gas usually combine in equal volumes, or in volumes bearing a very simple relation to each other, such as two to one or three to one. It follows from this correspondence of volume that the number representing the combining weight and that representing the specific gravity of an element is generally the same. Even in compound gases this law holds. But it is ascertained that a compound gas, whatever the number of atoms of each kind that go to form it, occupies invariably two volumes. As soon, however, as we pass from the gaseous to the liquid or solid conditions of matter we find all trace of this law lost, or at least it holds good in so very few cases and is so completely violated in the majority, that it seems some entirely different principle must prevail in these regions. Still the law is none the less admirable in its supreme simplicity; and as we may regard the gaseous as the free and native state of the elements, it would be difficult to find a more beautiful example of the symmetric impulse which Nature so constantly displays. With regard to these three conditions of matter, the gaseous, the liquid, and the solid, as on all points involving molecular laws, we are as yet very much in the dark. This much we know, however, that the molecular forces in a gas seem repulsive, while in a liquid or solid they are more or less strongly attractive. It is, therefore, no symptom of discord, nor should it be matter of astonishment that liquids and solids fail to conform to the laws respecting relations of weight and volume which hold true for gases. We know, of course, that the motion of large bodies in space, such as the planets and stars, is controlled by the force of gravitation, which is believed to arise from the fact that every portion of matter in the universe attracts every other with a force which varies inversely as the square of the distance between them. According to this law, unless some adverse forces come into play, or matter be infinitely distributed, all matter must ultimately be assembled in one immense mass. Again, when the conduct of smaller bodies at the earth's surface is examined into, this same force of gravitation is found in operation, but practically all attractions, except that of the earth itself, as a whole, may be left out of account, as the comparative remoteness of the sun and other large bodies, and the comparative minuteness of terrestrial objects in respect to the mass of the earth, make their effect relatively insignificant. All bodies, then, near the earth's surface, may be regarded as under the control of terrestrial gravitation, a force continually dragging them towards the earth's centre. But besides this terrestrial gravitation dragging at every particle there are, in the case of liquids and solids, molecular forces often capable of resisting gravitation. For example, if I hold this piece of paper up, every particle of it is attracted downwards and the reason no particle falls is that the molecular attraction which holds it to its adjacent particles is strong enough to resist the downward force exerted by the earth. It becomes a question whether this molecular force is not the same attractive force which in another phrase we call gravitation. When we consider the expression for the force of gravitation which is $\frac{\text{Mass}}{(\text{Distance.})^2}$ we see there are two ways in which the force may be made as great as we please, either by increasing the mass or diminishing the distance. Now we know that the particles of any kind of matter in a gaseous state are further apart from each other, than in a liquid or solid form. We also know that cold and pressure are the two means we employ when we wish to reduce a gas to a liquid or solid, which of course can be done. Both these agents tend to bring the particles nearer together. Does it not, then, seem probable that when the distance between the particles becomes indefinitely decreased, as it must be, this same force will become great enough to hold the particles firmly to each other? The mutual repulsion of the particles of gases arises apparently not from any change in the direction of this force, but is purely the result of the heated state in which the matter is. In solids and liquids the attractive force is still great enough to retard and limit greatly the repulsive force which heat develops, but in a gas the particles, having no hold on each other, are freely repelled by heat. We have now come back to the point we started from, viz., the different conditions of matter which we called gaseous, liquid, and solid. Unless I have gone hopelessly wrong they are all to be accounted for by the same law of attraction which governs the motion of planets, stars, and systems. What has been said seems to give us some clue to the rationale of the diffusion of gases—a remarkable and apparently anomalous law. But, if we regard each gas as in a state of heat, i.e., of motion and that of a repulsive kind, it is by no means difficult to see why and how this diffusion should occur. Whatever be the rationale of the law it is certainly one of the most necessary of all provisions for the preservation of life in this globe, and were it suspended but for a short period, all life would be extinguished. The gases would form separate strata, the carbonic acid would extinguish all animal life which it overflowed, and the undiluted oxygen would cause the consumption of the rest.

Two topics now present themselves as equally allied to that we have just been considering, viz., the circulation of gases and the phenomena of crystallization. By the circulation of gases, I mean the alternate transmutation by means of which those gases required for the support of vegetable and animal life are in turn prepared for the support of the one by the operation of the other. Thus, as we know the vegetable world with few exceptions decomposes carbonic acid and liberates oxygen, while the animal absorbs oxygen and gives off carbonic acid; and the one is busy assimilating nitric acid and ammonia, products which the other persistently concocts. I doubt if it be possible for the human mind to conceive an arrangement more beautifully simple, or more completely adequate than this. This is one of those laws which to use Emerson's expression "come full circle," as we trust finally all will, and which, therefore, is a source of delight and hope to the mind that contemplates it.

The phenomena of crystallization present both to the eye which beholds the resultant forms in all their precise and polished symmetry, and to the mental sense which rejoices in unity and discipline a field of unmeasured delight. Every flake of snow that floats irresolutely down from the drab wintry sky or drifts with dizzying multitudes over the dim white fields is itself a miracle of crystalline beauty, more graceful and more brilliant than any galaxy of diamonds empress ever wore. The surface of ice is perforated into beautiful patterns, which betray also the secret of its expansion. How these molecules of water acquired this architectic power we cannot say, nor do we yet know the manner and method of its action. Whether the molecules are polarized, or whether molecules of different substances are of different shapes, no one can be said to know. But it matters little to the reflections the facts suggest. We may even agree verbally with Mr. Tyndall, and say the forces producing these results are inherent in the matter, not in matter generally, for matter differs in its conduct. We may say in like manner that the power of thinking is inherent in the mind, the power of loving in the soul. To my mind, the teaching of the fact of crystallisation is higher than that of any facts we have yet dealt with: it declares most distinctly the connection of purity and beauty. The tendency of the crystal is to cast out all chemical impurity. Without this tendency the majority of chemical substances could not be obtained pure. Before a substance takes upon itself its form of permanence, beauty, and lustre, it rejects as far as it can all that is foreign. If not successful at first, it will on a second attempt attain nearer to success, and will ultimately purge itself to perfect purity. Solid mechanical impurities are entangled in the structure, and indeed the presence of a solid impurity is necessary to crystallization.

It is now time I draw this heterogeneous composition to a close. I have endeavoured to point out to you, as they appeared to me, the bearings of the science of chemistry on thought, and especially modern thought. We have considered laws of great beauty, simplicity, and fitness, and we have met with facts pregnant with hope and awe-inspiring significance. We are not, I would believe, of those who fear free inquiry; we claim a higher faith than theirs, a faith that holding it wiser and more manly to wrestle with difficulties than to avoid them, is content to struggle and suffer, doubting not the final issue of the contest, and yet content for truth's sake to risk all.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fifth general meeting of this Association was held on Thursday evening, December 16th, 1875. The president, Mr. A. H. Mason, F.C.S., in the chair. The minutes of the previous meeting were read and confirmed. Mr. John Jones was unanimously elected a member. The following donations to the Library were announced:—'The Year-Book of Pharmacy' from the Executive Committee. The 'Pharmaceutical Journal,' from the Society, and the 'Canadian Pharmaceutical Journal,' from the editor. Votes of thanks to the donors were accorded.

Mr. Martin Murphy, F.C.S., stated that wishing to confirm the experiments of Dr. Thudichum, he had experimented upon a sheep's brain but had not been able to get a trace of copper.

Mr. Edward Davies, F.C.S., called attention to the announcement that indol and indigotine had been found in serum and albumen. He thought this was a great chemical discovery, and would help chemists to account for the presence of indigo in urine, which hitherto they had not been able to do.

Mr. Murphy called attention to the address of the president of the Newcastle-upon-Tyne Chemical Society, which he thought cast serious reflections upon the chemists and chemical trade of Liverpool—where it referred to discrepancies which occur between the chemists of the two towns in testing samples of soda ash. He highly deprecated the idea of high testers and low testers, and thought it was for the Association to move in the matter and endeavour to remove the evil.

Mr. Davies fully endorsed the remarks of Mr. Murphy, and said that for some years he was connected with one of the largest chemical works in the neigbourhood, and always used to report his testing of soda ash as, say, 46½ "RA" (real ash) 48 "L. S." (Liverpool Standard); he did this to relieve his conscience. When he commenced business in Liverpool he always reported the *real* ash in the sample, and the result was that the sellers did not agree with his report, and now such samples were not entrusted to him to do, but confined to a few chemists in the town who upheld the Liverpool standard.

Mr. Murphy said that the discrepancy referred to put £12,000 to £15,000 per week into the pockets of the manufacturers in this district, and that instances had been known in which it was to the exporter's advantage to bring the ash from Newcastle to Liverpool for shipment.

Mr. James T. Armstrong, F.C.S., read a paper entitled "Thoughts suggested from a Laboratory Notebook on Oils." Mr. Armstrong commenced by urging the necessity for chemists to agree upon some special methods for the examination of oils, and the selection of standard samples for comparisons as being of great commercial importance in a town like Liverpool. He dealt fully with the various tests at present in use, such as colour tests, the oilometer (which he considered of little value or in fact useless, unless very accurate, and used in conjunction with the thermometer), and hydrometer. He further alluded to the viscosity of oils as a comparative test, and gave a table showing the results of his experience upon various samples of oils. The specific gravity was also enlarged upon. Mr. Armstrong next called attention to various kinds of oils, and the common adulterants found with them, and the methods of preparing compound oils, calling especial reference to linseed oil, boiled linseed oil, rape oil, olive oil, train oil, petroleum, and mineral oils.

The paper afforded much interest to the members present, and was illustrated with numerous experiments. A lively discussion followed the reading of the paper, and a cordial vote of thanks to Mr. Armstrong was carried by acclamation.

* * *

The Twelfth Conversazione of the Liverpool Chemists' Association was held at the Royal Institution, on Thursday evening, January 6th, 1876. There was a numerous attendance, upwards of 300 being present. The museums of natural history, curiosities of nature and art, antiquities, containing collections of birds from all countries, shells, minerals, insects, and geological specimens; and the museum of the Association, containing specimens of most of the products used in medicine, animal, vegetable, and chemical, were open for promenade during the evening, and through the kindness of many eminent firms, several objects of scientific interest and novelties were exhibited and explained. Several members of the Microscopical Society of Liverpool afforded opportunities for the examination of interesting specimens of natural history, botany and chemistry, animal and vegetable circulation, diatoms, foraminifera, insect anatomy, objects by polarized light, textile fibres, pathological specimens. The spectrum of blood and chemically coloured glasses were exhibited in the microspectroscope. Several photographic novelties including the latest illustrations of keramic art, works of art in bronze and electro-plate, chemical apparatus, graphoscopes, stereoscopes, with views, specimens of toughened glass, Clamond's patent thermo-electro pile, Gray's new magnetic indicator, Geissler's tubes, etc., were exhibited. A model was exhibited by Messrs. Chance, Bros., of Birmingham, showing the plant used in the new method of rectifying sulphuric acid by a continuous process. This consists in connecting together four glass retorts, which are made so as to allow the acid to flow through them in a continuous stream The crude acid is run direct from the concentrating pans into the first retort of the series, where it undergoes a certain degree of concentration, thence it flows to the retorts succeeding, undergoing in each a further degree of concentration, till finally it flows from the last retort of the series, as fully rectified acid. The average work done by a set of four retorts is ten tons of full strength acid per week; the average consumption of coal is 3½ cwt. per ton. of rectified acid. Two men per ton (a retort man and pan man) perform the whole of the work required for 16 retorts, making 40 tons of acid per week.

At eight o'clock the chair was taken in the Lecture Theatre by the President, Mr. Alfred H. Mason, F.C.S., who, in opening the more formal part of the proceedings, spoke of the efforts of the Society on behalf of science. Essentially an educational body, it had accumulated an excellent library and museum for the use of chemical and pharmaceutical students, and he reminded the audience that some of the most brilliant chemists of the present century had commenced their career in a pharmaceutical establishment. There was, he had been told, an impression that the members of the Association met together to discuss subjects not palatable to the general public—viz., about pills, plasters, etc.; this was not correct. They did talk of medicine, but in doing so, they were benefactors, at least, to the invalid public, for they discussed the best method of putting the properties of a medicine into the best form for administration so as to render the dose as small and palatable as possible. Reference to the programme for the present session showed that papers would be read of sanitary and great chemical interest, and he thought the Association might fairly claim, at least, to be one of the pioneers of scientific study in the town.

The audience had next the pleasure of listening to a most interesting lecture by Professor Barrett, F.R.S.E., F.C.S., M.R.I.A,, on "Geysers, and Glaciers, as exhibiting Physical Properties of Water;" of which the following is the syllabus:—

The phenomena associated with the boiling of water experimentally illustrated. Water freed from air; the water hammer. The spheroidal state of water. A miniature boiler explosion. Effect of pressure on the boiling point of water. The Geysers of Iceland. Model of a Geyser in action. Extraordinary eruptive power of the Strok'r explained and exhibited. The source of heat in the Geysers. The life history of a Geyser. The freezing of water, and the phenomena of crystallization. How under the influence of radiant heat the exquisite structure of ice is revealed. Production of the so-called "ice-flowers." The formation and motion of glaciers. How ice can flow like a river. Experiments illustrating the regelation of ice. Comparison of the life history of a Glacier with that of a man. Permanence of form amidst incessant change. Conclusion.

The lecture was profusely illustrated with most successful experiments, photographs, projected by the oxy-hydrogen light, diagrams, numerous views, etc.

After an interval of half-an-hour for refreshments and promenade, Dr. Richard projected on the screen a choice collection of photographs, comprising illustrations of sculpture and architecture, views of the principal cities of Europe, and microscopic specimens of insect life. The band of the 1st Lancashire Artillery Volunteers was in attendance, and performed at intervals during the evening.

Parliamentary and Law Proceedings.

POISONING BY A VERMIN KILLER.

An inquest was held at Norwood on Thursday, January 6, by Mr. W. Carter, on the body of Sarah Jane Vinall, whose death occurred under the circumstances detailed in the following evidence.

Mrs. Sarah Ann Vinall said the deceased was her daughter. She was 17 years of age, and being out of a situation, had been staying with witness's eldest daughter. On arriving home on the previous Saturday night witness found the deceased very ill. On being asked if she had taken anything, and where she had got it from, deceased said "Baldock's." Had not found anything in writing accounting for the death.

Frederick Vinall, son of the last witness, 13 years of age, said he saw deceased on Saturday evening with a handkerchief in her hand complaining of a head-ache. She had been crying. Did not understand why she had been crying. Witness saw her take a paper from her pocket; she asked his sister for some jam; his sister gave her some in a tea-spoon. Witness then saw the deceased mix something from the paper with the jam, and afterwards go in the passage. Witness remained in the room, and did not see her take it. Before she went into the passage she dropped the paper; witness picked it up, when she took it from him and put it in the fire. Did not say in witness's hearing what it was she mixed with the jam. Did not notice any label on the paper. She came back to the room, but did not say anything as to what had become of the mixture. She then sat down in a chair and put her hand to her head, and in about a quarter of an hour she fell out of the chair. Witness was sent for a doctor. Never heard the deceased say she had taken anything.

Mr. John Henry Baldock said he was a dispensing chemist, of 3, High Street, South Norwood. Had seen the deceased since dead; knew her by sight. Witness believed she came to his shop on the previous Saturday and asked for some poison, and in answer to witness, said she wanted it to kill mice. She asked first of all for two 3*d.* packets, but took a 6*d.* packet instead, for which she paid. She came in smiling, and there was nothing singular in her appearance. Witness told her she would have to sign her name and address in a book before he could supply it. (Witness here produced the entry, which was as follows: "C. Rack, 4, Addiscombe Road, Croydon, servant.") Witness added the word "servant," knowing her to be one. The remainder was in her handwriting. No one else besides the assistant was there at the time. The powder, he believed, contained six grains of strychnine. Had no doubt the person he served was the deceased. Witness cautioned her as to the use she made of it.

Mr. Henry Walter Plant, M.B., deposed that he was assistant to Dr. Cresswell, and on Saturday was called upon to see the deceased, whom he found lying on the floor. He asked her a few questions, to which she did not reply. She was in a very excited state, her face was flushed, and she was perspiring. Her limbs were at first in a state of repose, but afterwards became convulsed. The convulsions were of a tetanic character, and there were violent contractions. At first he was able to administer an emetic, but the teeth subsequently became fixed. Witness then said he had assisted Dr. Cresswell in the *post-mortem* examination, and gave the result of that investigation. He was of opinion that death had been caused by taking strychnine.

Mrs. Vinall, re-called, said her daughter had been out of a situation eight weeks. She had not left without a character, and was seeking for another place. She was to have gone after another one on the Saturday afternoon, but did not do so. Witness did not know why she did not go. Could not account in any way for the deceased taking the poison. She had complained of pains in her head.

After a brief consultation, the jury returned a verdict that the deceased caused her own death by taking poison, but that at the time she did so she was in a state of mental derangement.

Poisoning by Chloral Hydrate.

An inquest was held at Exeter, on Tuesday, January 11, on the body of Miss Jessie Rowe, who had died on the previous day from an overdose of chloral. The deceased, a lady of about 35, was stepdaughter of Mr. W. Kendall, J.P., with whom she resided. From the statements of Mary Ann Dimond and Harriet Chamberlain, domestic servants, it appeared that for about two years the deceased had been in the habit of taking "Hunter's Solution of Chloral," in order to soothe pains in the stomach, and Dimond spoke to having often found the lady lying on the sofa and on the floor in an unconscious state. On Monday Miss Rowe was rather depressed and complained of the pain. She asked Dimond to let her have a bottle of chloral which had been bought on the Saturday. In an hour or two later Dimond noticed that the bottle was half empty. About half-past one the servant found Miss Rowe lying on the floor in her room, and thinking she was asleep she took no notice of the matter. Subsequently the servant placed a pillow under the deceased's head and covered her with a blanket. Finding at the expiration of an hour and a half or more that Miss Rowe did not wake, the servants became alarmed, and sent to the club for Mr. Kendall, who at once ordered a medical man to be fetched. Dr. Perkins said that Miss Rowe had been dead more than an hour. Search was made for the bottle of chloral, but it could not be found. On the mantel-shelf there was a wine glass half full of a liquid, which Dr. Perkins ascertained to be water, containing 25 grains of chloral. There were several empty chloral bottles. The directions on the label stated that from half to a whole teaspoonful might be taken by an adult. This being an indefinite quantity, he had written to the makers asking the strength of the solution, and had received a telegraphic reply to the effect that each drachm contained 25 grains of chloral. A full bottle would, therefore, contain 300 grains. The witness estimated that deceased probably consumed in two hours 125 grains, from 15 to 25 grains being a sufficient dose. As much as 51 grains had been taken at a time, but it took several doctors four hours to bring the patient to consciousness. The immediate causes of death in this case were congestion of the lungs and apoplexy, which might be induced by an overdose of chloral. Dr. Perkins said so highly dangerous a drug ought never to be taken unless under the directions of a medical man. Some of the jury thought that its sale should be placed under the same restrictions as poisons. Verdict, "Death from an accidental overdose of chloral." —*Times.*

Alleged Poisonous Sweets.

On Tuesday, January 11, Phillip Tunesi, a confectioner, of Church Place, Old Town, Clapham, appeared at the Wandsworth Police Court, before Mr. Bridge, to answer an adjourned summons for selling certain sweets which were mixed or coloured with chromate of lead. On the last occasion the magistrate, not being satisfied with the analyst's certificate, adjourned the summons for his attendance.

Dr. Muter now attended and said he could not say that the quantity of chromate of lead present would kill.

Mr. Bridge said the question was whether the ingredient mixed with the sweets was injurious to health.

Dr. Muter replied that it was.

The Defendant said on the inspector calling he took the remainder of the sweets (French pears) out of the window. He was not aware they were injurious to health.

Mr. Bridge pointed out to him that he was liable even if he did not know the sweets were injurious to health, unless he took a written warranty. The only way to protect himself was to obtain a written warranty. He had no doubt the ingredient mixed with the sweets was injurious to the health of children, but as it was the first offence he should fine him 5*s.* only and 12*s.* 6*d.* costs.

Dr. Muter asked for costs for his attendance, but Mr. Bridge refused to grant them, on the ground that the certificate was not correct. Dr. Muter said it was the first case under the new Act.—*Standard.*

Refusal to Sell Milk.

At Lambeth, C. Henderson, dairyman, St. George's Road, was summoned by the Camberwell Vestry, under the Sale of Food and Drugs Act, for refusing to sell the inspector a pint of milk. The inspector stated that he went to the defendant's premises and asked the defendant's wife for a pint of milk out of the can he pointed to, and tendered the money for it. She said, "You can't have it out of that; its last night's milk." She then took the can away, and refused to answer any questions. Her husband then appeared, and witness again asked for milk out of the can, and tendered the money. Her husband said it was country milk, and he could not warrant it.

The defendant said the inspector asked for new milk, and he offered to sell him a pint out of the other can; but the inspector denied that he had asked for new milk.

Mr. Ellison said the object of the inspector was to have the milk tested, and by refusing to serve him out of the particular can the defendant was liable. It was an important provision, and, if not carried out, the new Act would be completely defeated. He fined the defendant forty shillings and costs.—*Sanitary Record.*

Obituary.

Notice has been received of the death of the following:—

On the 29th of November, 1875, Mr. Robert S. Goodchild, Chemist and Druggist, of Well Street, Hackney. Aged 32 years.

On the 1st of December, 1875, Mr. Charles Porter, Chemist and Druggist, of Statham, Norfolk. Aged 67 years.

On the 2nd of December, 1875, Mr. Charles Arnold Davies, Chemist and Druggist, of Devizes. Aged 26 years.

On the 8th of December, 1875, Mr. George Munro, Chemist and Druggist, of Lochee, Dundee. Aged 31 years.

On the 16th of December, 1875, Mr. Edward Hart, Chemist and Druggist, of Kegworth, Leicestershire. Aged 30 years.

On the 25th of December, 1875, Mr. George Seaton, Pharmaceutical Chemist, of Chelmsford. Aged 51 years. Mr. Seaton had been a Member of the Pharmaceutical Society since 1849.

On the 28th of December, 1875, Mr. Thomas Young, Chemist and Druggist, of Ryde, Isle of Wight. Aged 58 years.

On the 31st of December, 1875, Mr. Edwin Timms, Chemist and Druggist, of Worcester. Aged 46 years.

On the 2nd of January, 1876, Mr. Charles Felthouse, Chemist and Druggist, of Tamworth. Aged 43 years. Mr. Felthouse had been a Member of the Pharmaceutical Society since 1869.

On the 3rd of January, 1876, Mr. William Procter, Pharmaceutical Chemist, of Settle, Yorkshire. Aged 64 years. Mr. Procter was a Founder of the Pharmaceutical Society.

On the 7th of January, 1876, Mr. Robert Clay, Pharmaceutical Chemist, of Liverpool. Aged 84 years. Mr. Clay was one of the Founders of the Pharmaceutical Society.

On the 7th of January, 1876, Mr. Roger Swire, Pharmaceutical Chemist, of 36, Edgware Road, W., where he had carried on business upwards of forty years. Mr. Swire was one of the Founders of the Pharmaceutical Society. Aged 76 years.

On the 9th of January, 1876, Mr. Richard Gamble, Pharmaceutical Chemist, of Grantham. Aged 55 years. Mr. Gamble had been a Member of the Pharmaceutical Society since 1842.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Relations between Medical Practitioners and Pharmaceutists.

Nearly forty years' practical experience, and that, too, of a very diversified character—at one time in the ordinary family business of a country town, at another time dispensing for a country practitioner, then engaged in one of the largest private dispensing establishments in the metropolis, afterwards principal dispenser at one of the largest London hospitals, and now carrying on an old established country dispensing trade—have given me more than an average opportunity of forming an opinion upon this important subject.

I may say then at the very commencement of my letter, that I dissent from most of the deductions contained in Dr. Totherick's paper, read before the Wolverhampton Society, and published in the Journal of December 25.

The doctor admits that chemists have cause for complaint; that medical men dispense medicines; but the reasons he assigns for their doing so are, in my opinion, preposterously absurd. Of course it is perfectly clear that in places where there are no chemists no grievance can be made of a doctor dispensing his own medicines; this seems about as clear as anything the paper contains. But when he goes on to excuse the practitioner in town because the public prefer their medicine being compounded by the medical man, he asserts that which is contrary to all experience. The fact is, medical men are, as a rule, very bad dispensers; it has scarcely ever been my lot to meet with one who could dispense well. And more than this, their time being pretty fully occupied, their wives, daughters, or almost any member of the household have their services called into requisition. In large practices of course a properly qualified dispenser is kept, the preference generally being given to those who have learned the business of chemist and druggist.

So far from the public being in favour of their medicine coming direct from the prescriber, I venture to say it would be rather the contrary; certainly I have never seen the experiment tried where either patient or prescriber complained of the alteration on the grounds of want of confidence. The solution of the question "How then can the doctor secure his just remuneration, the druggist obtain the reward he labours for, and the advantage of the patient at the same time be secured?" rests with the doctor alone. When "the members of the medical profession are really tired of making up their own medicine," they may, perhaps, be induced to be satisfied with their charge for visiting and prescribing, allowing the chemists the chance of profiting by the supply of the medicine. This will put the stop to counter prescribing sooner than any arbitrary measures that could be devised.

I have nothing to say in favour of counter prescribing, and of the sort mentioned by the doctor, happily, I know nothing. How much regard the doctor can expect from the chemist, however, in this matter may be judged from what I am about to state from my own experience. Years gone by, on first commencing business here, a gentleman wished me to prescribe for him, instead of doing which I recommended him to one of our physicians, fully expecting that I should get the prescription to make up; instead of which the gentleman called upon me some days after and said he could not bring the prescription as the doctor had sent his servant to a chemist's and had it made up, and told him the prescription was there when he wanted more. A gentleman staying in the town for a short time, brought me his prescription several times to be made up, but not getting on satisfactorily, and the prescriber being a good distance off, he asked me to alter it or give him something different. As money was evidently not a matter of consideration, I advised his consulting one of our medical men, giving him a note from myself and enclosing the prescription. The doctor took care of the patient—I lost my chance by over courtesy. One of my regular customers called upon me saying his wife was dangerously ill, but the doctor being out it would be late before he could see her. I was not to close very early as it would be late before he could bring the prescription. After waiting until nearly midnight we retired to rest. Our customer called next day to say he could not bring me the prescription as the doctor had taken it to a chemist's to be made, and, of course, it was continued to be made up there. I could mention similar instances without number, and the same sort of thing has existed, more or less, in almost every place in which I have lived. There is no excuse on the grounds of protecting the public interests; for, without saying anything for myself, I affirm with confidence that the great majority of chemists here are better able to discharge the duties required, than those so unfairly patronized, and this is so commonly the rule that the reason must be sought for elsewhere.

As to the sale of patent medicines, if the laws respecting them require to be made more stringent, this may be a matter for legislation, but the public will never submit to their prohibition to please any monopolizing spirit the medical profession may choose to exhibit; and so far from its being the ignorant portion of the community who alone are the purchasers of these articles, our customers for them are amongst the clergy, magistracy, nobility, and commercials. A man tells me that he suffered from a bad leg for months, could get no rest; after a consultation of three leading surgeons it was decided to remove the limb. A friend brings him some ointment, applies a portion to the wound, and for the first night for many days he gets sleep, and the further use of this remedy alone quite restores the leg. He, whether rightly or wrongly, proclaims this woderful cure to every one he sees suffering, and if they come to my shop for the article, could I, in the face of this, try to persuade them against purchasing? The man just mentioned is in good position in society, and is far from being ignorant or illiterate.

Besides members of the medical profession have done a great deal to help the sale of proprietary articles, and these, too, not (as the lecturer said) men who have never been acknowledged by the profession, but men holding the most well-known names and highest positions.

Speaking of gulling the public, what are we to think of what I should call inferior articles, an instance of which I could make, being pushed upon the public by medical recommendation at more than four times its value? And all sorts of absurd mixtures of the same article brought out under the like weighty patronage. If you look in the grocer's windows you will see quinine wine, infant's food, baking powder, all puffed off with medical testimonials, and then forsooth we are to enlighten the public as to the folly of buying these advertized articles—well, where we ought to speak we have and should again.

We well know that in the matter of profit it would pay us much better to sell the preparations of the British Pharmacopœia. But if we do not supply what is asked for, the booksellers will, and it is not to our interest to drive the trade in that direction, it is too much in their hands already.

One who has known the Drug Trade more than Thirty Years.

The Title of Pharmaceutical Chemist.

Sir,—Mr. Whitfield appears to take a certain amount of pride in owning the title of Pharmaceutical Chemist. I, however, take not the slightest; for in my opinion, not one customer in fifty knows the real meaning of the title and the one who does know, would not, as a general rule, put himself out of the way to come to Pharmaceutical Chemist, when an "A.P.S.," or an "M.P.S.G.B.," or a "Member of the Pharmaceutical Society and Conference," was the more easily got at. The public knows that all Chemists and Druggists must now be examined and pronounced capable of dispensing properly, before they are allowed to go into business, and, that being so why should they trouble themselves to go to one more than another? It is the same with medical men. Who asks whether the qualification be English, Scotch, or Irish? The question always is "Who is the best doctor," as it is "Who is the best chemist?" It is the best man in each profession (and he need not of necessity be the one holding the highest certificate), who puts together the best practice or business. I must observe here that I am not running down the Major examination for I firmly believe that the extra study required to enable one to pass the Major, is repaid a hundred-fold if united to good business talents. In my own case I do not believe that a single shilling has ever come to me through parading my title of Pharmaceutical Chemist which would not equally have come to me had I been merely a "Member of the Pharmaceutical Society." Some months ago I was summoned to serve on a jury, and, as a matter of course, claimed exemption. The summons was sent from the office of our Town Clerk, and on my request being preferred and granted, he observed "It is a curious fact that none of your fellow chemists have ever claimed exemption," to which I replied, that some of them had not the right to claim it as they were not on the register of Pharmaceutical Chemists, myself being the only representative in the town. He begged me to explain what I meant, as he was under the impression that "we were all equal now." Now here is a gentlemen—a solicitor with an extensive practice—who, of most men, would be generally considered most likely to know and appreciate the value of the title, but who, on the contrary, is, (or was) totally ignorant of it, and he is merely an example of the general ignorance on the subject. So little do I care for the title that I would not lift a finger to prevent our Irish friends taking it. It may please them, but the robbery cannot hurt us. If the Society would give us a title sufficiently striking to mark the fact of our being in advance of the ordinary run of chemists and druggists, our assistants and apprentices would be stimulated into studying for it, but as far as I am concerned, our present one may go where it will, for—as a title—it is worthless.

Smith Major.

Remedy for Poisoning by Hydrocyanic Acid.

Sir,—Noting in the Journal of last week the report of a case of poisoning by hydrocyanic acid, I think it would be well to draw the attention of your readers to the only remedy I ever heard of succeeding in such cases, viz., the sudden affusion of cold water on the head. Many years ago when in my apprenticeship to my uncle he was asked by the Mayor of our town to poison some vagrant dogs that the police had taken charge of. I went with him and we poisoned two with about forty minims of Scheele's acid. The third, a rather larger dog, had a drachm, but as he cried out in a doleful way, after falling down, the policeman who was assisting took him up and threw into the river to put him out of his misery. To our surprise, after going under head first he came up a short way off and swam vigorously to the other side and ran off at a rapid pace. Some years after, my brother's son, then a lad of about seven years old, got at a bottle of almond essence and drank some two or three drachms. As he came out of the room he was met by a person carrying a jug of cold water, who noticing the strange whiteness of his face and seeing him stagger, threw the cold water into his face. He recovered rapidly and next day seemed but little the worse.

This brought the dog episode to my mind, and I tried a few experiments on dogs and cats, and found in every instance that if the cold water were used when the acid first took effect, as a sudden douche over head and neck, the animals recovered.

Perhaps, if some one with sufficient leisure and competent physiological knowledge were to take up the question it might lead to some better understanding of the action of hydrocyanic acid on the nervous centres.

I. S. L.

G. C. Druce.—(1) *Cuscuta epilinum;* (2) *Carex arenaria;* (3) Probably *Oxyacanthus tanacetifolius*, but it is impossible to say with certainty from the scrap sent.

"*Hampton.*"—We do not remember the article. The best plan would be to consult the index of the Journal referred to.

G. Burrell.—We thank you for your communication, but do not see that the evidence stated necessarily justifies the conclusion you draw. Why not have asked for a reference?

"*A Registered Apprentice.*"—Yes.

H. H. Pollard.—It is not unusual to find the *Petasiters fragrans* in flower at Christmas time in the southern countries.

G. E. S.—We thank you for your communication and will endeavour to obtain the information you ask for.

J. A. C.—Longmans, Green and Co., 4th edition, price 14*s.*

Communications, Letters, etc., have been received from Dr. Letheby, Mr. Radley, "Theta," A. J.

THE BOTANICAL SOURCE OF DAMIANA.

BY E. M. HOLMES.

Curator of the Museum of the Pharmaceutical Society.

Having lately received, through the kindness of Professor Bedford of New York, some samples of the three varieties of the new Mexican drug, Damiana, I was struck with the similarity of the San Francisco variety to the leaves of a drug which a few weeks previously had been put into my hands for examination by Messrs. Allen and Hanbury. On comparison the two proved to be identical in taste and in botanical characters. The drug was packed in an oblong chest of which the label was lost. The package formerly belonged to the late lamented Daniel Hanbury. This chest is therefore probably the one alluded to (*Pharm. Journ.*, Dec. 1875, p. 493,) by Mr. A. McIntosh of Rothesay, as having been brought over from South California, by Captain Hugo Müller of Copenhagen.

The small specimens of the San Francisco Damiana received from Professor Bedford contained no flowers. In the chest belonging to Messrs. Allen and Hanbury, however, two flowering stems were met with, the flowers of which on being dissected presented the following characters:—Flowers sessile, about a half-inch long, solitary in the axils of the leaves at the apex of the stem; bracts 2, lanceolate, concave, hairy externally, glabrous within; calyx monosepalous, with a short tube attached to the calyx, pale, obovate, unguiculate, with and 5 oblong acute teeth, hairy externally; petals 5, reddish forked veins; stamens 5, opposite the sepals, filaments subulate, flat and winged, anthers innate, 2 celled, apiculate; ovary hairy with three distinct styles longer than the stamens, stigmas toothed, placentation apparently parietal. The young state of the flower examined did not permit me to ascertain with certainty either the placentation, the character of the petals, whether erect or spreading, or their original colour.

The above characters show that the plant must certainly belong to the genus *Turnera*, of the natural order *Turneraceæ*. Neither in the herbarium of the British Museum nor in that at Kew is there a specimen exactly corresponding to the San Francisco Damiana, nor does it answer exactly to any of the species described in De Candolle's 'Prodromus,' vol. iii., p. 346—348. The species which it most nearly approaches in appearance is *Turnera microphylla*, D.C. From this species it differs in the branches being very erect and in the leaves being downy on the upper surface, those of *T. microphylla* being glabrous; the bracts also differ in shape and the plant has not the taste of Damiana. The family of *Turneraceæ* does not appear to have yet been thoroughly examined, and there are probably many species as yet unnamed, of which this kind of Damiana is probably one. Messrs. Allen and Hanbury's specimen shows that the plant is from two to three feet high, much branched, the stem being woody and suffruticose and the branches erect from a curved base, cylindrical, with a smooth reddish brown bark, the branches all being downy towards the apex. Since the leaves readily fall off, the dried stems bear some resemblance to broom tops, except in colour. The leaves are alternately arranged on the stem and are hairy on both sides, the under surface being most so. The root is nearly half an inch in diameter, yellowish white, long and tapering and unbranched, the bark of the root being remarkably soft and spongy.

Helmick's Damiana, fig. 1, p. 423, differs only in the leaves being smooth instead of hairy, and is probably only a glabrous variety of the same species of *Turnera*. It resembles the above in taste, and the leaf if held up before a strong light is seen to be veined in exactly the same manner, although in the San Francisco variety the veins do not appear quite so distinct, owing to the hairiness of the leaves. It is this fact which has probably led to the incorrect figuring of the course of the veins in fig. 2, p. 423. The number of serratures on each side of the leaf varies with its size and affords no distinctive character. The other variety of Damiana is undoubtedly a Composite plant which, by comparison with specimens in the Herbaria of Kew and the British Museum, and by the assistance kindly rendered me in those institutions, I have been enabled to decide is, without doubt, *Aplopappus discoideus*, D.C.* (the genus is now called *Haplopappus*). The leaves are readily distinguished from the other varieties of Damiana by their glaucous hue, rigid character, and their sage like taste. Both the upper and under surface of the leaf are covered with numerous resinous looking points or glands. The surface of the leaf is also rugose like that of Argel leaves. The flowerheads are mixed in considerable quantities with the leaves and thus render it easy to distinguish this drug from the foregoing kinds. These flowerheads somewhat resemble in appearance those of the common English plant *Conyza squarrosa*, both in the appearance of the phyllaries and in having no radial florets. The San Francisco Damiana is incorrectly stated on p. 423 to have a taste like sage, the taste recalling that of figs or of confection of senna rather than sage. It is the leaves of *Haplopappus discoideus* which taste like sage.

STUDIES UPON ESSENTIAL OILS.

BY G. DRAGENDORFF.

Professor in the University of Dorpat, and Honorary Member of the Pharmaceutical Society of Great Britain.

(*Continued from page* 544.)

(II). I will next proceed to describe some experiments which were made with oils prepared by myself, after they had been kept from two to two and a-half years, generally in bottles not quite filled, at the average temperature. As the same oils were used as in my first experiments, the results are directly comparable. They permit a reply to the, for our purpose, important question, Is the solubility of an essential oil changed by keeping, and in which direction does the alteration take place?

1. *Oil of Juniper.*—As has already been stated in the introduction to this memoir, 3 c.c. of 93 per cent. alcohol were requisite to obtain a clear mixture with 1 c.c. of freshly prepared oil. When the oil was again examined after two and a-half years, 1 c.c. mixed clear with 0·5 c.c. of alcohol of equal strength; with 0·8 c.c. it was turbid, and the turbidity did not entirely disappear with 10 c.c. An older oil of juniper from Zeise behaved with alcohol as follows—

Vols.	Per cent.	
0·1	97	Clear, with more turbid.
2·5	94·5	Greater part dissolved, with 5 volumes almost clear.
6	91	Greater part dissolved, with 10 volumes not quite clear.

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* De Candolle's 'Prodromus,' vol. v., p. 350.

2. *Oil of Copaiba* (Ader).—Two and a-half years previously 1 c.c. dissolved clearly in 6·5 c.c. of 95 per cent. alcohol; now the greater portion dissolved in 8 c.c. of alcohol of the same strength, but complete clearness was not attained with 10 c.c.

3. *Oil of Caraway* (*Oleum Carui*).—1 c.c. required of alcohol—

Per cent.	Fresh.	After two and a half years.
86	0·45 c.c.	0·85 c.c. (slight fluorescence); 1 c.c. quite clear; 2 c.c. a turbidity, not disappearing with 10 c.c.
85	0·6 c.c.	Not quite clear even with 10 c.c. Behaved similarly with 80, 75, and 70 p.c. alcohol.

4. *Oil of Peppermint.*—1 c.c. was formerly clear with 1·7 c.c. of 74 per cent. alcohol, now with 1·8 c.c. of 75 per cent.; but with 2 c.c. turbidity commenced, which did not again disappear, even with 10 c.c.; of 78 per cent. alcohol 1·35 c.c. was necessary for a clear mixture, but it became again turbid with 1·45 c.c. 70 per cent. alcohol did not yield clear mixture at all.

5. *Oil of Crisped Mint* required formerly 2·5 volumes of 65 per cent. and 1·6 volume of 70 per cent. alcohol for a clear mixture. Now it was no longer clearly miscible with 10 volumes of 65 per cent. alcohol; but with 1·8 c.c. of 70 per cent. alcohol it gave a clear mixture that became again turbid with more alcohol.

6. *Oil of Rosemary*, which formerly required 6 volumes of 76 per cent. alcohol, 1·4 volume of 78 per cent. alcohol and 0·8 volume of 80 per cent. alcohol, no longer gave a clear mixture with 10 volumes of either of the first two. With 1·1 volume of 80 per cent. alcohol it gave a faintly fluorescent mixture, but with 1·3 volume became again turbid.

7. *Oil of Marjoram* was formerly clearly miscible in 0·8 volume of 80 per cent. alcohol; it now (after being kept in a partially filled bottle) required 1 volume. The contents of another completely filled bottle of the same preparation required 1·3 volume to make a slightly bluish solution and 1·5 volume to become quite clear.

From these experiments it appears that the oils examined had undergone a change of such a nature during keeping that all had become somewhat less soluble in alcohol, and the greater part only gave a clear mixture with a certain quantity of alcohol. But, at the same time, may there not be a possibility that an oil by keeping becomes more soluble in alcohol? In my first memoir I had recognized the possibility of this with oil of turpentine; and also that it might be the case with the oils of sabina, citron, caraway, and cloves* did not appear to me from my former experiments entirely improbable. Unfortunately I cannot, in this review, contribute much that is new towards the clearing up of this question. I can only say that I have again examined an old sample of oil of caraway from Zeise, which was more soluble than my freshly prepared oil was; it required 1·9 volume of 77 per cent. alcohol. I must leave it to be determined by further experiments whether this diversity in regard to the solubility of oils may not be due to the presence of a small quantity of water, making them more difficultly miscible and only with certain proportions of alcohol, whilst the oils preserved in the anhydrous condition become somewhat more easily soluble. The tendency of many oils that have been kept a long time to make a clear mixture with a small quantity of alcohol, whilst they become turbid with more alcohol of the same strength, is highly noteworthy. There is produced an impression that among other things we have here to do with combinations between oil and alcohol, which are themselves clear, but insoluble in alcohol. Again, one is led to the view that a difference exists between a solution of oil in alcohol and a solution of alcohol in oil; in other words, that an oil might dissolve alcohol and yet be itself insoluble in the same alcohol. In my first memoir I have already directed attention to this phenomenon in the case of juniper and eucalyptus oils, and it has more recently again come under my notice in examining the latter oil. I regret very much that hitherto no specimen of eucalyptus oil has reached my hands so fresh that it was not rendered turbid with much alcohol. As latterly this oil has been much used for the adulteration of others, I would have been especially glad to have included it in the course of my experiments.

If it be asked whether the changes which genuine oils undergo by keeping are not sufficient to render the entire alcohol test for essential oils useless, it must be observed in the first place, in reference to the possibility of oils becoming more soluble by keeping, that such an increase of solubility of old turpentine and copaiba oils would appear to lie within narrow limits, and that consequently the sensibility of the test would not be thereby diminished. But when the oil to which turpentine oil or eucalyptus oil has been added itself becomes more readily soluble, this would in so far exercise a slight influence upon the detection of the adulteration, inasmuch that the accompanying oil, the turpentine or copaiba oil, might also become somewhat more easily soluble. In reference to the class of oils that possibly become more soluble by keeping, it should be especially remembered that there is one proportion in which every pure oil makes a clear mixture with alcohol, but that the presence of turpentine oil or copaiba oil would interfere even with this proportion, and it would then give no clear mixture, the probability seems to be the same for those oils that become less soluble by keeping. Here the alterations in most cases, moreover, are not sufficient to make the detection of copaiba oil, etc., impossible.

I have tried to overcome the above-mentioned difficulty by rectifying the oil altered through keeping by distillation with the vapour of water, and then applying the alcohol test. These experiments also were made with the oils prepared by myself, and gave the following results:—

(1) *Oil of Cloves.*—1 c.c. was with—

Alcohol.	Fresh.	After 2½ years.	Rectified.
93·5	3 c.c. clear.	Only with 0·5 c.c. clear.	Clear with 2·8 c.c. at 18 to 20° C.*
90	4·5 c.c. clear.	. . . .	Clear with 4·95 c.c. at 29° C. for a short time.

(2) *Oil of Savin.*—1 c.c. was with—

Alcohol.	Fresh.	Rectified.
85 . .	0·9 c.c. clear . .	3·7 c.c. clear.
84 . .	0·9 c.c. clear . .	4·65 c.c. clear.
82 . .	. . . .	7·1 c.c. clear.

(3) *Oil of Caraway.*—1 c.c. was clear at 21° C.

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* I found the old oil from Zeise almost equal with my fresh oil (soluble in 1·9 volume of 63 per cent. alcohol).

* Here again was found a certain dependence upon the temperature. 1 c.c. of oil was clear at—

30·5° C.	with 2·25 c.c. of 93·5 per cent. alcohol.
27·5° C.	,, 2·5 ,, ,, ,, ,,
25·0° C.	,, 2·6 ,, ,, ,, ,,
22·0° C.	,, 2·7 ,, ,, ,, ,,

with 5·3 c.c. of 86 per cent. alcohol, and with 7·5 c.c. of 85 per cent. alcohol.

(4) *Oil of Rosemary.*—1 c.c. was clear at from 19° to 21° C. with 4·1 c.c. of 84 per cent. alcohol, and with 5·6 c.c. of 82 per cent. alcohol. It was not quite clear with 10 c.c. of 80 per cent. alcohol.

It is evident from these experiments that by rectification in a current of steam the capability of forming clear mixtures with alcohol can be restored to oils, but not their original solubility.

It follows, therefore, that the alcohol test for the recognition of an adulteration with turpentine oil or copaiba oil is only trustworthy with fresh oils. But since up to the present, amongst all the fresh oils examined, not one, after forming a clear mixture with alcohol became again turbid upon the further addition of alcohol of the same strength, it might be used to indicate that the oil examined is not fresh, or that it is resinified, and in the latter case to warn against its purchase. Finally, it might indicate probably that an oil of good appearance but inferior solubility might be prepared from an oil that had become resinified.

It must be acknowledged that a means exists by which the recognition of an addition of oil of turpentine by the alcohol test can be prevented; namely, by the addition to the adulterated oil of a certain quantity of absolute alcohol. But fortunately of all the additions practised this is the most easily detected, and in such cases it is sufficient evidence that some foreign admixture has been made.

As in my former communication, I would also again here express the wish that these experiments may be followed and their value tested by others who may be able to command oils prepared by themselves. Also, that my colleagues who are occupied in the manufacture of essential oils will place at my disposal small specimens of their different preparations, together with the fullest permissible information respecting the art of preparing and keeping them.

III. How desirable it is that the pharmacist should more frequently, as formerly, himself undertake the preparation of essential oils is easily demonstrated. Any person examining, as I have, many of the oils which occur in commerce, would be surprised to find how few standard samples are to be met with. I have a collection of essential oils privately obtained from one of the most renowned manufacturers, which were evidently freshly distilled, mostly quite colourless, and of very elegant appearance. I found that the—

Oil of Cubebs did not dissolve clearly in 87 per cent. alcohol at all.

Oil of Bergamot did not dissolve clearly in 77 per cent. alcohol, and in 80 per cent. alcohol did not become perfectly clear with 7 volumes.

Oil of Peppermint first dissolved clearly in 4 volumes of 69 per cent., and 2·1 volumes of 73 per cent. alcohol; whilst a genuine Mitcham oil was soluble in 2 volumes of 70 per cent. and 1·4 volume of 78 per cent. alcohol.

Oil of Lavender was not clear with 10 volumes of 63 or 66 per cent. alcohol, and first became clear with 2·5 volumes of 69 per cent. alcohol. A commercial Mitcham oil was, on the contrary, like that prepared by myself, clear with 1·6 volume of 70 per cent., and 3·8 volumes of 66 per cent. alcohol.

Oil of Rosemary gave only a turbid mixture with ten times its volume of 80 per cent. alcohol.

With these oils, in my opinion, the adulterant was added before the distillation.

From another manufactory the *Oil of Rosemary* was not obtained quite clear with 10 volumes of 78 per cent. alcohol.

Oil of Fennel was first clear with 3·2 volumes of 85 per cent. alcohol.

Oil of Peppermint was not clear with 10 volumes of 78 per cent. alcohol.

Oil of Crisped Mint was not clear with 10 volumes of 70 per cent. alcohol.

Oil of Marjoram was not clear with 8·5 volumes of 78 per cent., and clear only with 5·5 volumes of 82·5 per cent. alcohol.

In a third consignment, the—

Oil of Crisped Mint was first clear with 8·5 volumes of 75 per cent. alcohol.

Oil of Rosemary (Italian) was not clear with 10 volumes of 84 per cent. alcohol.

Ditto (French) was not clear with 10 volumes of 78 per cent. alcohol.

Oil of Marjoram was not clear with 10 volumes of 85 per cent. alcohol.

I think these examples will be sufficient to admonish the pharmacist to caution in the purchase of essential oils.

(*To be continued.*)

STYROLATED LARD.*

BY R. ROTHER.

Benzoin, various volatile oils and also castor oil have been used with varied success in the preservation of lard and ointments. The ingenuity of pharmacists exhausted itself in the endeavour to bring benzoin by some practical means into an efficient shape to suit the purpose, as the alcoholic solution, however concentrated, was not exactly the desideratum sought. A solution of the active parts of castor oil, prepared by means of ether, was a promising form, but did not become popular because of the expense and inconvenience of the process for preparing it. The application of benzoin in alcoholic solution presented a disadvantage in that it imparted an undesirable brownish tinge to ointments otherwise white, and also that a perfect solution in the fat did not subsequently result; furthermore, that even a moderate heat would precipitate the resin as a pasty insoluble mass which hardened on cooling. In addition to these defects, benzoin did not perfectly preserve the ointments; that is, not for an unlimited period. The writer observed several years since that ointment of red oxide of mercury, although strongly benzoated, turned grey after a lapse of five or six months; especially does this occur in warm weather. Simultaneously with the discoloration a rancid odour appeared. The writer accounts for it on the basis that the benzoic acid, which in the case of benzoin is the preservative, after a time combined with the mercury and thereby became inert; the septic changes in the fat then took place, and the deoxidizing bodies thus produced subsequently reduced the mercury. Quite recently Dr. Benjamin Lillard proposed the application of balsam of peru in place of benzoin. This was certainly an advance in two directions, namely, first, a body convenient of application was pointed out, and, second, that the body did not depend upon benzoin or any other acid for its effect, since a peculiar volatile oil contained in it seems to be the preservative. The only objection to its general use is its very high price and the dark tint it conveys to ointments; nevertheless, it is evidently in every respect superior to benzoin except in cheapness, and even this objection totally vanishes in view of the fact that the expense of bringing the benzoin into an available form partly balances that.

The writer has, however, for more than a year past, abandoned the use of benzoin entirely, and employed liquid storax instead. This substance is unquestionably the best preservative of fatty substances that has ever been proposed. Its advantages are decided and numerous. Firstly, it is the cheapest; secondly, it is commercially in the best conceivable shape for its convenient use; thirdly, it imparts scarcely any colour; fourthly, it imparts a delicious fragrance, reminding of tolu; and fifthly, it preserves for an unlimited period, since its conserving action depends upon a volatile oil, and not upon an acid. A quantity of ointment of red oxide of mercury conserved with liquid storax nearly a year old, in the writer's possession, is now as bright in colour and fresh in odour as when first prepared. Lard and all other ointments requiring a preservative were found to keep equally well. Since the active principle of liquid storax seems to be the volatile oil called styrol, the writer has consequently denominated the basis of ointments prepared with liquid storax as *styrolated*; hence the designation, styrolated lard. A fragrant syrup could be prepared from liquid storax of superior quality to tolu.

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* From the Boston *Laboratory*, December, 1875.

METROPOLIS WATER SUPPLY.

The following report on the average Composition and Quality of the Metropolitan Waters in the Year 1875, has been furnished by Dr. Letheby, to the Society of Medical Officers of Health :—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon	Oxygen required by Organic Matter etc.	Nitrogen.		Hardness.	
			As Nitrates etc.	As Ammonia.	Before Boiling	After Boiling.
	Grs.	Grs.	Grs.	Grs.	Deg.	Deg.
Thames Water Cos.						
Grand Junction . .	19·78	0·084	0·146	0·002	14·5	3·8
West Middlesex . .	19·32	0·044	0·146	0·000	14·0	3·6
Southwark and Vauxhall	19·89	0·082	0·151	0·002	14·8	3·6
Chelsea	19·59	0·077	0·142	0·001	14·8	3·8
Lambeth	19·78	0·085	0·150	0·001	14·8	3·8
Other Companies.						
Kent	28·03	0·007	0·306	0·000	20·9	5·9
New River	19·06	0·030	0·147	0·000	14·5	3·4
East London . . .	20·70	0·046	0·172	0·001	15·1	3·9

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, etc., is determined by a standard solution of permanganate of potash acting for three hours, and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid —viz., in the case of all the Thames companies, except the West Middlesex.

These results are the averages of the analyses of the samples of water taken monthly from the mains of the several companies during the year, and they show that the total proportions of solid matter dissolved in the water have been as follows—namely, 19·67 grains per gallon of the Thames supply, 19·06 grains of the New River supply, 20·7 grains of the East London supply, which is chiefly from the Lea, and 28·03 grains per gallon of the Kent Company's water, which is obtained from deep wells in the chalk. The solid matter consists, in all cases, of a very large proportion (about two-thirds of the whole) of carbonate of lime, with a little carbonate of magnesia; and the other third is composed, in nearly equal parts, of sulphate of lime, common salt, and nitrate of magnesia. These substances, in the proportions in which they exist in the metropolitan supply, are of prime importance in a dietetical and sanitary point of view; for experience has shown that waters of a moderate degree of hardness, from the presence of calcareous salts, are more wholesome than those which are deficient of such substances. It is satisfactory, also, to know that the water supplied to the metropolis is remarkably free from organic pollution—the nitrogen, for example, which is present as actual or saline ammonia, does not exceed the 0·002 part of a grain per gallon of water; and in several cases, as in the Kent, the New River, and the West Middlesex Companies water, it is entirely absent. So also with regard to organic or albuminoid nitrogen, the proportion is exceedingly small—averaging, in the case of the Kent Company's water, the 0·003 of a grain per gallon; in the West Middlesex and New River Companies water, the 0·004 of a grain; in the East London water, the 0·006 of a grain; and in the rest of the companies, the 0·007 of a grain. Nitrogen, as nitrates, ranges from 0·147 of a grain per gallon of the water derived from the Thames, to 0·306 of a grain in the deep-well waters from the chalk. All these facts, together with the small proportion of alkaline chloride in the water, indicate a remarkable freedom from sewage or other organic pollution; and they fully sustain the high opinion entertained of the wholesome quality of the water supplied to London, as expressed in the reports of the scientific commission of 1850, the select committee of the House of Commons, 1867, and the Royal Commission on Water Supply in 1869, all of whom were specially appointed to investigate the quality of the water supplied to this metropolis. There is, moreover, a remarkable uniformity and constancy of the quality of the water supplied to London. Taking the last five years as an illustration of this, it will be found that the total amount of solid matter in the Thames supply has ranged from a yearly average of 17·98 grains per gallon to 19·67; in the New River water the range has been from 18·52 grains per gallon to 19·22: in the East London from 18·85 grains to 20·74; and in the Kent Company from 27·21 grains per gallon to 28·17. The same is the case with the individual constituents of the water, the most important of which show no sign of increase, but rather of decrease, in their proportions from year to year. If, therefore, in 1867 the select committee of the House of Commons were, as they reported, "satisfied that both the quantity and quality of the water supplied from the Thames is so far satisfactory that there is no ground for disturbing the arrangements made under the Act of 1852, and that any attempt to do so would end in entailing a waste of capital, and an unnecessary charge upon the owners and occupiers of property in the metropolis," there is manifestly still greater reason to be satisfied with the quality of the water at the present time, when with more refined processes of chemical analysis it is found that the water is yearly improving. This will be more evident, when the turbidity observed in the water supplied by some of the Thames companies is effectually removed by improved methods of storage and filtration.

The quantity of water daily supplied to the metropolis has ranged from 31·9 gallons per head of the population to 36·9 gallons, the average for the whole year being 33·7 gallons per head per diem. Month by month the proportions have been as follows :—

1875	Gallons per Diem.		Houses Supplied		Gallons per Head Daily.
January . . .	108,399,776	...	515,292	...	31·9
February . .	109,527,033	...	515,346	...	32·2
March . . .	109,352,343	...	516,514	...	32·2
April	113,045,907	...	517,200	...	32·8
May	121,543,736	...	517,489	...	35·3
June	127,381,916	...	518,127	...	36·9
July	122,319,088	...	519,063	...	35·5
August . . .	125,186,742	...	519,569	...	36·3
September . .	117,744,887	...	521,068	...	34·2
October . . .	117,744,907	...	521,068	...	34·2
November . .	109,998,771	...	521,336	...	31·9
December . .	111,420,340	...	521,566	...	32·3
Average .	116,138,787	...	518,606	...	33·7

About half of the water is derived from the Thames, about one-third from the New River and the Lea, and the rest from deep wells in the chalk. The largest proportion of it, amounting to about 80 per cent., is used for domestic purposes, and, considering the requirements of a household, a daily supply of 26·8 gallons per head of the population, or about 180 gallons per house, is abundantly sufficient for all domestic and sanitary purposes.

The Pharmaceutical Journal.

SATURDAY, JANUARY 22, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

DISPENSERS AND PUBLIC ANALYSTS.

The report of the discussion that took place last Wednesday, at the meeting of the Sheffield Pharmaceutical Association, published at page 588, contains some statements which we cannot omit to notice as having a very important bearing upon the report of the Borough analyst to which we called attention last week. On that occasion we did not attempt to raise any question as to the *bona fides* of Mr. Allen, and not only took for granted that he was in possession of what he considered to be reasonable grounds for complaint as regards those instances in which the prescriptions he sent out were not correctly dispensed, but also accepted the statement with which he opened his report, viz., that the inquiry had been undertaken because it was "thought desirable to ascertain" to what extent "the care and accuracy of the druggists of the town in making up physicians' prescriptions" could be relied upon. It is, therefore, with the utmost amazement that we learn from the remarks of some of the speakers at the meeting of the Sheffield Pharmaceutical Association, that there are reasons to doubt whether the inquiry undertaken by Mr. Allen was properly, or we may, indeed, say fairly conducted.

Altogether, apart from the very objectionable vagueness of the charge brought against the druggists of Sheffield, which had the effect of confounding the innocent with the guilty, and conveyed also the insinuation that the malpractices alleged to prevail in Sheffield were characteristic of the entire trade, and apart likewise from the fact that the actual facts observed by Mr. Allen were totally inconsistent with the purport and ostensible tenour of his report—inasmuch as only in four cases out of seventeen in which definite results were obtained by Mr. Allen was there any deviation from the proper quantities in the medicines dispensed—we now find from the statements made by Mr. Ward that no proper steps were taken by Mr. Allen to carry out satisfactorily the inquiry he undertook. The essential condition of such an inquiry would be having the test prescriptions dispensed by those druggists who were in the habit of dispensing physicians' prescriptions. But, as we gather from the report above referred to, this essential condition was disregarded, and it is declared to be a positive fact that at least two-thirds of those to whom the prescriptions were sent to be dispensed were wholly unfitted for this work, since they were for the most part tradesmen who did not see a prescription once a month, and whose business was of a nature that did not comprise the dispensing of physicians, prescriptions at all.

Truly this startling assertion is calculated to throw very grave suspicion upon the proceedings of the Sheffield Borough analyst. Its significance is so seriously compromising as to throw into the shade altogether the minor objections to which we felt bound to refer last week in speaking of this affair. We think that under so grave an imputation it is incumbent upon Mr. Allen at once to lay aside official reticence and make known what were his reasons for avoiding those Sheffield druggists whose business it is to dispense physicians' prescriptions when he was seeking to ascertain what degree of care and accuracy was exercised in the execution of such work. Any explanation he can offer or any reason he can assign for a course of proceeding so remarkably inconsistent with the avowed object of his inquiry would, we believe, be received with all due consideration by the Sheffield dispensing druggists, for there is an evident disposition to give Mr. Allen credit for meaning well and for a desire to perform his duties conscientiously. We hope, therefore, he will at once adopt some means of removing the unmerited opprobrium which has been cast upon some at least of the Sheffield druggists by his report and at the same time relieving himself from the counter charge of unfairness which has been brought against him by them.

In reference to the interpretation that has been very generally put upon Mr. Allen's report by the press, and the assumption which has been freely indulged in that it is almost impossible to get prescriptions properly dispensed, we have already pointed out that the facts alleged by Mr. Allen in his report do not in themselves afford any ground for such conclusions. But if we are correctly informed that the persons who were applied to by Mr. Allen to dispense his test prescriptions were so little accustomed to that department of the druggist's business that one of them actually sent the prescription to another shop, the inapplicability of the damaging comments of the newspapers and the impropriety of the report which gave rise to them will be still more strikingly apparent. If it is under such circumstances only that a result has been obtained, indicating that only four prescriptions out of seventeen were improperly dispensed, we venture to suggest that there is little ground in Sheffield for the "considerable anxiety existing in the minds of some of the inhabitants as to the care and accuracy of the druggists of the town in making up physicians' prescriptions."

THE CHEMISTS' BALL.

THE Chemists' Annual Ball came off last Wednesday with the success that has now become customary. Nearly three hundred persons were present. The usual toast of the occasion—"Success to the Chemists' Ball"—including the health of the very essential element of such a meeting, "The Ladies," was proposed at the supper table by the Chairman, Mr. THOMAS HYDE HILLS, and was heartily responded to.

WEIGHTS AND MEASURES.

BLUE-BOOKS are proverbially uninteresting, but in the ninth report on the proceedings and business of the Standard Weights and Measures Department of the Board of Trade, the Warden of the Standards, Mr. H. W. CHISHOLM, has furnished a decided exception. It deals with a variety of subjects, to some of which it will not be out of place to refer to here briefly.

In 1859 a statute was passed enacting that no copies of the standard weights shall be legal unless re-verified in this Department within five years, or copies of the standard measures unless re-verified within ten years. The Warden reports that there are seventy-two places in the United Kingdom that have not complied with the law. But the improvement that has taken place in this respect is partly shown by the fact that the number of verifications and re-verifications of local standards since the passing of this statute has already considerably exceeded the number during the thirty-five next previous years, being 37,184 to 30,256. Evidently there has also been a considerable improvement in the state of the local standards delivered for verification, the rejections for bad workmanship or as requiring readjustment having fallen from 20 per cent. in the year 1873 to 11 per cent. in 1875.

Besides the ordinary verification work, the Department has been engaged in verifying new sets of standard weights and measures for the Dominion of Canada, in anticipation of an Act which came into force there last July. The multiples of the avoirdupois pound in Canada differ from our septimal scale, being on a decimal scale of 1, 2, 3, 4, 5, 10, etc., up to 50 lbs., and the decimal parts of the lb. avoirdupois are used. The imperial gallon of 277·274 cubic inches has been introduced there in the place of the wine gallon of 231 cubic inches, the relation of the two being as 1 to 0·83, and the imperial bushel of eight imperial gallons replaces the old Winchester bushel, being an increase of capacity of about 3 per cent. The metric system has been permissive in Canada since 1871, but it does not appear to have been adopted there except by some writers on science.

The nicety of some of the operations undertaken by the Department of the Warden of the Standards may be estimated by what has taken place with respect to the verification of a platinum standard kilogram for the Russian Government. This standard was compared with the English standard kilogram in 1874, and its difference noted. In consequence of the result of a subsequent weighing in Berlin it was thought advisable to have it re-tested in England. It then appeared that meanwhile the Russian standard had lost weight. But before coming to this decision the English standard kilogram itself was tested by an elaborate series of weighings, which showed it was practically unchanged after a lapse of twenty-nine years, the utmost possible loss of weight during that period having been 0·3 milligram, or 3 parts out of 10,000,000! The loss from the Russian standard (0·418 milligram) was accounted for from its having been rubbed during its travels by the Swedish paper in which it was not encased so carefully as it should have been. Incidentally the whole question of the variability of platinum weights was opened up, and the Warden states that so far as present experience extends standard weights of platinum, except where defectively constructed, have been found to be unaltered in weight from ordinary atmospheric influences. But pure platinum is too soft to withstand friction, and this defect is now being avoided by combining with it about 10 per cent. of iridium, the alloyed metal thus produced being as hard as steel.

Discordances sometimes occur in the results of the comparisons on different days of the larger standard measures by weighing their contents of distilled water, which are partly attributable to the difficulty of obtaining distilled water of uniform purity and density. This has led to the construction of a still in the office. The water is twice distilled after previously adding lime to it, and this yields water so pure that no ponderable residue was left after the evaporation of half a gallon in a platinum bowl.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

THE next meeting of the above association will be held at 17, Bloomsbury Square, on Thursday evening, January 27, at eight o'clock, when Mr. ARTHUR HUNT will read a paper entitled "Notes upon the Properties and Uses of Magnoliaceæ, Sarraceniaceæ, and some allied orders."

REBUILDING OF THE PARIS SCHOOL OF PHARMACY.

PREVIOUS to the dissolution of the National Assembly, the subject of the rebuilding of the Paris School of Pharmacy was once more raised by a demand for a credit of three million francs for the purpose. A first vote of three millions was made and the works are to proceed immediately in the grounds of the Luxembourg.

SALICYLATE OF IRON.

AT the sitting of the French Academy of Sciences on the 3rd inst. a paper was received from M. DECLAT relative to the employment of salicylate of iron to replace perchloride of iron in medicine and surgery. The note was entrusted to M. BOUILLARD to examine and report upon.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

Two hundred and thirty candidates presented them-lves for examination, of whom one hundred and six iled.

The following one hundred and twenty-four passed, id have been duly registered as Apprentices or Stu-ents:— (Arranged alpabetically).

Adam, Frederick	Birmingham.
Atkinson, John Robert	Adwick le Street.
Baines, Francis	Corsham.
Barlow, Arthur	Hull.
Barnes, Thomas	Preston.
Betts, Charles Ernest Oscar	Woodbridge.
Blagg, Arthur Frederick	Kilburn.
Boatwright, Henry Samuel	Godmersham.
Bobby, Charles William	Brixton.
Brown, Francis Arthur	Liverpool.
Bull, Ezra John	Cambridge.
Calder, James	Inverness.
Carver, Frederick Llewellyn	Cambridge.
Cheal, Harry Alexander	London.
Cholerton, Alfred Foster	Leicester.
Clarke, Henry	Whitehaven.
Clayton, William Kitson	Wakefield.
Coates, Tom Abbey	Hutton.
Cockcroft, John William	East Retford.
Cowap, Samuel Evan	London.
David, Martin Sinclair	Laugharne.
Davies, John Fred	Hay.
Dews, Arthur	Ossett.
Dickinson, John George	Lancaster.
Dunn, George Stewart	Landport.
Downes, Joseph Oliver	Croydon.
Earp, Richard Thomas	Melbourne, nr. Derby.
Evans, John Thomas	Bala.
Exley, George Stephen	Legbourne.
Farnham, William Frederick	Ipswich.
Farrar, George	Ossett.
Faulkner, Henry William	Newport, Mon.
Faulkner, Richard Henry	Newport, Mon.
Fletcher, John Joseph K.	Bedford.
Forrest, Ernest William	Northolme.
Foulston, George Robert	Hull.
Fraser, Alexander	Edinburgh.
Gardner, Valentine Frederick	Ty-derwen.
Gower, Edward Thomas	Tonbridge.
Grant, Thomas McKay	Edinburgh.
Greaves, Harry	Wakefield.
Harrison, Wm. Salisbury, jun.,	Sunderland.
Harwood, George	Folkestone.
Hill, John	Alford.
Hinde, Frederick	Pailton.
Hogg, Robert William	Gateshead.
Hughes, David	Holywell.
Hughes, John Evans	Pwllheli.
Hughes, Thomas Llewellyn	Llandovery.
Humphreys, William Carr	Bromsgrove.
Huskinson, Clarence John	Nottingham.
Jackson, William Moses	Ayr.
Jenkins, Thomas	London.
Jenner, William Edward	Sandgate.
Jennings, Francis Rice	Falmouth.
Jones, John Kinsey	Llanidloes.
Jones, William Harris	Abergavenny.
Kelly, Hugh	Kilmarnock.
Kennerley, Arthur Edward	Congleton.
Kennett, Edward C.	Sandgate.
Kidd, James Cassie	Macduff.
Lambert, Charles Ernest	Old Elvet.
Lloyd, Walter	Carmarthen.
Lyon, Alexander	Aberdeen.
McCrae, Samuel	Aberdeen.
McLanachan, John	Chesterfield.
Mair, William Low	Leslie.
Mason, George Henry	Levenshulme.
Medd, William	Gloucester.
Melville, William	Langholm.
Mendus, William	Cardigan.
Miller, William Henry	Howden.
Monk, Frederick Albert	Alton.
Murray, John Edward Dodd	Hawick.
Norris, Oliver	Wakefield.
North, Samuel James	Great Grimsby.
Ogilvie, George S.	Brighton.
Ogilvie, William Ogilvie	Arbroath.
Owen, Alfred Ernest	Newcastle-on-Tyne.
Parker, William	Sessay.
Payne, William Henry	Pensnett.
Pickering, Wade	Crowle.
Powell, Saml. John	Swansea.
Ray, Frederick James	Maidstone.
Richardson, Frederick William	Hull.
Ridley, Thomas	Brampton.
Roberts, William Pritchard	Bangor.
Rouw, Theodore John	Ruthin.
Saunders, James Ambler	Oswestry.
Selleck, William Robert	Bovey Tracey.
Semple, William	Dumbarton.
Shaw, Herbert	Grantham.
Sime, Thomas	Edinburgh.
Simnett, Thomas	Wandsworth.
Simpson, Alexander	Huntly.
Simpson, William	London.
Smith, Benjamin Mortiboy	Stafford.
Smith, John	Barmby Moor.
Smith, John	Liverpool.
Smith, Robert North	Barnsley.
Steele, Arthur Martin	Edinburgh.
Stephens, Walter	Stone.
Stevens, George	Cannock.
Street, Herbert	Lincoln.
Sugden, Ebenezer	Birmingham.
Swadling, Arthur Samuel	Reading.
Taylor, Edward	Tonbridge.
Thompson, John Robert	Bakewell.
Tickler, Robert Shaw	Epworth.
Toole, John	Hulme.
Turner, Arthur	Aylesbury.
Udale, Septimus	Hornsey Rise.
Warner, Matthew Richard	Shrewsbury.
Waters, George	Alnwick.
Watson, Harry Oswald	Leeds.
Weddle, William	Gateshead.
Wells, William George	Maidstone.
Williams, John	Carnarvon.
Williams, Nathanael	Ranceby.
Williamson, William Parker	Wakefield.
Wookey, Edgar	Bristol.
Wooldridge, C. Caplen	Southampton.
Wright, John Leonard	Liverpool.
Wright, Joseph Newton	Newport, Salop.

The questions for examination were as follows:—

Time allowed: Three Hours.

LATIN.

1. Translate into English:—Caesari quum id nuntiatum esset, eos per provinciam nostram iter facere conari, maturat ab urbe proficisci; et quam maximis potest itineribus in Galliam ulteriorem contendit, et ad Genevam pervenit. Provinciae toti quam maximum potest militum numerum imperat (erat omnino in Galliâ ulteriore legio una): pontem, qui erat ad Genevam, jubet rescindi. Ubi de ejus adventu Helvetii certiores facti sunt, legatos ad eum mittunt.

2. Parse fully *toti, pontem, certiores, iter, urbe, maximis, ulteriorem;* and in the case of adjectives show the concord with the noun

3. Give the principal parts (present, perfect, infinitive, and supine) of *facere, contendit, pervenit, potest, jubet, mittunt, conari.*

4. Write the Latin numerals (cardinal and ordinal) from one to ten.

ARITHMETIC.

5. Define the terms *metre, decimetre, kilometre,* and give a nearly as you can their English equivalents. Convert 3 cwt. into grammes.

6. Divide fifty-six millions eight hundred and fifty-four thousand three hundred and twenty-seven, by seven thousand three hundred and twenty-three.

7. Multiply $3\frac{3}{20}$ by $15\frac{5}{7}$. Divide $\frac{2}{3\frac{2}{4}}$ by $\frac{2\frac{3}{4}}{3}$

8. Reduce ·0675 and $\cdot 067\dot{5}$ to equivalent vulgar fractions.

9. Find the value of ·375 of £5·375.

ENGLISH.

10. What is the general rule for forming the plural of English nouns? Give the plural of *folly, half, echo, tooth, ox, die, appendix, sheep, fungus, phenomenon.*

11. How are the comparative and superlative degrees of adjectives formed from the positive? Compare *bad, lively, beautiful, wide, old, fore.*

12. Parse the following lines:—

> "Honour and shame from no condition rise,
> Act well your part, there all the honour lies."

13. Write a short account of the reign of some English sovereign.

The following is a list of the Centres at which the examination was held, showing the number of Candidates examined at each Centre, and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	5	3	2	Leamington	1	0	1
Aberystwith	2	2	0	Leeds	15	8	7
Birmingham	13	6	7	Leicester	2	2	0
Boston	5	3	2	Lincoln	6	2	4
Brighton	2	1	1	Liverpool	8	4	4
Bristol	2	2	0	London	28	14	14
Cambridge	2	2	0	Manchester	13	3	10
Canterbury	7	6	1	Newcastle-on-Tyne	10	6	4
Cardiff	4	3	1	Northampton	1	1	0
Cardigan	1	1	0	Norwich	3	0	3
Carlisle	4	3	1	Nottingham	4	1	3
Carmarthen	1	1	0	Oxford	3	0	3
Carnarvon	2	2	0	Portsmouth	1	1	0
Cheltenham	1	1	0	Preston	4	2	2
Chester	3	1	2	Reading	1	1	0
Colchester	4	2	2	Salisbury	2	0	2
Darlington	2	0	2	Sheffield	5	2	3
Doncaster	6	5	1	Shrewsbury	4	3	1
Dumfries	1	0	1	Southampton	1	1	0
Dundee	1	1	0	Stafford	1	1	0
Edinburgh	13	8	5	Swansea	7	2	5
Exeter	1	1	0	Taunton	2	0	2
Glasgow	4	3	1	Truro	2	1	1
Hereford	3	2	1	Worcester	2	1	1
Hull	9	6	3	York	4	2	2
Inverness	1	1	0				
Jersey	1	0	1				

BENEVOLENT FUND.

Subscriptions Received during November and December, 1875.

	£	s.	d.
Amoore, Herbert, 4, Lansdowne Crescent, Bournemouth	1	1	0
Beard, James, 5 Great Ancoats Street, Manchester	1	1	0
Cull, Joseph, 105, London Wall, E.C.	0	10	6
David, S. S., Laugharne, St. Clears	0	5	0
Evans, A. E., The Market Place, Brynmawr	0	5	0
Frith, J. B., Great Coggeshall, Essex	0	10	6
Guyer, J. B., 11, Strand, Torquay	0	10	0
Handford, E., Torrington, Devon	0	5	0
Hutchins, H. C., Market Hill, Framlingham	1	1	0
Johnstone, Walter, Cromarty	0	4	0
Keyworth, Geo. A., Hadley House, Hastings	0	10	0
Macnaught, William, Greenock	0	4	0
Maughan, Samuel, Binbrook	0	10	0
Rickwood, H., 1, Kingsmead Square, Bath	1	1	6
Strawson, G. F., 99, Woodstock Road, Finsbury Park	0	10	6
Taylor, Charles, 10, Cleveland Square, Liverpool	0	10	0

Donations.

	£	s.	d.
Rickwood, H., 1, Kingsmead Square, Bath	2	2	0
Taplin, Joseph, 13, Corn Street, Bristol	5	5	0

Legacy.

	£	s.	d.
The Executors of the late Barrington Garnham, of Brighton	50	0	0

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL ASSOCIATION.

THE SHEFFIELD CHEMISTS AND DRUGGISTS AND THE BOROUGH ANALYST.

The annual meeting of the members of the Sheffield Pharmaceutical and Chemical Association was held in the rooms, at the Music Hall, Surrey Street, on Wednesday evening, January 12, when there was a large attendance of members owing to an anticipated discussion on the report issued to the Health Committee by Mr. Allen, the borough analyst, as to the way in which the local druggists had compounded certain physicians' prescriptions. Mr. Maleham presided.

At the opening of the meeting Mr. J. H. D. Jenkinson, the secretary, read the report, which showed that twelve new members and three associates had been added to the Association. An increased number of subscriptions had placed the society on a firmer basis. Several convictions under the Pharmacy Act had been obtained during the year, and several cases of infringement contrary to the provisions of the Act were now under consideration, and would be proceeded with. Some notorious cases had occurred of infant poisoning by cordial, and the borough coroner had offered to co-operate with the Association to put a stop to the sale of poisons by unlicensed persons. The balance-sheet, after all expenses had been paid, showed a gain on the year's working of £6 19*s.* 11*d.*

Mr. Jervis was elected president of the association for the ensuing year, and took the chair forthwith. Messrs. Ellinor and Hudson were appointed vice-presidents, and Mr. Radley treasurer. The secretary having been re-appointed, the meeting was made special, to take into consideration the recent report prepared by the Borough Analyst to the Health Committee.

The Chairman, in introducing the subject, said he trusted that recent events would show to the chemists generally how necessary it was that they should join an association to prevent a most honourable and respectable calling from being abused and dishonoured in the manner they had lately seen. The vague report prepared by Mr. Allen as to the compounding of prescriptions by Sheffield chemists caused a feeling of discomfort which only time and energetic measures could dispel. The mistake had been not in making specific charges, and thereby giving persons an opportunity of defending themselves, and of allowing the public to form an unbiassed opinion, but in making a sweeping, general charge against the trade. It rested with the Association to take what steps it thought fit, and he trusted they would give the matter their serious attention in order to prevent in future such a serious and undeserved scandal upon the respectable chemists of the town.

Mr. Radley said he would never stand up in defence of a wrong, but he did think it hard that the respectable members of the trade should be involved in such a very serious charge, a charge which was not confined to Sheffield, for it had flown on the wings of the press to every part of the country, and, in fact, to every part of the civilized world. The misfortune was that the defence was not at all likely to travel so far as the mischief. He regretted very much that there was so much indefiniteness in the report prepared by Mr. Allen. He thought that the report ought not to have been made at all, or that it should have been a definite report. If it were merely intended by the authorities as a warning to certain persons in the trade, that result would have been obtained by communication in a more direct and more private manner. To attack and to throw odium on the whole trade, and to do that, as it was stated in one paragraph in the report, for the purpose of testing the dispensing of medicines from prescriptions by the chemists in Sheffield, was not at all a fair thing, because the principal chemists in the town had been overlooked entirely. He felt sure that had the parties in the habit of dispensing physicians' prescriptions been tested, the result would have been quite different. He had the greatest confidence that the dispensing of medicines was well done in the town, and that the purity of the medicines was equal to that to be obtained anywhere else. He sincerely regretted that the affair had assumed its present shape. He felt that it was a difficult matter to deal with it specifically; they could only look at it in a general way. He had no doubt that they would be much abused, and it would be years before they gained throughout the country the character which they previously possessed. In these days of chemical associations the doings of large towns and their associations were pretty well canvassed, and he feared that they would be held up to the odium of other chemical associations in the country, although that odium would be thoroughly undeserved. So far as his information went, persons had been applied to who seldom or ever had physicians' prescriptions in their shops; in fact they were persons for the most part who would rather not see such prescriptions brought into their shops. He had been told that one of the tradesmen applied to actually sent the prescription to another shop; therefore, he contended, that was not a fair sample of the trade, and he felt ashamed that the respectable chemists of the town should be subjected in such an unfair manner to that unfavourable report. He did not for one moment blame Mr. Allen for discharging his duly as a public analyst, and cast no reflection on his ability, but merely on the mode in which he had drawn up the report.

Mr. Ward said the chemists and druggists did not desire any favour from the borough analyst; but it was their duty to see that fairness and justice were done to them as a body. He contended that the mode adopted by Mr. Allen in the preparation of his report was not satisfactory to them as members of an association which had endeavoured to advance the position of the chemist and druggist. If in sending in the prescriptions, Mr. Allen had sent them to men who were accustomed to compound physicians' prescriptions, he would have adopted a straightforward course; but instead of that he had gone to those who were wholly unfitted to dispense such prescriptions. It was a positive fact that at least two-thirds of those who dispensed the prescriptions referred to by Mr. Allen were wholly unfitted for the work. They were for the most part tradesmen who did not see a prescription once a month—men to whom a prescription was really a *rara avis;* and, therefore, how could it be expected that men like that could correctly compound prescriptions, with chemicals constantly undergoing changes, and with drugs deteriorating by keeeping? How could they expect to stand by analyses by the borough analyst under circumstances such as these? He argued that Mr. Allen had not at all gone in a straightforward way in his mode of testing; and that whilst it was his (Mr. Ward's) wish and the wish of every member of the Association to carry out to the full the provisions of the Sale of Food and Drugs Act, he must enter his protest against any advantage being taken against them. He intended asking Mr. Allen to think carefully over the matter, and to take steps other than those of which he had been guilty during the past few weeks. It happened to be his lot to be visited by the two formidable gentlemen known as inspectors; and he need not say he should have no hesitation to subject a portion of the preparation given to them from his establishment to further analysis. He did not hesitate to say that it was prepared as carefully and as correctly as any pharmacist could prepare it. Fortunately, the prescription brought to his shop came under his own superintendence; and he was glad it did so, because he was able to say the medicine was prepared exactly in accordance with the prescription. He hoped in future the borough analyst would bear in mind what had been said, and not in any way indulge in taking advantage of them as a class. If he wanted prescriptions carefully prepared, it was not fair he should go to those who were not in the habit of carefully preparing them or of compounding prescriptions at all. He hoped the members of the Association would let Mr. Allen know that they were prepared to carry out the Sale of Food and Drugs Act to the very letter, so far as lay in their power.

Mr. J. T. Dobb then addressed the meeting, informing the members of the association that he had already brought the subject before the Town Council. He pointed out that he objected to the report because it did not convey what the borough analyst intended it should convey. The question raised was whether the chemists and druggists of Sheffield dispensed prescriptions accurately, fairly, and honestly, and in alluding to this matter in the Council he had spoken not as a chemist, but as a public servant anxious to do a public duty, without casting any reflection upon Mr. Allen, who, he believed, was capable of fulfilling his duties as borough analyst. It seemed to him, however, that a chemist who would sacrifice the health of another in order to save a few grains of a certain ingredient, would be a vile scoundrel, and he could not think for a moment that any man would wrongly dispense a prescription for monetary gain. So it would not be easy to charge the chemists, where there was an alleged deficiency of ingredients and a difficulty of analysis, with doing such a thing to get a little more money into the till. The report had unfortunately gone all over the world, traducing the character of the chemists and druggists of Sheffield, when there had been no intention to do so on the part of the borough analyst, and the fact showed how important it was that public officials should be very careful in any reports they might make.

Mr. Preston observed that the report spoke not of the particular druggists to whom the prescriptions had been sent, but to "the druggists of the town," and against this phrase he desired to enter his protest. They found that eight samples had been sent out, in which there was iodide of potassium, and the whole of these were compounded correctly; therefore it might be said that 100 per cent. had been made up correctly. He then went into very minute details, alluding to the number of grains of iodide of potassium found in some of the mixtures, and argued that the analysis might or might not be true. In concluding, he regretted that the chemists to whom these prescriptions had been supplied had not been prosecuted and the matter pressed to a trial, because it was desirable that in cases like this they should be brought before a public tribunal, and condemned or acquitted as they deserved. (A voice: "It may be so yet.") Then, he said, the sooner the better, because the town, as well as the trade, was concerned in the matter.

Mr. E. R. Learoyd and several other members of the Association also addressed the meeting on Mr. Allen's report, and expressed a very strong opinion as to the way in which the report had been drawn up.

Mr. Radley moved :—

"That whilst strongly disapproving of any dishonest act in the trade, this meeting desires to express its regret that the borough analyst, in the wording of his report on the dispensing of prescriptions in this town, has cast unmerited reproach on the entire trade, inasmuch as the test was applied to a small number residing in the outskirts, and not frequently called upon to compound prescriptions for medical men, whilst those residing in the principal parts of the town, and accustomed to such duties, were all but ignored."

Mr. Ward seconded the motion, which was carried unanimously.

Some conversation then ensued as to the probable presentation of a memorial to the Town Council on the subject of the report.

The following gentlemen were then elected a council for the ensuing year: Messrs. Ward, Cubley, Maleham, Preston, Learoyd, Turner, Hewitt, and Carr.

The nomination of Messrs. Horsefield, Leslie, and Archer for membership, concluded a very successful meeting.

THE ASSOCIATION OF CHEMISTS AND DRUGGISTS FOR WOLVERHAMPTON AND DISTRICT.

The first annual meeting of the above Association was held on the evening of the 13th inst. in the committee room of the Agricultural Hall. The President (Mr. W. Fleeming) occupying the chair. There was a fair attendance of members and associates.

The President, in introducing the business of the meeting, congratulated the members upon the very satisfactory conclusion of the first year since the establishment of the Association, for although the preliminary meeting was held but thirteen months ago the Association had already accomplished much good, and had already become one of the recognized provincial pharmaceutical associations. He believed that next year's work would be still more satisfactory, and that year by year the Association would uphold and increase the position it had already gained.

Mr. W. Y. Brevitt then read the report of the council of the past year, which was as follows:—

"Your Council, in submitting their first annual report, have much pleasure in congratulating the members on the great success which has resulted from the establishment of the Association of Chemists and Druggists for Wolverhampton and District. In this report they do not deem it necessary to enter into any lengthy statement of the past year's transactions, as the able monthly reports of the secretaries have kept the members well acquainted with the work which has been accomplished. They, however, think it desirable to briefly epitomize these accounts, so that the steady progress made may be be readily apparent. First, your Council wish most gratefully to acknowledge the assistance they have received from honorary members and other friends in supplying entertaining and instructive lectures and papers at the monthly evening meetings. Their thanks are especially due to Messrs. E. W. T. Jones, W. L. Scott, Stokes Dewson, and other gentlemen, for the interesting lectures they have given. At the commencement of last year a well-attended course of lectures was delivered on Botany and Materia Medica by Mr. Stokes Dewson, and during the present winter session classes on all subjects connected with pharmaceutic art have been carried on. Although your Council cannot but regret the somewhat scanty attendance at some of these classes, they think that much good has already been accomplished by the instruction given, and they earnestly hope that their younger friends will more thoroughly appreciate the great benefit which would be derived from regular attendance at these lectures. The thanks of the Council are due to the able instructors, the Rev. Mr. Heastie and Messrs. Stokes Dewson, Barrett, and Severs. The library, which now contains upwards of eighty standard works on pharmacy, chemistry, botany, materia medica, etc., etc., and which is also supplied with the usual trade periodicals, is well attained by students. Your Council have very recently taken into consideration the formation of the nucleus of a museum, and have already obtained several very interesting specimens. They cannot let the present opportunity pass without expressing their deep gratitude to the several donors of the various handsome additions to the library and museum, especially to the President of the Pharmaceutical Society (Mr. Thomas Hyde Hills,) for the very valuable present of engravings which now adorn our library walls, and for the donation of five guineas, which has been expended in adding several important works to the library; to Mr. Frederick Weaver, of Tettenhall, for his donation of £5 for the same purpose, and to their many other generous friends who have assisted them by their advice and contributions in this work. Your Council have this afternoon had under consideration the treasurer's report, from which they are pleased to learn that a considerable balance is left in the hands of your treasurer. While thoroughly appreciating this fact they would respectfully caution their members that many very heavy various expenses will have to be met during the present year, and they urge them not to relax any of those exertions through which the establishment of the Association has been so successfully accomplished. The meetings of the British Pharmaceutical Conference at Bristol were attended by three of the members. Your Council were pleased to note the cordial mention made by the President of the Conference of the formation of our Association. They would suggest that in future their deputation attending these meetings should be requested to prepare a report of the proceedings, which may be read at a subsequent evening meeting of the Association. They would also suggest that pharmaceutical subjects should be brought more prominently forward at these evening meetings, and they hope that during the next session members would contribute papers upon this subject. In conclusion, your Council would again respectfully urge all the members of the Association to use all exertions in extending the work of the Association, so that it may become a permanently useful institution for the chemists in their borough and county."

Mr. W. B. Cooley (in the unavoidable absence of Mr. Alexander Gow) read a report of the financial condition of the Association, and explained that owing to the accounts not having been audited he could not lay them before the present meeting, but that he hoped the balance sheet would be ready for publication in the *Pharmaceutical Journal* with the report of the Council. The treasurer, however, trusted that when the accounts were balanced he might be able to congratulate the members upon having a balance of £23 in the banker's hands.* He would, however, remind them that some heavy expenses had to be met during the early part of the present year in defraying the fees of lecturers on Botany, Materia Medica, Latin, etc., and it was probable the whole of the balance would be absorbed in this way. Besides this it would be necessary to make many additions to the library and museum, and also to increase the present accommodation for students, etc. The treasurer, therefore, hoped that the members would endeavour as much as possible to add to their muster-roll, so that the Association so successfully inaugurated might become one of the largest and most efficient in the kingdom.

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* From a copy of the audited balance just received it appears that this anticipation was confirmed, the balance in hand being £23 3*s*. ½*d*. The total receipts for the year (including £19 8*s*. 6*d*., for members' subscriptions) amounted to £63 14*s*. 6*d*. The total expenditure £40 11*s*. 2½*d*.—ED. PHARM. JOURN.

The Chairman said he thought they might congratulate themselves upon the success they had attained as a society. Their thanks were due to the numerous outside friends who had assisted them for the library which now formed the nucleus of a very valuable and interesting collection of books which would be very serviceable to the young men of the profession. The Association might get all that was necessary for the advantage of young men, but it rested with themselves whether they would take any interest in what was provided for them. He thought the society was now fairly launched, and he hoped that nothing would occur to prevent that good feeling, harmony, and co-operation amongst the various members of the Council which was absolutely necessary for the success of the society. He then moved the adoption of the reports of the Council.

Mr. Kearns, of Bilston, seconded the motion, which was then put and carried unanimously.

Mr. F. J. Barrett (the Junior Secretary) then handed to the President the result of a ballot for Council, which was as follows:—

President, Mr. W. Fleeming (re-elected unanimously).

For the post of vice-president, Messrs. R. H. Lowe (Wolverhampton), Kearns (Bilston), T. Reade (Wolverhampton), and Mr. J. Pratt (Wolverhampton), were nominated. The first-named gentleman received the highest number of votes and was therefore declared elected. The Chairman stated that Mr. Lowe had expressed a wish to be permitted to retire, and in the event of his doing so Mr. Kearns (the next highest on the list) would take office.

Mr. Gow was unanimously re-elected treasurer, as also were Messrs. Brevitt and Barrett, the co-secretaries. The Council were elected as follows:—

By the Members: Messrs. W. Coleman, C. C. Burnett, W. Cannell, J. Pratt, A. C. Weaver, W. Fleeming, jun., R. H. Kearns, Thomas Reade, and Edward Walker.

By the Associates: Messrs. Severs, W. B. Cooley and O. Matthews; and Messrs. John Hamp and Theophilus Wedge were re-appointed auditors for the current year.

Mr. Brevitt stated that the sum of half-a-guinea had been received from Mr. Kearns as an extra "pharmacy" prize. The following gentlemen were also elected "Associates:"—Messrs. Sibthorpe, Miller, and Watts.

Mr. F. J. Barrett next presented a scheme for the holding of the first Annual Soirée, the consideration of which was after some discussion postponed to the next meeting.

The President then stated he had a few remarks to make upon the address delivered at their last meeting by Dr. Totherick,

ON THE RELATIONS BETWEEN MEDICAL PRACTITIONERS AND PHARMACEUTISTS.

The President said that the lecture had gone forth without protest in any shape whatever. He had rather expected that some one would have taken up the subject in a letter to either the *Chronicle* or *Express* newspapers, but he supposed that at this very busy season of the year no one could find time to do so. He therefore felt that it was due to themselves as a body of tradesmen not to let the present opportunity pass without expressing a decided protest against the imputations upon them expressed in that lecture. He thought that this protest should be as publicly and widely circulated as the lecture had been, inasmuch as there were imputations conveyed either directly or indirectly which certainly affected the status of chemists and druggists in the eyes of the public. He certainly felt astonished when he read the lecture that a number of gentlemen representing the associated chemists of the town and neighbourhood quietly sat and listened to the lecture without raising a discussion, and instead of entering a protest against it, should have passed a hearty vote of thanks to the lecturer. He could only account for it by supposing there might have been some strange suporific influence pervading the atmosphere of that room which prevented them carefully listening to the lecture, or thoroughly taking it in. When they came to look at the imputations cast upon them as a body he felt they would be wanting in self-respect if they did not earnestly protest against those imputations. He did not blame the secretaries for the lecture having been delivered, because it was arranged in the ordinary course with consent of the Council, and they could not be responsible for what Dr. Totherick might say. He would now refer to a few items of the lecture, presuming it to have been correctly reported. In the first place, Dr. Totherick stated that there was a popular feeling, whether right or wrong, in favour of getting the physic from the man who prescribed it. He, Mr. F., demurred to that assertion, and believed the fact to be quite otherwise. With regard to the Doctor's assertion, "that the tradesman element has been apt to overtop the scientific," of course chemists were of necessity obliged to deal in many other articles besides medicines, for he believed that if all the dispensing in the town were confined to two or three chemists they would be quite unable thereby to eke out anything like a respectable livelihood; but it did not follow that therefore they neglected the scientific element. Dr. Totherick then remarked, "If, however, pharmaceutists assiduously devoted themselves to the higher branches of their calling, and proved themselves to be careful, conscientious, and expert dispensers, they will get dispensing to do." Now if he, Mr. F., understood the plain English of that sentence, it meant that pharmaceutical chemists were at present, *not* careful, *not* conscientious, *not* expert dispensers. Now, gentlemen, he continued, "I repudiate strongly in your name the imputation conveyed in that sentence. What! has the Pharmaceutical Society been in existence for upwards of twenty years—educating our young men for dispensers—with no better result than that? I say, gentlemen, we throw back the imputation, and most emphatically protest against it." Then as to counter prescribing, so strongly condemned by Dr. Totherick, he apprehended that it must exist from the nature of circumstances to some extent. So long as medical men were compelled to make the charges they did (of which he did not complain), poor people could not afford to go to them for every ailment from which they or their children suffered, and therefore applied to those chemists in whom they felt confidence. But every respectable conscientious chemist knew where to draw the line. In simple cases they gave antidotes to the best of their judgment, but when a case required it, they always recommended people to go to a medical man. Of course there might be some amongst them who were not over scrupulous in the matter, but were they to be taken as representatives of the whole body, and all to be condemned on their account? He (Mr. F.) apprehended there were some amongst medical men who were no great credit to the profession. Dr. Totherick, referring to certain cases, further said, "These things ought not to be; masters ought by their own example and precept to put a stop to all this detestable quackery." He again protested against such a reflection on respectable chemists. He never allowed his young men to interfere in cases except of the most simple character. Then he equally repudiated what Dr. Totherick said about the sale of patent medicines, viz., "I have next to touch upon a *nasty* subject," and went on to refer to chemists as follows, "Their corporate morality is in this respect the very reverse of what it ought to be." He would leave it with the public to judge whether the corporate morality of pharmaceutical chemists would not bear comparison with that either of the medical profession or any other body of tradesmen. With regard to patent medicines, they had become an established institution; respectable chemists as a rule did not generally *recommend* them, but people of all classes would have them, and he certainly thought that the chemists were the legitimate channel through which they should be supplied to the public. He would say that all respectable chemists thoroughly disapproved of the absurd puffery which was adopted to bring some of these before the public, but they could not prevent it, and could not be held responsible for it. The Doctor then suggested "that this sale should be given up, and all chemists take a firm stand in recommending instead the various preparations of the Pharmacopœia." But this was a strange alternative to put before them. He thought that if they adopted the Doctor's advice they would be intrenching far more on the province of medical men than by selling Cockle's Pills, King's Magnesia, Brown's Chlorodyne, and many other patents, all of which he had known to be recommended by medical men, and which he had been in the habit of selling for about fifty years without feeling that it was an "unclean thing," or that he was "humiliating" himself before society in so doing. He, therefore, again protested in their name against the remarks of Dr. Totherick, which he had quoted and which he was sure were a grave injustice to a respectable body of tradesmen. The Doctor had stated earlier in his lecture that these things raised a lofty barrier against the existence of a friendly and cordial feeling between the two bodies. If such was the case he exceedingly regretted it, and had certainly not been aware of the existence of such a fact, and he felt desirous so far as lay in his power to break down any such barrier, if it existed; but he was sure that the expression of such sentiments delivered in the uncourteous spirit and tone of that lecture would never conduce to so desirable a result.

Mr. Brevitt said, as one of the chemists present at the lecture, he considered it due to himself to explain why he sat still without making any comments upon it. He must candidly state at starting that in the main he agreed with the remarks made by the Doctor. It seemed a pity that this discussion should take place in Dr. Totherick's absence, because at the opening part of his lecture he invited discussion, and was prepared for one. It had been a great consolation to himself (Mr Brevitt) to find that whilst the lecture had been reported in the *Chronicle* and *Express* newspapers, and also in the *Pharmaceutical Journal*, there had not been a single line in either of the above-named papers against it. On the other hand, the editor of the *Pharmaceutical Journal* described it as "an able lecture delivered by Dr. Totherick." He (Mr. Brevitt) had received a letter on the subject from a gentleman holding a distinguished position in the pharmaceutical world, stating that he had read the report of the lecture in the *Evening Express*, and added, "Personally, I agree with Dr. Totherick's paper." He regretted he could not read the whole of the letter, as it was marked "private." He was sorry that the lecture had been delivered, because the division of opinion it had created was opposed to the objects of the society. One chemist who was present at the lecture had been recently so annoyed and pestered about it by members taking but little interest in the welfare of the Association that he had resolved not to attend one of the meetings again. The ill feeling expressed by some members was much to be regretted, and was calculated to do their Association much harm. For his (the speaker's) own part, he would say that the remarks did not apply to himself. With reference to the observation of Dr. Totherick about questions being put over the counter which were only fit for the consulting room, he might say that he had asked a commercial traveller in his shop whether he had ever heard questions of the character referred to asked over the counter in chemists' shops, and the answer was, "Repeatedly, I have." The reason that Dr. Totherick specially referred to that point was that he objected to chemists undertaking to treat long and complicated cases. No one regretted more than himself that the lecture had been delivered, because of the annoyance it had caused. However, as members of the Association appeared to object to medico-pharmaceutical discussions, and as it might interfere with the harmonious working of the Association, it would perhaps be better to prevent such discussions in future.

Mr. Thomas Reade remarked that it was somewhat cool for a member of a profession which, he believed, only devoted a few months to the study of pharmacy, or else employed second or third rate druggists' assistants as dispensers, to assume that pharmaceutists, who, in their training, spent years in the study of pharmacy, did not understand their business, and were not fit for or trusted in dispensing. Whatever odd members of their trade might be, he believed as a body they would compare favourably with the medical profession for expertness, accuracy, and conscientiousness in dispensing. As to the patent medicine question Dr. Totherick's mistake was that he drew no distinctions, but branded all as worthless and as an imposture, and implied that any one therefore who sold even so much as a box of Cockle's pills was lending his aid to deception and imposture. Against this sweeping denunciation both of patent medicines and chemists he protested as unfair. Whilst they were not prepared to swear by all the articles sent out of this character (and they could not vouch for the beneficial effects of some other drugs the people asked for) he did believe that the bulk of them were sent out by chemists and druggists who were as respectable and conscientious as any in the land, and that they were as carefully prepared, and contained as good drugs, and were as adapted to the purposes for which they were recommended, as medicines sent out by doctors themselves often were. He was not now speaking of those few things which were recommended "for anything and everything," but of the bulk of the special preparations sent out by the trade, and which were put forth for definite and specific complaints, or classes of complaints, and which it was well known were both recommended by and used in the houses of doctors themselves in some cases. With respect to those amongst their number who put forth special preparations of their own, as the public would have such things, it was better that respectable men should put forth such things for specific purposes, than abandon the entire trade in such things to the few adventurers who might not be so careful or scrupulous as to what they put forth. Dr. Totherick's remarks wanted considerable qualification on this subject, and also as to counter prescribing in the town, such cases as he had quoted being isolated and exceptional, and not representative of the manner in which the chemists as a body conducted their business in the town. Wolverhampton chemists did not as a rule attempt to treat continued and complicated cases; they had generally something better to do, and would shrink as a body from dealing with cases which required professional treatment, even were their advice asked, whatever isolated members of the trade might choose to do.

Mr. Coleman observed that Dr. Totherick had made a great mistake by speaking upon a subject on which he was perfectly ignorant.

Mr. W. J. Reade endorsed all that had been said in objecting to the remarks of Dr. Totherick. They could not emphasize too strongly their indignation as to what Dr. Totherick said about their "corporate morality." Such a statement was a downright libel and an insult. If they were to be condemned as a body because of one or two black sheep being amongst them, they might as well condemn the medical men as a body because one or two, through want of skill, sacrificed the lives of their patients.

Mr. Fleeming, jun., also protested against Dr. Totherick's strictures, and with respect to what he said about patent medicines, asked why the seller should be considered "a rogue" and the buyer "a fool," because the medicine had a 1½*d.* stamp around it. He had known medical men who not only recommended, but themselves took certain patent medicines, and he denied that there was of necessity any degradation either in the preparation, recommendation, or sale of those whose beneficial effects were well known. He did not believe that any popular feeling existed in favour of getting medicine from the medical man, but on the contrary was of opinion that the public felt more confidence in that prepared at a chemist's, where it generally underwent some system of checking. He thought that pharmaceutical examinations ought at least to be some test of efficiency, and his own experience was that assistants who had previously been dispensers to surgeons were invariably inaccurate. He did not think that counter prescribing prevailed to any large extent among respectable chemists, and suggested that it must be a very low type of business when any man need blush at hearing anything said behind the counter. There was some reciprocity wanted in the matter, and if medical men would allow chemists to dispense, which was their legitimate work, they would not have to complain of counter prescribing. Their corporate morality might very well be left to take care of itself. With regard to the secretary's promise that such subjects should not be brought forward again, he did not see that there was any objection to their discussion, so long as it was conducted in a courteous and kindly manner.

The subject then dropped, and after the transaction of some routine business the proceedings ended.

It was annouuced that the next lecture will be delivered on the 11th prox., by J. E. Morris, F.C.S., on "Starch, and a passing notice of the Polyglucosic Alcohols."

Parliamentary and Law Proceedings.

The Pharmaceutical Society of Great Britain v. Edward Mickle.

This case was tried on the 12th instant at the Liverpool County Court, before the judge, Mr. Perronet Thompson.

At the instance of the defendant, a jury had been summoned to the trial. Mr. Shee, barrister, instructed by Messrs. Hull, Stone, and Fletcher, the correspondents of Messrs. Flux and Co., appeared for the plaintiffs. Mr. Nordon, solicitor, appeared for the defendant.

The action was for the recovery of £10, the amount of two penalties of £5, one of them incurred by the defendant in "selling or keeping an open shop for the retailing, dispensing, or compounding poisons or a poison, contrary to the provisions of the Pharmacy Act, 1868;" and the other incurred by the defendant in "taking, using, or exhibiting the name or title of chemist contrary to the provisions of the same Act."

The facts supporting the allegations requisite were duly proved. The defendant alleged that he had been a chemist for nineteen years. He produced an indenture of apprenticeship to a chemist; he alleged that he had purchased a business at Hull in January, 1868, and carried it on for three months; that he had been in business in Liverpool since April, 1871. He produced a receipt dated the 22nd March, 1871, for five guineas, as the registration fee as a chemist and druggist under the Pharmacy Act, and deposed that upon the production of certain certificates and payment of that fee he had been put upon the Register of the Society, and that six months after he was struck off the Register without any reason being assigned except that a Manchester doctor who had signed one of the certificates had withdrawn his name.

The defendant's solicitor contended that under the circumstances the Society had no right to strike off the defendant's name, and that he was entitled to carry on business as a chemist, as he, in fact, had done.

The learned judge, in summing up, remarked that if the name of the defendant had been improperly erased from the Register he had an appeal to the Council of the Society, and if the Council of the Society did not properly discharge its duty he had also resort to the Queen's Bench Division of the High Court of Justice, and that the County Court was not the proper tribunal to determine whether the defendant was a proper person or not to be entrusted with the sale of poisons.

The jury returned a verdict for the plaintiffs for the full amount.

The jury stated that they considered the case a hard one, and requested Messrs. Hull, Stone, and Fletcher to suggest to the Council of the Society that the penalties should be reduced, if possible.

The judge said that he did not consider that there was any hardship at all in the matter.

Patent Medicine Stamps.—Excise Prosecution.

At the Manchester City Police Court, on Wednesday, Jan. 12, Henry Ross, manufacturing chemist, 50, York Street, Cheetham, was summoned at the instance of the Inland Revenue Department for selling a certain "medicine" without enclosing it in a proper and legal stamp, as required by law.

Mr. Tilsley, barrister, of London, prosecuted; and Mr. Cottingham defended.

Mr. Tilsley said that the proceedings were taken under the 52 George III., c. 150, which enacted that all unguents, salves, medicines, etc., "for the prevention, cure, or relief of any disorder or complaint incident to or in anywise affecting the human body," made or vended, which shall by any written or printed papers, handbills, etc., be held out or recommended to the public by the makers, vendors, or proprietors as nostrums or proprietary medicines, shall be furnished with a wrapper or label, provided by the Commissioners of Stamps, denoting the duty charged on such packet, box, or other enclosure. The defendant occupied a private house in York Street, and on his door was a plate bearing "H. Ross, operative chemist and manufacturer of Gustave Blanc's Parisian proprietary articles." On the 17th of November, Mr. T. Reilly, supervisor of excise, bought at the defendant's house a packet of "Gustave Blanc's Parisian corn solvent," and paid the defendant 1s. for it. On the 19th November, Mr. Hoyton, excise officer, bought from the defendant a box containing twelve packets of the solvent. On these packets there was no stamp, as there ought to have been, the "solvent" coming within the meaning of the above section. With each packet was a handbill, which "set forth and recommended to the public" the solvent as being beneficial to the "prevention, cure, or relief of a distemper, malady, or ailment, disorder, or complaint incident to the human body." This clearly showed that the "solvent" was liable to stamp duty, and also, on the defendant's own showing, for he announced himself as vendor of proprietary articles, which was sufficient to make him liable.

Mr. Cottingham said that Mr. Ross had not done this from any desire to evade payment of the stamp duty, but entirely from ignorance of the law. He had defended this information because he wanted to be assured of what he was bound to pay, and as to whether or no these articles were really and fairly chargeable. He would not pay the stamp duty or submit to a penalty without having a thorough investigation of the matter. What he was afraid of was of incurring a penalty which would be binding to him, but which would not prevent other dealers vending the "solvent" as they had done for years. He (Mr. Cottingham) further argued that the "solvent" did not come within the meaning of the Act.

Mr. Headlam said he thought it did.

Mr. Cottingham then addressed the Bench in mitigation of the penalty. He said that the Excise did not intend the defendant should be fined £10 for each package. At that rate he would be liable to £120 for the box bought by Hoyton, which would be simply absurd. He (Mr. Cottingham) thought that £10 for the one article was the maximum penalty the Bench could inflict, as the selling of the box was one transaction, and one breach of the law.

Mr. Headlam said he should have to inflict the full penalty on every article, which would be £10 on the one bottle, and £120 on the box. He would, however, reduce it to one fourth, which was as much as he could do. That would make £2 10*s.* for the single bottle and £30 for the box, or £32 10*s.* in all. Had he possessed the power, he would have still further reduced, as he did not think the defendant intended to defraud the revenue.—*Manchester Guardian.*

Alleged Sale of Spurious Butter.

At the Southwark Police Court, on Tuesday, January 18, Frederick Mullis, cheesemonger, of Great Suffolk Street, appeared before Mr. Partridge on a summons issued at the instance of the Vestry of St. George the Martyr, charging him with selling as pure butter a compound containing no butter. On the previous hearing the defendant disputed the correctness of the analyst's certificate, and the third portion of the sample was accordingly ordered to be sent for the decision of the chemical officers of the Inland Revenue Department.

The evidence in the case having been read over, the magistrate called upon Mr. Bell (who attended on behalf of the Inland Revenue authorities) to give some explanation of his certificate. He stated that Dr. Muter, the Public Analyst, had certified to at least 55 per cent. of adulteration with foreign fats, whereas the certificate from Somerset House was extremely vague and unsatisfactory, and merely stated that the results were consistent with the sample being genuine butter.

Mr. Bell: It is our first certificate under this Act.

The Magistrate: I am doubtless bound to take it as evidence and give the defendant the benefit of the doubt, and therefore cannot re-open the case. At the same time, I should be glad to hear the certificates of any other analysts on the other side, because of the extremely vague and unsatisfactory character of the Somerset House certificate. In my opinion this should certainly be identical in form with that of the public analyst, if not it would be grossly unfair to the latter. As the certificate at present stands, it may not be an analysis at all, but only a cursory examination. According to my view they should give the component parts.

Mr. Bell then proceeded to give the results of his analysis. He found—

Water	9·83	per cent.
Salt	3·73	"
Curd	0·93	"
Fat	85·54	"

He was of opinion that the fat corresponded to butter fat. It yielded 88·73 per cent. of fatty acids which was lower than they had sometimes found in genuine butter. The method which they employed was not known outside their laboratory. Had examined a large number of samples of genuine butter, but not one of "Butterine." Had however, seen some samples of "Bosh." In analysis he placed most reliance on the specific gravity of the fat. The witness then proceeded to read a long list of some 30 or 40 specific gravities of so-called genuine butter fats. He (Mr. Bell) further agreed with many other chemists that it was in many cases quite impossible to distinguish carefully mixed fats from butter. Hehues and Angell had evidently taken a one-sided view since they found a maximum of 85·6 per cent. fatty acids, whereas he, Mr. Bell, had found 87 per cent., and in one old sample 90 per cent.

The Magistrate: Then the upshot of it is that you are unable to say whether the butter is or is not adulterated, and so you give the benefit of the doubt?

Mr. Bell: Yes, that is all any of us can say.

Dr. Muter was then allowed to state his results. He distinctly affirmed that the butter was adulterated, and said that if Mr. Bell had had seven years' experience instead of the three months' experience he had talked of, he would have come to a different result Six different chemists had analysed the sample on their side, and their results all varied between about 93 and 94 per cent. of fatty acids. They had not, however, relied on this only. They had examined it microscopically, and taken the melting point. In fact they had taken every precaution to get reliable results. The so-called curd of this sample was a vegetable matter, and the proportions of fatty acids and curd were incompatible with genuine butter.

The Magistrate: The defendant, however, has the benefit of the doubt.

Dr. Muter: Quite so; He was simply pointing out the scientific points. He would only add that the acidity of the sample was inappreciable.

Dr. Dupré, F.R.S., stated that he had examined the sample in question within the last few days. It had not decomposed so as to become to any sensible degree rancid. Had made the study of butter a specialty for a long time, and was of opinion that this sample did not contain any butter at all. The fatty acids were 94·04 per cent. He believed it was simply "Butterine," with which he was quite familiar.

Mr. Wigner stated that he had analysed the sample, and found the fatty acids 94·20 per cent. The melting point was 4° centigrade lower than genuine butter. The microscope showed the presence of crystals, which indicated that the sample had been melted. The so-called curd did not appear to consist of animal, but rather of vegetable matter. It contained a considerable proportion of woody tissue and other vegetable structure. The sample contained very little, if any, real butter. It closely resembled "Butterine" in taste and in the peculiar granular feeling on the tongue, and it was probable that it was one of the kinds of "Butterine."

Mr. Bell suggested that on this evidence it was impossible that the samples could have been identical.

Mr. De Konigh stated that he had analysed this sample and found more than 93 per cent. of fatty acids, and minutely described the precautions which he had adopted. He concluded by stating that in his opinion the sample was not butter at all.

Another witness gave special evidence as to the microscopical character of the sample, which he considered to be entirely of vegetable origin.

Mr. Harkness and another Somerset House chemist then gave their results, which in the main agreed with Mr. Bell's. They had found no crystals and therefore concluded the sample had not been melted, but woody fibre was present in the curd which was attributed to cotton and hard wood.

In the end the case was dismissed, the Vestry being ordered to pay the costs of the analysis only, and the magistrate consented to grant a case for appeal if the Vestry decided on that course.

The Cost of an Independent Analysis.

The Judge of the Birmingham Court was engaged on Thursday, Jan. 13, in hearing the case of John Postgate *v.* the Mayor, Aldermen, and Burgesses of the Borough of Birmingham. The claim was for £21, for making an analysis of a sample of tea in connection with one of the celebrated tea cases fought out in Birmingham in the latter part of 1873. Dr. Evans appeared for the plaintiff, and Mr. Young for the defendants. Dr. Evans, in opening the case, said it was one of particular hardship to his client, who was a medical gentleman of the town, and who had devoted a considerable portion of his ife to practical chemistry and to the public. He had given great attention to the question of adulteration of food and drugs, and the Acts of 1860 and 1872 were originally drafted by Mr. Postgate. Some two years ago he was appointed to make an analysis of tea by the Stipendiary and Mr. Biggs (the then Mayor of the Borough). On application for payment, he had been treated with contumely, and refused the payment of his just charge. The case was one in which Mr. James Hull, tea-dealer, High Street, was implicated. Samples of tea had been taken, and the Sanitary Committee instructed prosecutions to be instituted, and, as there were several summonses, Hull's case was taken as a test case by consent of all parties. Mr. Hayes, the Town Clerk, conducted the prosecution, and the case came before the Bench on September 24 (as an adjourned case), an analysis of the sample of tea having been made by Dr. Hill, who had recently been appointed borough analyst. A dispute arose as to Dr. Hill's analysis, and he refused to attend the court. An independent analysis of the tea was ordered to be made, and Mr. Maher, who was engaged for one of the defendants, suggested that Mr. Postgate, who was in the court at the time, might analyse the tea. Mr. Hayes immediately asked Mr. Postgate " whether he was in the habit of studying practical chemistry." He could not understand Mr. Hayes' object in asking such a question, unless it was that Mr. Hayes had only recently arrived in the town, and did not know Mr. Postgate. The further hearing was adjourned until October 8, and on that occasion Mr. Hayes had employed counsel, and something cropped up that Mr. Postgate's report was not received, and Dr. Arthur Hassall was engaged to make another analysis, and the cases were adjourned to November 5, when Dr. Hassall's report was received. Dr. Hassall got paid, and Mr. Postgate (who was appointed by the Stipendiary and the Mayor) was refused payment simply on the ground that Mr. Hayes was not a party to the appointment. The sum claimed was £10 10*s.* for the analysis, and £10 10*s.* for attendance at the court on the several occasions, and waiting upon Mr. Gem, the magistrates' clerk, in reference to the claim. In the Acts of 1860 and 1872, it is recited that the expenses of such prosecution, if not chargeable against the party summoned should be considered a portion of the expenses of carrying out the Act, and section 2 states that the expenses of carrying out the Act shall be taken out of the borough fund.

Mr. Young said there was no intention to dispute those points of the law.

Mr. T. S. Kynnersley deposed that he was the Stipendiary Magistrate of the borough. He remembered the hearing of the tea cases in 1873, at the Public Office ; there were seven of them. He sat with Mr. Biggs, the then Mayor of the town. The case of Hull was adjourned for the attendance of Dr. Hill, whose analysis was disputed. He remembered the time when Mr. Postgate was appointed. Mr. Biggs and himself appointed him, and it was considered at the time with the acquiescence of both parties. On the next occasion when the case was called on, Mr. Postgate was not in court, but he was not called. Dr. Hassall was afterwards appointed. He considered that Mr. Postgate was appointed, and that he was the officer of the court for that purpose. He certainly did not make any order for the payment of Mr. Postgate on either the plaintiff or the defendant. Cross-examined by Mr. Young : In justice to Dr. Hill, he must say that Dr. Hassall concurred in Dr. Hill's evidence. Had he known that Mr. Postgate had been supervising the samples of tea which had been analysed for the defendants he should not have considered him an independent analyst. He was not aware that Mr. Maher, who was interested for one of the defendants, had proposed Mr. Postgate.

Mr. Young said that it was so, either by accident or otherwise.

Mr. Ambrose Biggs (ex-Mayor) said that Mr. Postgate was appointed with the sanction of all the parties.

Mr. John Postgate deposed that he was a surgeon practising in Birmingham. He had been practising between twenty and thirty years, and for some time held the position of Professor of Jurisprudence and Toxicology at Queen's College. For some years he had taken a great interest in the question of adulteration, and had a perfect knowledge of practical chemistry. He had made analyses of food for the Corporation and for the Guardians. He remembered the case of Mr. Hull coming on before the magistrates in September, 1873. On the Saturday previous to the hearing (September 19), he received an invitation from Mr. Alfred Bird, analytical chemist, of Bristol Road, to call and see him at his house, when Mr. Bird asked him whether he would object to be present and see certain analyses, for, as he was engaged to give evidence he should object to do so unless he had corroborative evidence. The investigations comprised analyses of camomiles, tea, and other vegetable substances. The investigations had nothing to do, to his knowledge, with Hull's case, and witness was to attend in court to confirm what he had seen. Dr. Hill was not in court, although in town. Witness was appointed by the bench—the Mayor and the Stipendiary—as an independent analyst. He was appointed on September 24, and attended on October 8 with his report, portions of the tea, and other substances. His claim was ten guineas for the analysis, and ten guineas for time and attendance, and he considered the charges very reasonable. Cross-examined by Mr. Young : When he went to Mr. Alfred Bird's, he was not aware that Mr. Bird was engaged making an analysis for the defendants in the case. He was not aware that Mr. Joseph Rowlands was solicitor for Hull. He knew that from what he heard in court. He did not know the defendants had clubbed together to defeat the prosecution. He did not know that a society had done so to obtain the same witnesses. He went to Mr. Bird's to supervise certain analyses, and to attend at court and support Mr. Bird's evidence. When he was vouched by Mr. Maher it was not stated that he was present in court to support either of the defendants or their witnesses. He got up to mention it to the bench, but it was suggested by some one in court—a person he did not know—not to do so. It would have been proper to have acquainted the Bench with the reason he attended in court. He had been paid ten guineas for the supervision of the analyses at Bird's. The sum was paid through his solicitors, Bower and Price, from Mr. Joseph Rowlands, by the Association of Grocers. It was for attendances and for work done before his appointment as independent analyst. He had apparatus to perform the experiments, which he had done, some at his own house, and some at Mr. Bird's, in Worcester Street. He did not know that the regular charge for an analysis was three guineas. He did not know the charges of Dr. Hassall, Dr. Voelcker, or Dr. Thudichum. Had known Dr. Voelcker for years. He did not know whether his charges were ordinary ones or extraordinary. He attended at the court from before eleven o'clock ; at two o'clock he found he was superseded. His report was not put in. Re-examined : He assisted Mr. Bird, and was to be his corroborator.

Mr. George Gore, analytical chemist, said he was not acquainted with the ordinary charges for performing analysis. He should consider ten guineas a fair charge for an exhaustive analysis of tea. He had been paid by the Corporation twenty guineas for analysis of butter.

Mr. Young, for defendant, said he could not help thinking, in regard to certain things which had transpired in the cross-examination, that if the facts had been known to the Bench, of the plaintiff's connection with the defendants, he could not have been considered an independent analyst. If a gentleman was appointed as an arbitrator to hold the scales equally between one party and another without leaning one way or other, he felt that Mr. Postgate could not be considered to be in such an independent position. He had asked Mr. Kynnersley whether, if he had known that Postgate had been engaged in analysing tea for the defendants he should have appointed him ; and he had replied that he should not. It was an appointment that was never contemplated by the Act of Parliament. Then the question was, if he was entitled to anything, what was he entitled to? The only evidence he had called to show that twenty guineas was not an excessive charge, was a person who had been paid under protest twenty guineas for an analysis of butter. Dr. Hassall only charged three guineas for the analysis, and five guineas for attending the court; and he came from London.

Dr. Alfred Hill (examined by Mr. Young): He had been twenty-five years engaged in making analyses, fourteen years officially in Birmingham. Two guineas was the general charge for an analysis. Dr. Hassall charged three guineas. Cross-examined: He had not seen Mr. Postgate's analysis. He had a good notion of what it would be. Three guineas for an analysis he said was a good fee. Had never seen Mr. Postgate; never said his charge was a reasonable one—on the other hand, he thought it was exorbitant. His charge for an analysis of borax would be two guineas. If the analysis and certificate were for publication for trade purposes, the fee would be ten guineas. Had never asked anyone to corroborate his evidence; it was not unusual to do so. The Council had asked Dr. Campbell Brown to do so.

Dr. Evans, in replying on the whole case, said it was a most shameless defence. It had been stated that Mr. Postgate was a prejudiced witness in the tea cases,—an ally of the defendants. Nothing could be so baseless as this. The plaintiff had acted as a corroborator to Mr. Bird, who had been engaged in these cases. It was monstrous to state that he was paid for what he had done by the Grocers' Association. He submitted that there was no doubt that Mr. Postgate was appointed. The charges were moderate, and he had waited two years and four months for payment; and he asked the Court confidently to give them a verdict.

His Honour, in summing up, said that it was clear the plaintiff was duly appointed under the Act of 1860, from the evidence of the magistrates, and if no order was made for the payment it must be paid out of the borough fund. It would have been a matter of good taste on the part of the plaintiff if he had informed the Bench that he had been engaged with Bird in the examination of tea. The person, whose name had not been given, who had suggested that he should not do so, was indiscreet. It was a pity that he had not acted on his own conviction, and informed the bench of his connection with Bird. But that did not make the appointment void. To the plan he had adopted in making the analysis he must take exception. Instead of making the analysis independently —he did not say with any corrupt intention—he went down and did a portion at Mr. Bird's. He should have abstained from any connection with Bird. This, however, did not disentitle the plaintiff to recover. He should give a verdict for £3 3*s.* for the analysis, £2 2*s.* for attendances at the court (two days), and £1 1*s.* for looking after or dancing after Mr. Gem — total, £6 6*s.*—*Grocer.*

HICKINSON v. ASHTON.

In this action, which was for the infringement of the plaintiff's trade mark distinguishing his marking ink, which was one of the various inks manufactured by the successors and relations of John Bond, the original inventor of Bond's marking-ink, a rule *nisi* for a new trial was moved for in the Common Pleas Division of the High Court of Justice, on Saturday, the 15th inst., by Mr. Macrae Moir (with him Mr. Denison) on the part of the defendant, on the ground that the verdict was against the weight of evidence, and for misdirection.

Their Lordships this morning said they had consulted Baron Cleasby, who had tried the case, on the matter, and that, as the learned judge was satisfied with the verdict for the plaintiff for nominal damages, they must refuse the Rule. Rule refused.—*Times.*

POISONING BY A MIXTURE.

Mr. J. Graham, coroner, held an inquiry on Thursday January 13, at Monkwearmouth, into the circumstances attending the death of Thomas Deans, four months old. Barbara Deans, mother of the infant, stated that she found the child lying dead beside her that morning. On Monday morning it seemed to have bronchitis, and on Tuesday some medicine was got from the chemist, which was administered to him. He had half an ounce of castor oil in three doses on Wednesday. She had not sent for a doctor, because she had no money, her husband having been out of work.

Margaret Rookes, mother of the previous witness, said that on Tuesday night she went to the shop of Mr. Wm. Sanderson, chemist, Church Street, Monkwearmouth, where she there saw Mr. McDonald, whom she asked to give the same mixture as Mrs. Calvert, a neighbour, had for her child when it was ill with closeness at the chest. She told him that the child was four months old. Mrs Calvert's child was now three or four years old. Mr. McDonald was going out, and he told the apprentice something which she did not hear, and he mixed the medicine, for which she paid 6*d.* He said she was to give half a teaspoonful about three times a day, and four times if it was very bad. One dose was given on Tuesday night, and three on Wednesday.

Robert Robson, apprentice with Mr. Sanderson, said he was very little accustomed to dispensing. He described the constituents of the mixture in the bottle, but was unable to say the relative proportion of the component parts. He did not put a label on the bottle, because he thought it was a repeated mixture. The mixture was diluted according to age. To a child of four months a quarter of an ounce of the mixture was given with three-quarters of water. He had only measured the mixture by the eye. He gave it according to the directions of Mr. McDonald, who told him to give about two drachms.

Mr. James Collard, Sussex Street, said that assuming the child was suffering from acute bronchitis, he believed the administration of the mixture produced, which contained narcotic poison, namely, laudanum and camphor, was improper at the age of the child. His impression was that the child had died from acute bronchitis, accelerated by the administration of narcotic poison.

The jury returned a verdict in accordance with the evidence of Mr. Collard (adding that the administration of the mixture was by mistake).—*Sunderland Times.*

ALLEGED CHILD POISONING.

At Shelton, Hanley, on Monday, Jan. 10, the Deputy-Coroner for North Staffordshire (Mr. D. S. Sutton) held an injury into the circumstances of the death of an infant child named Hannah Ellen Lewis.

Mrs. Lewis said the deceased child at the time of its death was six weeks old. It had been a weakly child from its birth, and at times had suffered from convulsions. In consequence of the child's uneasiness, witness gave it thirty drops of a drug from a bottle labelled "Mother's Friend." She had purchased the contents at Mr. Charlesworth's shop in Howard Place. The bottle she took for it was labelled "Mother's Friend." Some time after the dose was administered the child became worse, and medical assistance was thought to be necessary. Mr. Folker saw the child twice during the day, and gave witness a powder to administer. The child, however, could not swallow the powder. It vomited about seven o'clock, and expired at half-past ten in the evening. The drug was supplied to her by Mrs. Charlesworth, who took a large bottle to the window, and poured a quantity out. Witness could not see what label the bottle had on it.

At this juncture Mrs. Charlesworth produced two bottles, and said that she had made a mistake. Instead of taking the drug from the bottle marked "Mother's

Friend," she had accidentally taken it for one labelled "Cough Mixture." The bottles were about the same size.

Mrs. Charlesworth was cautioned by the Deputy-Coroner, and upon electing to give evidence said that her nome was Ellen Charlesworth, wife of Richard Charlesworth, clogger, and keeper of a grocer's shop in Howard Place. She remembered Mrs. Lewis applying for a pennyworth of "Mother's Friend," which drug she thought she had supplied. She found out the error, however, when Mrs. Lewis subsequently made a complaint. The bottles were examined, and witness then found that she had given a dose from a bottle labelled "Cough Mixture."

The inquiry was adjourned for a week that a *post mortem* examination might be made.

At the adjourned inquest Mr. Sparkes, one of the jurymen, said that he had examined the mixture which had been given to the child, and he found it quite free from any of the compounds usually found in chlorodyne. It did not contain either opium or morphia, or any of their compounds, or chloroform or hydrocyanic acid. It contained a large quantity of saccharine matter, grape and cane sugar, squills, and sulphuric ether.

Mr. Folker, surgeon, said he had made a *post mortem* examination of the child's body. All the vital organs were healthy, but the brain and the vessels connected with it were congested. On his first visit to the child he noticed a contraction of the pupil of the eyes and other symptoms which made him suspect the administration of some preparation of opium.

The jury, after some consultation, returned a verdict to the effect that the child died from the effects of an overdose of cough mixture, administered in mistake, but they did not consider there was any culpable negligence in the administration of the mixture. At the same time they entered their protest against the sale of drugs of any kind by unqualified persons.—*Staffordshire Sentinel.*

Suicide of a Medical Student by Cyanide of Potassium.

On Monday, Jan. 10, Dr. Hardwicke held an inquest on the body of a Parsee named Manekje Nasarvaneja Dalat, who was a student at University College Hospital. He was only twenty years of age, and held the Gilchrist £100 Bombay Scholarship. Evidence was given that deceased was found dead in his bed on the previous Thursday morning, and that a tumbler and bottle were on his pillow, both of which contained solution of cyanide of potassium. There was no doubt that deceased committed suicide, but beyond the fact that he has been depressed in mind lately no motive can be assigned for the act.—*Medical Times and Gazette.*

Obituary.

For the following information respecting the late Mr. John Hudson, formerly a well known leech merchant, we are indebted to a letter from Mr. J. Richardson, in the *Hull Evening News* :—

"This gentleman, whose death took place in Hull, 1st January, 1876, in his 92nd year, was at one time celebrated throughout the United Kingdom as the greatest importer and dealer in leeches throughout the world, importing into Hull millions of leeches yearly. He was the son of a Wesleyan minister, and after serving his time in Malton came down to Hull and became assistant to Mr. Chapman, druggist, in the Market Place, nearly opposite the statute of King William. Mr. Chapman had another shop in Waterworks Street, which was managed by Mr. Hudson. Chapman was a man of most violent temper, and in his passion would strike at anything that stood in his way, and, when in these fits, his apprentices and assistants had a sorry time of it. When in one of these passions he came down to the place in Waterworks Street, and struck at the whole of them, finishing off by giving Mr. Hudson a black-eye. His violence was so great that he injured his wife and son by his attacks. Having so often been assaulted by him, Mr. Hudson could put up with it no longer, and took out a summons against him, which was compromised by his turning over the business in Waterworks Street to Mr. Hudson. This was the turning point of his future fortune. By his activity and attention he soon got together a good business. He was one of the old school of apothecaries, before the Act of 1815, incorporating the surgeons and apothecaries; and, therefore, any of his apprentices could if it pleased him, qualify as a surgeon under the old law, and many of them did so. In the year 1813, after Napoleon Bonaparte was sent to Elba, leeches were in demand in England, and some were imported into Hull from Hamburg. A parcel of leeches was bought by Mr. Hudson in 1814, just before the escape of Napoleon from Elba; the whole continent was in tumult again and trade was virtually stopped for a time, and no more leeches came over. Mr. Hudson had a good stock, for which he had given the sum of £10. I have heard him say that by this parcel after deducting all expenses he cleared £110 2*s.* 6*d.* By this his name as a leech dealer became well known. He now entered largely into the trade, which increased so rapidly that, in the year 1823, he imported no less a quantity than 4,893,000 leeches, procuring them from all parts of the Continent of Europe, and even from Africa. His name was now celebrated throughout the world as the largest importer of leeches. He was most indefatigable in business, and the writer of this letter has often been with him in his leech warehouse at three o'clock in the mornings of summer and autumn, counting leeches to send away to all parts of the United Kingdom, to the extent of 60,000 and 70,000 daily. At that time there was a mania among the medical men for blood-letting, and people thought it necessary at the spring and fall of the year to have a little blood taken from them, and many of the older surgeons of the present day, who had the bleedings as their perquisites, used to hail with delight the visits of such persons. Not only Mr. Hudson, but several others in Hull, entered into the leech trade, but Mr. Hudson was able to over-ride all comers, many of whom lost money by their transactions. In 1826 he opened an establishment in London for their import and sale, and eventually contracted to supply all the hospitals in London and many in the country. Always enterprising, he entered into commercial affairs, the firm being known as Beckington, Wilson, and Hudson. After a time he retired from the firm, which was carried on as Beckington and Wilson, and on the death of Beckington by Mr. Thomas Wilson. This Mr. Wilson was the founder of the celebrated Wilson line of steamers, sailing from Hull. About 1840 a change came over the medical profession; and, instead of bleeding so much, they began to abstain, and the demand for leeches became less and less, until, at the present time, not more than 100,000 are imported yearly into Hull. Mr Hudson now retired from business, having by his industry and attention realized a handsome fortune, transferring his business to Mr. Baynes, who still continues the leech trade. Mr. Hudson was a fine old English gentleman, as worthy a man as ever lived, his purse always open to relieve the necessitous. In his latter days he might be seen walking about, as a hale old gentleman, with a broad-brimmed hat and long snowy locks, and bade fair to live to much older age. He was of a very cheerful disposition, and his genial countenance was always pleasant to look upon. Last year he had a severe fall, which shook him much, and though he appeared to recover from it, yet, eventually it became evident that his vital powers were failing, until on the first day of this year, he passed calmly and peaceably from this world, respected and beloved by all who knew him."

Notice has also been received of the death of the following:—

On the 10th of January, 1876, Mr. Varey Pickup, Chemist and Druggist, of Bank Parade, Salford. Aged 53 years.

On the 11th of January, 1876, Mr. Alfred Green, Chemist and Druggist, of Myton Gate, Hull. Aged 49 years.

On the 13th of January, 1876, Mr. Charles Brooks, Pharmaceutical Chemist, of Wandsworth Road, Surrey. Aged 56 years. Mr. Brooks had been a Member of the Pharmaceutical Society since 1845.

Review.

Descriptive Catalogue of the Collection Illustrating the Utilization of Waste Products, in the Bethnal Green Branch of the South Kensington Museum.

The utility of any museum is undoubtedly much increased by the publication of a catalogue of its contents. This is especially the case when the catalogue is a descriptive one and furnishes information lending interest to specimens which otherwise would appeal only to the eye, and the sight of which too frequently leaves only a confused recollection that a number of curious things have been seen without any definite idea of their value and commercial relations. The amount of information conveyed in this catalogue is not only very large but has the additional advantage of being very readable and of possessing such a suggestive character that few could peruse its pages without having their interest excited upon such an important subject as the saving of money or the making of a fortune by the utilization of waste substances.

It has been well said that one half of the world does not know how the other half lives, a saying the truth of which cannot be doubted after reading the very instructive notes upon such articles as shoddy, old clothes, rabbit skins, the value of dead horses, etc. Many will probably be surprised to learn the extent to which waste substances contribute to our national wealth. Thus we are told that £140,000 is annually earned by the collectors of rabbit skins, and that this branch of industry gives employment to about 8000 people, while those who cut up these skins earn no less than £60,000 per annum; and that old clothes are exported to the value of nearly £3,500,000. To give an idea of the suggestive nature of this collection and its catalogue, we cannot do better than quote the words of the author.

"As competition becomes sharper, manufacturers have to look more closely to those items which make the slight difference between profit and loss and convert useless products into those possessed of commercial value, which is the most apt illustration of Franklin's motto that 'a penny saved is twopence earned.' It is a curious fact that our countrymen are unable to compete with our foreign neighbours in the purchase of, and trade generally in, bones, for the simple reason that our workers in bones are unable to utilize the chips and waste cuttings which the French can convert into small toys, ornaments, etc., which are sold at a large profit. This additional source of gain enables them to outbid our buyers for raw bones."

"A fortune awaits the happy inventor who shall teach manufacturers how to restore old india-rubber to the condition in which it was before vulcanization."

The value of chemical research applied to this subject is exemplified by the statement that anthracene, a substance commercially unknown a few years ago, and then classed among the unutilized waste products, represented in 1874 a value of about £200,000, its value having arisen from the discovery that alizarine could be profitably produced from it. Even soiled corks we are told, are collected and re-cut in such a manner that it is difficult to distinguish them from new ones, and are in considerable demand by ink bottlers, etc. The catalogue is arranged in three sections, the first containing descriptions of the utilization of vegetable waste, the second of animal waste and refuse, and the third of sewage and mineral waste. An index is given at the end, so that reference may be easily made to any particular article in the collection; an arrangement which somewhat counterbalances the fact that no mention is made of the number or letter of the cases containing the specimens. Even those who have not the opportunity of visiting Bethnal Green Museum may learn a good deal by the perusal of this catalogue, which we may unhesitatingly state is one of the most useful of its kind that we have seen.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Food: its Adulterations, and the Methods for their Detection. By Arthur Hill Hassall, M.D. Lond., etc. Illustrated by upwards of 200 Engravings. London: Longmans, Green and Co. 1876. From the Publishers.

Notes and Queries.

[453]. GLYCERINE AND LIME CREAM.—In answer to a query by "Nemo" in a recent issue I append directions by following which he will obtain a perfectly satisfactory result:—Mix in a pint bottle, with a rather large mouth, ℥vj ol. amygdalæ (previously perfumed) and ℥viij aq. calcis. If at the end of twenty-four hours some oil has separated, add a little more aq. calcis, and again set by for twenty-four hours; repeat this process until no oil separates, and a perfectly homogeneous preparation is obtained. If by accident too much aq. calcis be added more ol. amygdalæ should be used to take it up. By this process, although it may seem tedious to some, a perfect combination results, and after a little practice it may be made in a short time. No accurate proportions of aq. calcis and ol. amygdalæ can be given, as I find the product varies according to the amount of alkali contained in the aq. calcis and the quality of the oil.—John Woodland, *Rochester*.

[454]. CLOCK OIL.—Can you or any of your numerous readers recommend any particular oil for clocks and watches? Has sperm oil with a small quantity of bude been tried?—A. E. I.

[455]. BARM DROPS.—G. E. S. would be glad to be informed what the article is that is known by the name of "Barm Drops."

COMPOUND OF CARBOLIC ACID WITH SANTONIN.—H. Sodour describes (*L'Union Pharm.* xvi. 363) a compound of carbolic acid with santonin, which he obtains by treating crystallized santonin with a mixture of 9 parts of carbolic acid and 1 part of alcohol, until, by heating, a syrupy liquid is produced, that upon cooling takes the appearance of an extract. This product is treated with a small quantity of ether, when a pale yellow powder is precipitated. The whole is thrown on a filter, and the precipitate is washed with a fresh quantity of ether and dried. This compound has a bitterish taste, resembling slightly that of carbolic acid. It is insoluble or only slightly soluble in water; soluble in ether, but still more soluble in alcohol. With caustic potash it gives a red colour, which disappears after a considerable time, apparently through the decomposition of the potassic compound by the air and the formation of carbonate of potash.

Correspondence.

**** No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE RELATIONS BETWEEN MEDICAL PRACTITIONERS AND PHARMACISTS.

Sir,—I have read with much interest and satisfaction a letter which appeared in last week's Journal from "One who has known the Drug Trade more than Thirty Years," pointing out the relative positions of the medical practitioners and pharmacists. From an experience longer and more varied I can fully endorse his views. I have long since come to the conclusion that counter prescribing as carried on in many establishments is unjust to the medical practitioners. This evil always, I have observed, exists most in those localities where medical men, from the M.D. downwards, send their own medicines, or what is, perhaps, a greater evil, gets some chemist to dispense for them at so low a price as to leave his chance of remuneration to arise from the sale of articles required in sickness and which would otherwise have been obtained from the patient's family chemist. This combination our friend Mr. Ince well described as a "miserable" one. If medical men wrote their prescriptions and allowed the chemist to dispense them as the legitimate branch of his business for which he is educated expressly, I feel assured he would soon cease to prescribe except in the simplest cases, and would even then recommend calling in the doctor unless speedily relieved, knowing, of course, that when medicine was required the prescription would be brought him to dispense. The only objection I see to this course is that the doctor may feel that his prescription would be handed about from one to another. To obviate this to some extent I would suggest that the chemist should not copy it unless it came under the "poison" schedule of the Pharmacy Act, and that the patient should be required to take his prescription to the doctor on his next visit, who could then, if he chose, destroy it or write a new one if necessary. In reference to the Sheffield *exposé* I think the whole body of chemists have much to complain of the newspaper articles on the subject; these have been so false and sensational that not even the present scantiness of "latest news" of that type can justify them. For when we come to analyse the report we find, as you well put it in your leader on the subject, "that in all there were twenty prescriptions sent to be dispensed; out of them thirteen were properly prepared, four incorrectly, while in regard to three Mr. Allen was unable to ascertain whether they had been properly dispensed." Also, before passing such sweeping condemnation, I think there should be proof that the analyst is to be relied on, for as other recent cases (needless to particularize) show, they often disagree among themselves even in very simple reports.

I would be the last to justify a chemist omitting anything or in any way sophisticating a prescription entrusted to him, as I think nothing can be more villanous and mean. Any such act should be brought home to the guilty party, and then the medical practitioner would know whom to trust. As for those who dispense their own medicine getting their drugs, etc., from the Apothecaries' Hall, as reported in the imaginative and embellished article in the *Telegraph*, it is simply rubbish. Some, doubtless, do so, but the majority procure them from the same source as the pharmacists, and with this disadvantage, many of them do not know how to detect impurities or adulterations as the latter do from their technical training.

BENJAMIN HUMPAGE.

Turnham Green, W.
January 18, 1876.

Sir,—I would not unwisely occupy one line of the valuable space in the Journal, but having been engaged preparing medicine for the medical profession, and in business on my own account for forty-five years, I cannot help saying a few words on Dr. Totherick's protest against 'counter prescribing." He very wisely admits our right to treat simple and casual cases, and no rightminded druggist wishes to go beyond that point; but admitted that there are some of us who excuse that limit, I would ask with whom does this evil mainly originate? I have no hesitation whatever in saying that medical men themselves are the originators of the evil which they so loudly and so bitterly condemn.

We have only to look into any Saturday's *Lancet* when lots of advertisements meet our eye for assistants "sine diploma," which of course means without a qualification. These gentlemen are received in very many instances from chemists' shops, and engaged to dispense, keep books, and visit occasionally (and in too many cases are received by patients as qualified). Now, is it to be wondered at, when they go into business for themselves, if they follow on in the same line of things that they have been put into by the medical profession, or that parties should be led to look upon them and trust them as more or less qualified to prescribe for and treat many ailments? There is indeed reform urgently demanded in that quarter.

SENEX.

INSECTIVOROUS PLANTS.

Sir,—It is not with any idea of making a captious criticism or of entering into an adverse correspondence with one whom I so much respect as Mr. Corder, that induces me to write this crude and fragmentary letter, but rather to protest against the experiments of Mr. Morren, recently noticed in your columns, being regarded as a definite settlement of the question.

That plants attract insects has long been known; that insects are useful to plants for fertilizing processes is now put to practical use;[*] while the more startling fact of plants, and those not only small ones as *Cuscuta*, but some of our largest flowers as *Rafflesia*,[†] growing upon and drawing their nutriment from other plants, is readily believed, and that others, such as the orchids, derive their principal nutrition from the moisture in the air[‡] is not denied. But the apparently more credible one of their being able to absorb animal matter through their leaves, is to some people absurd if not impious, that they scarcely have patience to seriously consider the question, notwithstanding that they do not disbelieve in the plant's power to absorb animal matter through its roots, or even in its exerting some peculiar solvent power on what are practically insoluble substances, such as silex and other mineral substances.

After the laborious, scientific, and most elaborate experiments made by Mr. Darwin, corroborated as they have been by Sir John Lubbock, Dr. Hooker, and other reliable observers, it seemed proved that some plants have the power of attracting insects, retaining them by a viscid matter in which they are rendered to some extent soluble, and are then assimilated by the plant through its leaves. That plants should be carnivorous is undoubtedly most interesting, but the gradual fading away of the supposed specific differences between the animal and vegetable kingdoms was a sufficient preparation for it, less wonderful as it is than the discovery of plant fertilization by species of insects, which in earlier times caused much greater opposition and met with far more ridicule, accepted as the fact is now by the most conservative botanist.

The *Saxifragra tridactylites*,[§] whose carnivorous proclivities were jokingly denied by "Botanist," in your Journal, has been subsequently investigated by Dr. Lawson Tait, who, both in a lecture at Birmingham, and more recently in a letter which appeared in the 'Spectator,' expressed his opinion that it is an insectivorous plant, but did not go the length of asserting that it assimilated animal matter through its leaves, and thought that the insects retained by them were washed down to the roots and thus afforded nutrition and Mr. Darwin in 'Insectivorous Plants' has related the peculiar susceptibility to ammonia exhibited by some of the *Saxifragaceæ*.

My own opinion is that the use of hairs and other epidermal appendages is far from being fully understood or valued in the process of plant nutrition, especially when we know in the economy of nature nothing seems made which is unrequired. Plants growing on dry acrid soil as a rule become more hairy than if growing in damp situations, and probably their pubescence enables them to absorb dew or moisture at almost every part; for instance, take *Geranium molle*, grown in a dry gravelly field, and notice it in the early morning when its pubescence may be seen thickly covered with dew it has condensed, and with that dew doubtless absorbing food.

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[*] A hive of bees was recently exported to Australia to fertilize clover which without insect aid will not produce seed.

[†] *Rafflesia Arnoldi*, a parasitic plant, measuring some three feet across and possessing a nectary capable of holding nine pints.

[‡] The stags-horn fern only requires the root to be nailed to a board, and with occasional watering will grow to a great size.

[§] *Pharm. Journ.*, vol. v., N.S., p. 903, 924, 964.

S. tridactylites varies according to its situation; if growing in the shade on damp soil the plants lose to a great extent the glandular hairs, while if they grow, as they do more generally in our Midland counties, on some dry limestone wall, the glands almost cover the plant, and secrete a viscid substance sufficiently tenacious to hold small insects. So, too, in *Saxifragra umbrosa*, whose stem in garden grown specimens is but thinly covered by hairs, while plants from Killarney show them much more freely developed. During the past summer I had an opportunity of seeing it growing in its native site, and was much astonished at its abundance on Mangerton's Mountain, Killarney, near which is the Gap of Dunloe, where flourishes the recently famous *Pinguicula grandiflora*, whose flabby yellow leaves were encurved round a mass of insect *débris*, and this consisting not only of small flies, but larger insects, beetles, moths—one of the latter being a "footman." Though I examined some scores of plants none appeared to suffer from indulging the appetite for animal food; it was peculiar to see plants with the leaves in different positions closing over some insect and quickly covering it with digestive fluid. In the ditches, another of the insectivora, *Utricularia minor*, was growing, whose little bladders were long thought to be only of use to sustain it in the water, but are now said by Darwin to be so many traps set for aquatic insects on which it feeds. The *Droseraceæ* were also well represented by *D. Anglica, intermedia*, and *rotundifolia*. Very frequent was the voracious *Pinguiculo lusitanica*. Abundant as are these about Killarney, it is in the "wild west" of Connemara where they are to be seen in perfection; nearly a hundred miles of country through which we walked being covered with them, and though all that I noticed were more or less supplied with animal food, they seemed to be in no way upset by it nor showed signs of becoming extinct. The systematic way in which the glands of *anglica* or *rotundifolia* gradually enclosed and held fast an insect was very striking,* but so far from looking with apprehension upon their work we should have been only too pleased to see any probability of the occurrence of some giant *Drosera* sufficiently powerful and abundant to diminish if not extinguish the carnivorous fly (chrysops) which preyed upon us so unmercifully.

The beautiful Connemara heath (*Menziesia polifolia*) was plentiful, its hairy peduncles seemed to offer some especial attraction to insects, possibly to assist in the peculiar fertilization of the *Ericaceæ*. Between Clifden and Ma'am, *Utricularia intermedia* and *Erica Mackayi* were gathered, the lakes there being thickly fringed with the North American *Eriocaulon septangulare*, whose only European habitats are Connemara and the western Hebrides; the Skye specimens, however, being smaller than the Irish.

J. C. DRUCE.

Northampton.

CHEMISTRY: ITS RELATION TO MODERN THOUGHT.

Sir,—I am sure many who have read Mr. Baildon's paper in this week's Journal are sorry to see such a subject introduced into a pharmaceutical meeting. It was entirely foreign to the objects for which those meetings are held, and to which I submit they ought to be restricted. If that gentleman considers it important that he should ventilate his theological and cosmological opinions, there is ample opportunity at Young Men's Christian Associations and similar institutions; at least, I would suggest (with all deference) that ten columns of the *Pharmaceutical Journal* should not be taken up with such pretentious nonsense, to the exclusion of practical and useful papers like Mr. Armstrong's of Liverpool, not to speak of its being disgraced by blundering misrepresentations of opinions held by certain scientific men, which of itself is sufficiently lamentable. I read your reprint of Professor Tyndall's Belfast address, and although I thought the subject ill-suited to the occasion, I could not find in it the "logical fallacies" that Mr. Baildon, it seems, has. I venture to think many, without in any manner accepting Professor Tyndall's conclusions, must have felt irritated by Mr. Baildon's what I regard as stupid misconception of the expression "promise and potency of all terrestrial life," and the foolish inferences he draws from it. Is he not as sensible as Mr. Baildon of the "impassable gulf" between the phenomena of mind and matter; but he also recognizes the fact that "the beasts that perish" are the possessors, with man, of consciousness, will, emotions, memory, and some amount of reasoning power. On which side of the gulf does Mr. Baildon place these? He also notices that the higher in the scale of being, the greater the mental powers. But it is nature's puzzle, not the materialist's, as Mr. Baildon wishes to make out. Whether the materialist interprets it falsely is another matter. Again, with regard to the doctrine of evolution, what worthless stuff about the analogy between chemical elements and primitive organisms! Truly "a little knowledge is a dangerous thing," if unaccompanied by modesty! As to whether John Stuart Mill, a man whose freedom from dogmatism is acknowledged by his opponents, ever asserted that he could manage the universe better than God, those who have read his essays can decide. Whether a clumsy and irreverent joke in connection with the dead is good taste or not I leave. But the lecturer next falls foul of the poet-laureate, whose orthodoxy is stamped on the first page of 'In Memoriam,' and rebukes him as the author of an "uncouth libel" for saying concerning nature, what he admits Christians remark also. If the lecture had not been unwisely delivered in the "cool sequestered vale" of a trade meeting, who knows that the objectionable lines might not have been suppressed in the next issue of the poem? These leading men of the time, then, are condemned to often "flounder" in deep waters, while our B.A. buoyed up by his inflated rhetoric, is wafted calmly on.

In his "only question of technical importance," he is, of course, perfectly in order.

I commenced the perusal of the paper, thinking "lo! a Daniel come to judgment," but finished thinking it must be the work of a young man who had dabbled in logic, metaphysics, and other -ics, and had swallowed more than he had yet been able to digest.

Hoping you will admit this letter into the Journal equally with Mr. Baildon's paper,

H. J. LANGHAM.

[*** Our correspondent labours under some misconception. Mr. Baildon's lecture was published as part of the officially reported proceedings of the North British Branch meeting, and not in any way to the exclusion of Mr. Armstrong's paper which has not been sent to us.—ED. PHARM. JOURN.]

"Syrupus."—Polypodium vulgare.

J. S.—We do not think it possible to get the iodide of iron into solution in the proportion mentioned.

"*Inquirer*" is referred to the rule respecting anonymous communications.

"*Inquirer*" (Bacup).—The article mentioned is a proprietary preparation; we therefore cannot give you the formula. A report of an analysis was in 1870 copied into this Journal from the *Medical Times and Gazette*, but its correctness was disputed at the time.

A. Bond.—We cannot give you any information respecting what takes place in the examination room beyond what is contained in the published "Regulations of the Board of Examiners." It is not probable, however, that the analytical tests have special reference to the charts in one particular book.

W. Wright.—No doubt such an appliance would be useful, but nothing of the kind should be esteemed other than a supplement to the more varied experience to be obtained in the every-day work of a pharmacy.

"*Gluten.*"—The following formula for liquid glue has been recommended:—Macerate 6 parts of glue, in small pieces, for several hours, in 16 parts of water; add 1 part of hydrochloric acid and 1½ parts of zinc sulphate, and expose the mixture for ten or twelve hours to a temperature of 68° or 70° C.

"*Theta.*"—We think the prescription is one that is not likely to be explained even if any of our readers should be in the secret.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Bell, Mr. Bostock, Mr. Pumphrey, Mr. Slade, Mr. Wilkinson, Mr. Shields, Mr. Atkinson, Mr. Jenkinson, Senex, Pharmacy.

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* See an article in *Popular Science Review*, by Mr. A. W. Bennett.

GELSEMIUM SEMPERVIRENS.

BY E. M. HOLMES,

Curator of the Museum of the Pharmaceutical Society.

(Concluded from p. 564.)

The chemical and physical properties of Gelseminia and Gelseminic acid have been somewhat fully examined and the facts known concerning them may be thus summarized:—

Gelseminic Acid.

This acid was prepared by Dr. Wormley by concentrating Tilden's fluid extract of the root in order to drive off most of the alcohol present in it, and then diluting the resulting liquid with water in order to precipitate resin originally held in solution in the spirit. The watery liquid after filtration was acidulated with hydrochloric acid, and repeatedly shaken with ether, which upon evaporation left the acid in crystals. It was purified by converting it into gelseminate of lead, decomposing by sulphuretted hydrogen, and extracting the pure acid from the filtered solution by means of chloroform. The acid thus obtained consisted of tufts of acicular crystals (Fig. 2 *a*), which were colourless, odourless, nearly tasteless, and possessed of strongly acid properties, completely neutralizing bases, and uniting with them to form salts which, excepting those of the alkalies, are very sparingly soluble in water. Its salts with the alkalies are freely soluble in water, and crystallizable. Gelseminic acid is freely soluble in chloroform and ether; it is soluble in about 1000 parts of cold, but in much less of hot water, from which, when the solution contains more than $\frac{1}{500}$th part of the acid, it crystallizes out as the solution cools in slender needles (Fig. 2 *b*). It gives a yellow precipitate with acetate of lead, readily soluble in free acids—even in acetic acid—with displacement of the organic acid. Mercuric chloride gives a yellow filmy precipitate, readily soluble in free acids, and which in strong solutions becomes converted into crystalline needles. Nitrate of silver produces a brownish-yellow precipitate, slowly acquiring a blackish colour, and then insoluble in nitric acid, $\frac{1}{1000}$th of a grain of the acid even yielding a decided black deposit. Sulphate of iron produces in moderately strong solutions of the acid a black precipitate, speedily becoming brown, in which, after a time, masses of colourless acicular needles appear. Chloride of gold gives a deep green precipitate, becoming bluish and appearing black by reflected light. Bichloride of platinum gives a yellow precipitate insoluble in acetic acid. It is also precipitated by the neutral salts of calcium.*

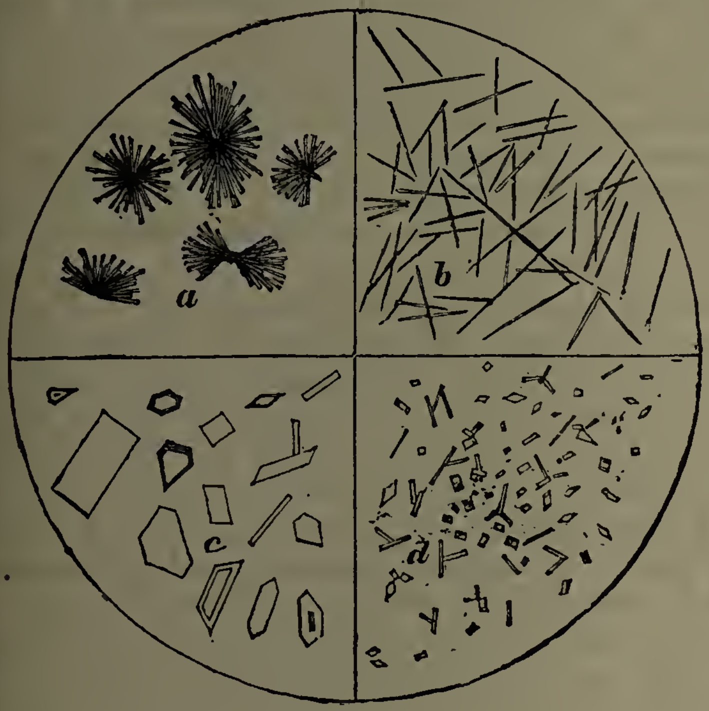

Fig. 2.

That the acid exists in the root in a free state, and is only partly combined with the alkaloid, is evident from the investigations of Fredigke, who obtained 38 grains from a pound of the root by the following process:—

Exhaust the powdered root by repeated decoction in boiling water, filter the decoction while *hot*, and evaporate to a small bulk; then repeatedly shake it with ether until a drop of the ether no longer leaves a stain when evaporated on a piece of glass. The root is known to be exhausted when the filtered decoction is no longer fluorescent.†

Gelseminic acid possesses two peculiar properties, which have been turned to account in a medico-legal investigation in a case of poisoning by the drug.‡ One of these is the remarkable fluorescence displayed in an alkaline solution of its salts, and the other is its property of subliming without decomposition in minute crystals—when heated considerably above 212° F.

The fluorescence is by far the most delicate test for gelseminic acid. If a drop of an alkaline solution containing only $\frac{1}{1000000}$th part of its weight of the acid be examined in the end of a pipette, under a cone of sunlight condensed by a lens, a perceptible blue coloration may be seen along the path of the condensed rays. A solution containing $\frac{1}{1000}$th of its weight of the acid by transmitted light appears of a greenish yellow colour, the surface of the liquid at the same time appearing of a deep blue colour—by reflected light it presents a strong greenish blue, and under condensed light a deep blue coloration.

A very pretty experiment to illustrate fluorescence may be made by placing a large test tube nearly filled with water against a black ground in direct sunlight, and allowing a drop of an alkaline solution of the acid to fall into the tube; a beautiful deep blue colouration will be seen along the path of the drop as it diffuses in the water, especially if viewed obliquely and under a cone of condensed sunlight.

This fluorescence is not confined to an alkaline solution of the acid, since a piece of root digested in a tumbler of water for twenty-four hours will cause the water to become decidedly fluorescent. The fluorescence of gelsemium differs from that of quinine in immediately disappearing on the addition of an acid.

When gelseminic acid is cautiously heated above 212° F., it sublimes without fusion or change of colour, and the vapour may be condensed on a warmed glass slide in the form of brilliant transparent crystals, as represented in Fig. 2, *c* and *d*. For the success of the experiment it is necessary that only a minute quantity of the acid be used—$\frac{1}{100}$th of a grain of the acid will furnish a number of sublimates; the exact character of the crystals depending upon the temperature and the quantity of the substance employed—even when contaminated with a comparatively large proportion of foreign matter very satisfactory sublimates may be obtained. The nature of the sublimate is proved by heating it with a drop of water containing a trace of ammonia, or by dissolving it in nitric acid and adding excess of ammonia, when an orange red colour is developed.

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* *Amer. Journ. Pharm.*, 1870, p. 29.

† *Proc. Amer. Pharm. Assoc.*, 1873, p. 652.

‡ *Amer. Journ. Pharm.*, 1870, p. 14—16.

Gelseminia.

The best method of obtaining this alkaloid according to Fredigke is the following:—

Concentrate the aqueous portion left after the extraction of gelseminic acid by ether, shake it with twice its volume of strong alcohol to precipitate gummy matter; then allow it to deposit, filter, wash the filter with alcohol, evaporate to a small bulk, set the alkaloid free by means of liquor potassæ, and remove it from the liquid by means of chloroform or ether. On evaporation it is left as a brownish yellow amorphous residue.

Gelseminia in its pure state is a colourless, odourless solid, having an intensely persistent bitter taste, which is perceptible in a solution only containing $\frac{1}{1000}$th part of its weight of the alkaloid. It has not yet been obtained in the crystalline state. Gelseminia is soluble in 25 parts of ether, in chloroform, bisulphide of carbon and turpentine, less so in alcohol, and very sparingly in water, but dissolves freely in water acidulated with hydrochloric acid, from which alkalies precipitate it.

It is a strong base, restoring the colour of reddened litmus paper, and forming salts with the strongest acids. The sulphate, nitrate, hydrochlorate, and acetate are freely soluble in water. At a temperature below 212° F. it fuses, and it solidifies on cooling into a transparent vitreous mass. At a higher temperature it is dissipated in white fumes which may be condensed on glass in the form of minute drops.

Caustic alkalies precipitate gelseminia from solutions of its salts in the form of a white deposit which after some hours acquires a brick-red colour; the precipitate is insoluble in excess of alkali. Mercuric chloride causes a white precipitate, sparingly soluble only in excess of hydrochloric acid. Tannic and carbazotic acids precipitate the alkaloid. Biniodide of potassium, bichloride of platinum, iodo-hydrargyrate of potassium, and chloride of gold give a precipitate in solutions containing only $\frac{1}{1000}$th of a grain. Concentrated sulphuric acid causes the alkaloid or any of its colourless salts to assume a reddish-brown colour, and if the solution be heated it acquires a purple colour.

Gelseminia is a powerful poison, one-eighth of a grain hypodermically injected having been sufficient to cause the death of a strong cat in 1½ hour.

The properties of the acid, resin, and volatile oil, and other ingredients of the root have not been fully investigated.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 503.)

Our next duty is to discuss such microscopical uses of polarized light as appear of real utility either from their purely scientific or their practical aspect. The first place must be given to the former, since the scientific applications of polarized light in microscopy are the most numerous and, perhaps, have had the most satisfactory results. But I fear it must be confessed that this branch of microscopy, like some others, is still in its infancy.

Brücke,* and others, notably Schäfer, have successfully employed polarized light in their researches on muscular fibre. Brücke's method is as follows:* From a number of mica or selenite films, one is selected which gives, when properly placed between the crossed Nicol prisms, the purple violet *teinte sensible*, and is fixed by a drop of balsam or dammar to the lower surface of the object slips, or mounted on a separate slip which is to be placed beneath the object slip. A still more preferable plan appears to me to be that already recommended, mounting the selenite or mica between thin glass circles and placing them in the revolving cell of the selenite carrier. Fresh muscular fibres of the extremities of the crab, frog, or *Hydrophilus*, are placed in absolute alcohol for half an hour, and as soon as the tissues are deprived of their water they are soaked in turpentine. Of the muscle so treated, a preparation is made on the object slide, the fibres being placed in such a way that they lie in various directions. If the preparation be now examined, the selenite being in position beneath it, the different colours of the fibres are brought out with the greatest distinctness. All transitions present themselves between those that are bright between crossed Nicols, and those that are invisible, and it is found that the latter are those that are cut in planes at right angles to their axis, the former those that are cut at an angle of 45° thereto. It is thus seen that the long axis of a muscular fibre corresponds in relation to its properties of double refraction to the axis of crystallization of a uniaxial crystal; in short, that muscular fibre is optically comparable to such a crystal. Brücke shows also that these fibres are comparable to "positive" crystals, that is to those crystals in which the index of refraction of the extraordinary ray exceeds that of the ordinary. Merkel,† however, whilst agreeing generally with this statement of the doubly refractive character of muscle, quotes contradictory accounts of it from Krause and Henson which prove that in certain conditions, or phases of contraction, this cannot be said to hold good of the fibre, as a whole, and that it is really a complex structure of singly refractive as well as bi-refractive elements. Henson regards the fibre as made up successively of "*one-half* (mass) doubly refractive substance, *one* singly refracting, and again, *one-half* doubly refracting;" whilst Krause regards the "single muscle element as consisting of, one-half a mass of singly refracting substance, a whole mass of doubly refracting substance, and again one-half of singly refracting." Schäfer's account‡ may be taken as to a certain extent explanatory of these others. He says, speaking of the bright and dark bands seen in contracted muscle, by ordinary light, that "by polarized light these bright bands are seen to be anisotropous, whereas the dark bands are isotropous.§ From this it is evident that the ground substance is anisotropous, the muscle rods isotropous, although in the state of rest the whole fibre appears to be anisotropous; this however may be easily explained by bearing in mind that the muscle rods are surrounded by the anisotropous ground substance, and are therefore illuminated by light that has previously traversed this."

Professor Clerk Maxwell has examined (*M. Micro. Journal*, from P. R. S. xi., 1869) certain medusæ, and says, "the body of a sea-nettle has all the appearance of a transparent jelly, and at one time I thought that the spontaneous contraction of the living animal might be rendered visible by polarized light transmitted through them. But I found that even a very considerable pressure applied to its sides produced no effect, and I then found what I might have learned from dissection, that the sea-nettle is not a true jelly, but consists of cells filled with fluid."

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* Handbook for the Physiological Laboratory. Churchill.

* Op. cit., page 63, *et seq.*

† Schultze's Archiv. viii—244, 1872. Abstracted in *Quart. Jour. Micro. Sc.* 1872, p. 185.

‡ *Q. J. Mic. Sc.* 1874, 195.

§ Isotropous = singly refractive. Anisotropous = doubly refractive.

The human eye possesses, as is well known, the probably unique property for a single lense of achromatism and aplanaticism. That is, its formation is such that the several rays of which white light is composed are sensibly brought to the same focus, and rays passing through it at different distances from its optical centre, being brought to practically the same focal point, the errors due to spherical aberrations are quite at a minimum and insensible. This state of things is, speaking generally, brought about, so far, at any rate, as concerns the aplanaticism of the eye, by such an arrangement of the fibres of which the lense is composed, that each concentric zone of the eye, from the centre outwards, is of different density, the centre being the most dense, the circumference the least dense. This peculiarity of structure may be easily demonstrated, according to Sir David Brewster, by examining the lense by polarized light, when it will be seen to be divided into four quadrants by a black cross. On examining the eye minutely between the prisms it will be found that these quadrants may be divided into one or more—one in the case of the human eye, and three in the case of the horse and certain other quadrupeds. And it will be found also that these quadrants act differently upon the polarized light as it passes through them; that in certain cases the light emerges in a state of what is known as positive polarization, and that then the density of the quadrant increases inwards, but that in others the light is in certain parts of the quadrant negatively, and in others positively polarized. In these cases, as in that of the horse, where Sir David Brewster says he has found three sets of luminous quadrants (or in a cow of fifteen years old, four series), separated by their black cross, the phenomena indicate that the "central part of the lens has its density diminishing outwards, the next portion of its density *increasing* outwards, and the other portion diminishing outwards." Sir David adds that a "curious property of the lenses of several animals, and perhaps of all, is, that when they are kept in distilled water the rings or quadrants of polarized light change their form, and even their colour, as if the lens was assuming a new and more complex structure. After a certain time the lens bursts from the breaking of the capsule or bag which encloses it. The distilled water had been absorbed in such quantity as at first to stretch and then tear the capsule, and the effect of its expansion was to give it a polarizing structure which modified the polarizing structure of the lens itself. This experiment is of some practical value, as it shows that the disease of *soft cataract* in the human eye may be produced by the lens absorbing too much water from an excess of water in the aqueous humour."

We may now turn our attention to the use of the micro-polariscope in vegetable histology and in the examination of vegetable substance generally. Here we find a nearly untrodden field, for if we except certain work by way of examination of starch grains (mostly inaccurate) and some inaccessible observations of Nägeli's, there will be little left.

THE QUANTITATIVE ESTIMATION OF VANILLIN IN VANILLA.[*]

BY F. TIEMANN ET W. HAARMANN.

The manufacture of vanillin artificially, in accordance with the discovery made by the authors, having been commenced on the large scale, it became necessary to find out a method by which the relative value of vanillin to natural vanilla could be approximately estimated. As the taste and smell of both are identical it seemed only necessary to estimate the quantity of vanillin usually present in vanilla. But a difficulty arose from no method being known by which the vanillin could be clearly separated from the vanilla without loss and free from vegetable extractive matter, resin, etc. At first the empirical method was adopted of estimating the relative effects produced by determined quantities of vanilla and vanillin in perfumery and culinary preparations. Here, however, the proverbial variations in the perception of taste and smell in different persons interfered, and practised experimenters, such as chocolate makers, confectioners, and perfumers, variously estimated the value of one part of vanillin at 5, 10, 20, 80, 100, and even 500 parts of the same specimen of vanilla.

The authors were, therefore, compelled to revert to the search for a more scientific method. Another investigation of the reactions of vanillin gave fresh proof of its aldehyd nature, and suggested that a test might be found among the alkaline acid sulphites. It was found that when vanillin was fused, or dissolved in the smallest possible quantity of water or ether, and shaken with a concentrated solution of acid sulphite of potassium or sodium no crystals were formed even after standing a long time. Nevertheless, under these conditions the alkaline acid sulphites form with vanillin a characteristic, uniform, and very constant compound, differing from the analogous compounds of most other aldehydes only in its greater solubility in water. This appears from the fact that vanillin is taken up more readily and in larger quantity by an alkaline acid sulphite solution than by water, and is not removed from it by shaking with ether. When a solution in which vanillin was present together with sodium acid sulphite acid was carefully evaporated, slender crystalline needles were obtained, in which vanillin, sodium, and sulphurous acid could be detected.

Not only is vanillin not removed by ether from an aqueous solution to which excess of an alkaline acid sulphite has been added; but if an ethereal solution of vanillin is shaken with an aqueous solution of acid sulphite, the whole of the vanillin passes into the acid sulphite solution, without a trace of any other substances present with the vanillin in the ethereal solution, except such as may be of the aldehyd nature. Vanillin is the only aldehyd occurring in natural vanilla.

The compounds of vanillin with the acid sulphites of the alkali metals can easily be decomposed with sulphuric acid, and the sulphurous acid by careful heating can be almost completely driven off without incurring any loss of vanillin. Upon shaking the solution with ether the whole of the vanillin is taken up by that solvent, and may be obtained in a perfectly pure condition by distillation or spontaneous evaporation.

Upon the determination of these facts the following method for the quantitative estimation of vanillin in vanilla was devised:—

30 to 50 grains of vanilla cut small are placed with 1 to 1½ litre of ether in a large stoppered bottle, and left in contact during from 6 to 8 hours, being frequently shaken. The clear liquid is then decanted off and filtered through a plaited filter into a large flask A fresh quantity of 800 to 1000 c.c. of ether is introduced into the stoppered bottle, shaken very frequently, and after from 1 to

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[†] Abstract of paper read before the Berlin Chemical Society (*Bericht der Deutschen Chemischen Gesselschaft*, vol. viii., p. 1115).

2 hours filtered. The operation is repeated for a third time with 500 to 600 c.c. of ether. The now exhausted fragments of vanilla are thrown upon with the filter with the very last portion of the third quantity of ether, and then washed with a small quantity of fresh ether. After this treatment the fragments of vanilla are absolutely tasteless and odourless, so that it may be inferred that the whole of the vanillin has passed into solution. The united ethereal extracts are now distilled from the flask upon a water bath to 150 or 200 c.c. The residue is placed in a tall narrow stoppered glass, then 200 c.c. of a mixture of equal parts of water and a nearly saturated solution of sodium acid sulphite added, and the closely stoppered vessel shaken during from 10 to 20 minutes. It is necessary to open the flask from time to time, especially at the commencement of the shaking, and during the operation to hold the stopper firmly to prevent loss of the liquid. After the yellow-coloured ethereal layer and the almost colourless solution have become sharply defined, they are separated from one another by means of a stoppered separating funnel. The ether is returned to the stoppered flask and again well shaken for five or ten minutes with 50 c.c. of a concentrated solution of sodium acid sulphite, and 50 c.c. of water. The aqueous solution is separated as before, and placed with the result of the former operation in a clean stoppered vessel. This saline solution, which contains all the vanillin, is now shaken for a short time with 180 to 200 c.c. of pure ether, in order perfectly to remove a small quantity of impurities derived from the original ethereal extract. After the ether has been again separated, the saline solution is poured into a large flask, with a long, but not too wide neck. The neck is closed with a cork pierced in three places. Through the middle hole passes a funnel tube reaching nearly to the bottom, and dipping into the solution. A second tube, equally long, connects the flask with the steam apparatus, or a vessel of boiling water. The third tube for carrying off the sulphurous acid evolved, passes from the under side of the cork to a vessel containing soda crystals and water. An empty wash-bottle should be introduced between this vessel and the flask, to retain a small quantity of the solution that may be carried over from the flask. By using such an apparatus, the decomposition of the alkaline acid sulphite can be effected without inconvenience from the sulphurous acid evolved. Dilute sulphuric acid, in the proportion of 150 c.c. of a mixture of three volumes of concentrated sulphuric acid, with five volumes of water to each 100 c.c. of acid sulphite solution, is poured gradually thorough the funnel tube, and when the consequent evolution of sulphurous acid becomes less, steam is introduced to remove it as completely as possible. As soon as the wash-bottle becomes much moistened on the inner side, the operation is stopped. When cooled, the contents of the flask are removed into a well-stoppered vessel, and shaken three or four times with not too small quantities of ether (from 400 to 500 c.c.); the ether takes up all the vanillin present. The ethereal extracts are separated from the aqueous solution and distilled together from a large flask down to 15 or 20 c.c. The last part of the operation is conducted very cautiously, the temperature of the contents of the flask being raised with a little steam to a point not beyond 50° or 60° C. The residue, which is of a faint yellow colour, is placed in a weighed watch-glass, washed carefully with pure ether, and the ether allowed to completely evaporate at the ordinary temperature. If the operation has been properly conducted, and especially if a too strong heating of the concentrated vanillin solution has been avoided, pure crystals of vanillin are formed, melting at 81° C. These are dried over sulphuric acid until they no longer lose weight. The solution of acid sulphite of sodium can be recovered.

In order to test the exactitude of the methods, the authors made the following experiments :—

(1) 0·417 gram of pure vanillin was dissolved in 200 c.c. of ether. After operating as above described, 0·400 gram, or 95·92 per cent. of the quantity used, was recovered.

(2) 0·508 gram of pure vanilla was dissolved in a concentrated ethereal extract obtained from 60 grams of natural vanilla, out of which every trace of vanillin had been previously removed by treatment with sodium acid sulphite solution. From this artificially prepared extract of vanilla, 0·502 gram of vanillin, or 98·81 per cent. of the quantity used, was recovered.

The following are the results of experiments made with samples of the varieties of vanilla most esteemed in commerce. Samples 1, 2, and 3, were obtained from Paris; sample 4, which externally appeared to be a good Bourbon vanilla, came from Hanover.

(1) *Mexican Vanilla.*—32·527 grams of vanilla, treated as above, gave 0·548 gram of pure dried vanillin. This vanilla therefore contained 1·69 per cent. of vanillin.

(2) *Bourbon Vanilla.*—29·969 grams of vanilla gave 8·745 gram of pure dried vanillin. This vanilla therefore contained 2·48 per cent. of vanillin.

(3) *Java Vanilla.*—32·739 grams of vanilla gave 0·903 gram of pure dried vanillin. This vanilla therefore contained 2·75 per cent. of vanallin.

(4) [*Bourbon Vanilla.*]—49·441 grams of vanilla gave 0·947 gram of pure dried vanillin. This vanilla therefore contained 1·91 per cent of vanillin.

Experiments were also made with samples of fine vanillas from other sources, as well as of inferior kinds and also with extract of natural vanilla met with in commerce. The conclusion drawn by the author from the results hitherto obtained is that the actual quantity of vanillin present in vanillas of good quality varies between 1·5 and 2·5 per cent., and that Bourbon and Java vanillas generally contain more than Mexican.

It was considered notable that the lower priced Bourbon and Java vanillas contained more vanillin than the high-priced Mexican vanilla, and it appeared that the ground for this could only exist in the substances present with vanillin in the vanilla.

Upon distillation of the ether from an ethereal vanilla extract from which the vanillin had been previously removed by treatment with acid sulphite of sodium, there remained a yellow loathsome smelling oil, with an insipid resinous taste, which in a concentrated condition was sticky, and after standing became partly crystalline. Of this badly smelling oil, which doubtless modifies the vanilla aroma more or less, there has been found hitherto much less in the Mexican than in the Javan or Bourbon vanilla. It appears, therefore, that vanilla is valued not only according to the strength but also the purity of the aroma present.

As the oil accompanying vanillin is only slightly soluble in water, and has no very decided taste, it has a much less detrimental influence on the flavouring of food than in perfumery. It follows, therefore, that chocolate manufacturers, confectioners, etc., can use to greater advantage the high percentaged Bourbon and Java vanillas than the dearer though purer smelling Mexican kind.

The above process may be used for the detection of adulteration of vanilla by perfuming it with such substances as benzoin, etc. These remain behind in the ethereal extract after the removal of the vanillin, and may then be easily recognized.

THE PAPYRUS EBERS.*

The Astor library, New York, has quite recently come into possession of a work of extraordinary antiquity, which will prove of immense value to the archæologist, historian and student of science. This remarkable book is a fac-simile of an Egyptian medical treatise, written in the sixteenth century B.C., and consequently more than 3400 years old. Though strictly a medical work, it reveals much relating to ancient Egyptian domestic life, and is without doubt one of the most important contributions to the history of medical science ever discovered.

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* From the Chicago *Pharmacist* for December.

The title translated is as follows:—

Papyrus Ebers, the Hermetic Book of Medicines of the Ancient Egyptians, in Hieratic writing. Published, with Synopsis of Contents and Introduction, by George Ebers. With a Hieroglyphic-Latin Glossary by Ludwig Stern. Under patronage of the Royal Bureau of Education in Saxony. Leipzig, William Englemann, 1875. Two volumes. Folio.

The papyrus, of which this work is a fac-simile reproduction, was discovered by the archæologist Ebers, during his visit to Egypt in the winter of 1872-3. Ebers and his friend Stern were residing at Thebes, collecting archæological data, and there became acquainted with a well-to-do Arab from Luxor, who brought to them for sale a wooden image of Osiris and a papyrus of no especial value. Suspecting that the Arab was holding in reserve objects of greater interest, Ebers offered him a considerable sum for any superior specimens in his possession. This induced the Arab to return on the following day, bringing with him a metallic case containing a papyrus roll enveloped in mummy cloths. Ebers immediately perceived he had a prize, but was unable to command the large sum of money demanded for it until provided with the means through the liberality of a German gentleman, Max Gunther, travelling in that vicinity. According to the Arab's account, the papyrus had been discovered fourteen years previously, by a man since dead, between the bones of a mummy in a tomb of the Theban Necropolis.

Ebers hastened back to Leipzig with his precious roll, and deposited it for safe keeping in the university library in that city. And now, with the co-operation of an enterprising publisher, and the assistance of royal patronage, he places it at the disposal of the civilized world, by reproducing it in these handsome volumes.

The papyrus as received by Ebers, consisted of a single solidly-rolled sheet of yellow-brown papyrus, of finest quality, three-tenths of a meter wide, and a little more than twenty meters long. It formed one enormous book, but was divided into 110 pages, which were carefully numbered. For purposes of preservation and exhibition in convenient form, it has since been cut into several lengths. The writing, which is exceedingly clear and regular, is partly in black and partly in red ink, the latter occurring at the heads of sections and in the expression of weights and measures. The characters are known as Hieratic, being a cursive form of the hieroglyphic method of writing, and bearing the same relation to the latter that our ordinary written hand does to printed characters. Hieratic script resulted from attempts to simplify the forms and outlines of the ideographic characters employed in hieroglyphic writing, which is essentially a combination of picture-writing with a phonic system. Hieroglyphics in ancient Egypt were the written language of the people, and hieratic writing was chiefly confined to the sacerdotal caste.

The Papyrus Ebers is so marvellously well preserved that not a single letter is lacking in the entire roll. The material of the papyrus itself, the inner bark of *Cyperus papyrus*, was examined by Professor Schenck, professor of botany in the University at Leipzig, who established its identity with that of similar rolls, and pronounced it of remarkably good manufacture.

The age of the manuscript was determined by a consideration of three points: 1. Palæographic studies of the form of the written characters; 2. Occurrences of names of kings; 3. Examination of a calendar which occurs on the back of the first page. These data enable Ebers to assign the writing to the middle of the sixteenth century, or more precisely, 1552 B.C. Accepting the date—and it has been established beyond reasonable doubt—the writing was prior to the exodus of the Israelites; in fact, according to the commonly received chronology, Moses, in 1552 B.C., was just 21 years of age.

The authorship of this ancient treatise is not revealed but it bears internal evidence of being one of the six Hermetic books on medicine named by Clement of Alexandria (200 A.D.) The Egyptian priests, who were also the physicians, in order to give greater authority to their writings, were wont to ascribe them to their gods, and their codified medical knowledge was generally ascribed to the god Thut (or Thoth). In proof of this Ebers quotes the following passage from page 1, lines 8 and 9, of the papyrus in question:—

"Ra pities the sick; his teacher is Thuti, who gives him speech, who makes this book and gives the instruction to scholars and to physicians in their succession."

This god Thuti, also written Thoth and Taant, is the famous Hermes Trismegistus of the Greeks, the same who was regarded by the alchemists of the middle ages with superstitious reverence as the father of alchemy. However this may be, historians accord in representing Hermes as the inventor of arts and sciences, and that he first taught the Egyptians writing, invented arithmetic, geometry, astronomy and music; gave laws to the people, and regulated their religious ceremonies. At the time of Jamblichus, A.D. 363, the priests of Egypt showed 42 books which they attributed to Hermes (Thuti). Of these, according to that author, 36 contained the history of all human knowledge; the last 6 treated of anatomy, of disease, of affections of the eye, instruments of surgery and of medicines. The Papyrus Ebers is indisputably one of these ancient Hermetic works. A study of the synopsis of the contents given in part below will justify this belief.

The recipes and prescriptions contained in the treatise are evidently collected from various sources, some of them being quoted from still more ancient writings. It bears internal evidence of having been used in the healing art, for the word "good" occurs in the margin in several places, written in a different handwriting than the body of the work and with lighter coloured ink. Ebers thinks the compilation was made by the college of priests at Thebes, basing his conjecture partly on the locality in which it was discovered.

Ebers gives a synopsis of the contents of the entire work and a literal translation of the first two pages of the roll, reserving a fuller translation with commentary for a future publication. A hieroglyphic translation of a portion of the Hieratic manuscript also accompanies the plates; the latter, 107 in number, are faithful and beautiful reproductions of the original papyrus in the same yellow-brown colour. The second volume contains a hieroglyphic Latin glossary by Stern and the remainder of the plates. Before proceeding to give details of its contents, one more peculiarity is worth mentioning. Though the pages are carefully numbered, the figures 28 and 29 are omitted, while the text is continuous. Ebers conjectures that the writer accidentally forgot his count or abstained from using these numbers for superstitious reasons.

As already remarked, the work is divided into chapters or sections. A fair insight into the character of the treatise may be obtained from the selected headings of sections and extracts here following:—

Headings of selected chapters. The numbers refer to the pages of the papyrus:—

1. Of the preparation of medicines.
25. Of salves for removing the *uhan.*
47. Catalogue of the various uses of the *Tequem* tree.
48. Medicines for alleviating the accumulation of urine and diseases of the abdomen.
55. The book of the eyes.
65. Medicaments for preventing the hair turning grey, and for the treatment of the hair.
66. Medicines for forcing the growth of the hair.
79. Salves for strengthening the nerves and medicines for healing the nerves.
85. Medicine for curing diseases of the tongue.
89. Medicines for removal of lice and fleas.
91. Medicine for ears hard of hearing.

99. The secret book of the physician. The science of the beating of the heart and the knowledge of the heart as taught by the priestly physician Nebsecht.

Verily: "There is no new thing under the sun." Chapters 65, 66, 79 and 89 show that hair invigorators, hair dyes, pain-killers and flea powders were desiderata 3400 years ago.

Ebers encountered immense difficulties in the work of deciphering this papyrus on account of the large number of technical terms. As an example of the obstacles met, he gives the following literal translation of a diagnosis beginning on Plate xxxvi., line 4:—

"Rules for the *re-het*, that is, suffering in the pit of the stomach. (Pylorus or cardia.) When thou findest anybody with a hardening of his *re-het*, and when eating he feels a pressure in his bowels (*chet*), his stomach (*het*) is swollen and he feels ill while walking, like one who is suffering from heat in the back, *tau nu peht*, then look at him when he is lying out-stretched, and if thou findest his bowels hot and hardening in his *re-het*, then say to thyself this is a liver complaint, *sepu pu n merest*. Then make thyself a remedy according to the secrets in botanical knowledge from the plant *pa chestet* and from scraps of dates. Mix it and put it in water. The patient may drink it on four mornings to purge his body. If after that thou findest both sides of the bowels (*chet*), namely, the right one hot, and the left one cool, then say of it: That is bile. Look at him again, and if you find his bowels entirely cold, then say to thyself: His liver (?) *merest* is cleaned and purified: he has taken the medicine *sep nef sep*, the medicine has taken effect."

In view of the direction to look at the patient "when lying out-stretched," it is curious to note that (according to Dunglison) the priestly physicians of Egypt are said by Diodorus to have formed their diagnosis principally on the position which the patient assumed in bed.

The following is the translation of the first four lines of Plate 1:—

The book begins with the preparation of the medicines for all portions of the body of a patient. I came from Heliopolis with the great ones from *Het aat*, the lords of protection, the masters of eternity and salvation. I came from Sais with the mother goddesses, who extended to me protection. The lord of the universe told me how to free the gods from all murderous diseases.

The work abounds in prescriptions, of which the following are samples:—

Beginning of the Book of Medicines. To remove illness from the stomach. Rub up the seed of the *thehui* plant with vinegar and give the patient to drink.

The same for sick bowels.

Caraway Seed	$\frac{1}{64}$	dram.
Goose Fat	$\frac{1}{8}$	"
Milk	1	tenat.

Boil, stir and eat.

The same:—

Pomegranate Seed	$\frac{1}{8}$	dram.
Sycamore Fruit (?)	$\frac{1}{8}$	"
Beer.	1	tenat.

Treat as above.

In the original the arrangement of the substance and quantities in two columns is the same as here given. The weights are written in red ink. Other prescriptions contain reference to pills made by mixing certain substances with honey and rolling them into little balls. The weights and measures in this unique work deserve a longer notice than space will permit. Certain characters with dots above them represent weights, and a series of special signs indicate measures of volume. The unit of weight employed is believed by Ebers to bear a close relation to the later Arabic dirhem, or dram, which is equivalent to about 48 English grains. But owing to the smallness of the quantities given in the prescriptions, the unit is probably double the dram in value. This unit is represented in hieroglyphics by a spindle-shaped figure, and divisions of this unit into eighths, sixteenths, thirty-seconds, and sixty-fourths, were indicated by arbitrary dots and other characters placed beneath the sign of the unit, in certain positions; the fractions $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, always recurring, and $\frac{1}{10}$ predominating; a quartenary arrangement which was superstitiously regarded as beneficial.

The unit of volume is thought to be the *tenat*, which is equivalent to six-tenths of a litre. This unit and its subdivisions are represented in the Hieratic script by arbitrary signs. When equal parts of the components of a prescription are taken, the fact is indicated by a light short vertical dash placed opposite each substance.

Ebers states in his Preface that notwithstanding there are to be found in this wonderful work many incantations and conjurations from which the priestly physicians could not abstain, still there is no hocus-pocus or gibberish in it. On the contrary, it shows that it was possible to write in the sixteenth century, B.C., complex recipes, and that it was then understood how to administer with care the medicines prescribed. Moreover, sorcery was forbidden in the ancient times in the strongest manner, and the alchemist magi were punished in the reign of Rameses III. with death. The art of the physician was lost in the post-Christian era; science became more and more tinged with magic, and was gradually obscured and degraded by it.

The librarian of the Astor library says, with reference to the intrinsic value of this papyrus: "It is hardly possible to exaggerate the literary, scientific and historical importance of this remarkable document. It is the largest, best preserved and most legible text in the language of hieroglyphics, and does not speak vaguely of incomprehensible and fantastic ideas, but furnishes indubitable insight into different phases of the life of the ancient Egyptians."

MEDICATED ICE.

The possibility of using frozen antiseptics in medicine was recently pointed out by Mr. Edward Martin, of Weston-super-Mare, in a letter to the *Lancet*, from which the following is taken:—

"Every practitioner has at times to face the difficulties of the scarlatinal throat in young children. It may sadly want topical medication; but how is he to apply it? Young children cannot gargle, and to attempt the brush or the spray often fills them with terror. In many cases neither sternness nor coaxing avails. Yet these little ones in almost every case will greedily suck bits of ice. This has long been my chief resource where I could not persuade the child to submit to the sulphurous acid spray. Lately I have been trying an ice formed of a frozen solution of the acid (or some other antiseptic). Though, of course, not so tasteless as pure ice, the flavour is so much lessened by the low temperature, and probably also through the parched tongue very little appreciating any flavour whatever, that I find scarcely any complaint on that score from the little sufferers; they generally take to it very readily. The process of making it is simple. A large test tube immersed in a mixture of pounded ice and salt is the only apparatus required, and in this the solution is easily frozen. When quite solid, a momentary dip of the tube in hot water enables one to turn out the cylinder of ice as the cook turns out her mould of jelly. I have tried the three following formulæ, all of which answer, though I think I prefer the first:—

1. Sulphurous acid, half a drachm; water, seven drachms and a half: mix and freeze.
2. Chlorate of potass, one scruple; water, one ounce: dissolve and freeze.
3. Solution of chlorinated soda, half a drachm; water, one ounce: mix and freeze.

However, the form is of secondary importance, as each practitioner can construct his own. Boracic acid, salicylic acid, or any other harmless antiseptic with not too much taste, would, doubtless, be as useful as those indicated."

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THE RECTIFICATION OF THE REGISTER.

THERE does not appear to be a sufficient acquaintance in some quarters with the fact that the rectification of the 'Register of Chemists and Druggists,' a duty imposed upon the Council of the Pharmaceutical Society by the provisions of the Pharmacy Act, 1868, was intended for the protection of the public rather than as a means of protecting chemists and druggists in the exercise of their business. The terms of the Act are, in this respect, very precise; for instance, the very preamble sets forth this principle by stating that "whereas it is expedient *for the safety of the public* that persons keeping open shop for the retailing, dispensing, or compounding of poisons, and persons known as Chemists and Druggists, should possess a competent practical knowledge of their business, and to that end," etc., etc. To that end also, persons assuming the title of chemist and druggist are to be qualified by registration, and the Council of the Pharmaceutical Society is charged with the keeping of the Register through its officer the Registrar. With the same object in view it is provided by section 12 that "any entry in the Register which shall be proved to the satisfaction of the Council to have been fraudulently or incorrectly made, may be erased from, or amended in the Register, by order in writing of the Council of the Pharmaceutical Society." Lastly, it is provided by section 15, that any person using the title of chemist and druggist, not being duly registered, shall be liable to a penalty of five pounds.

These provisions are so explicit, and their object is so clearly set forth that it is scarcely possible they can be misunderstood by any one who takes the trouble to read the Pharmacy Act. It is equally clear also that it is the duty of the Council and the Registrar to take proceedings against persons who carry on the business of chemist and druggist without being properly registered. But notwithstanding all this, an attempt to enforce the Act appears to be sometimes regarded as a species of persecution, instigated either by personal interest or vindictive feeling on the part of the Society's officials. In a case reported in the present number it appears that some such motive had been suggested by the defendant or his solicitor, for the judge took occasion to express his opinion that "so far from thinking there was any vindictive feeling on the part of the Council of the Pharmaceutical Society, he thought it would be failing in its duty if it neglected to put the statute in operation against men trading as chemists and dealing in such deadly poisons without due qualification."

In a similar case reported last week, the defendant complained that having paid a fee of five guineas to be put on the Register, he was six months afterwards struck off the Register, as he alleged, without any sufficient reason, and he contended that in these several particulars he had been unfairly treated.

At first sight it no doubt appears somewhat hard that a person who has served his apprenticeship to a chemist and druggist, and as he alleged, carried on business for himself prior to the time specified by the Act as limiting the right to be registered, should be prosecuted as infringing the Act; but a little examination, even of the evidence given when the case was heard, will show that any hardship the defendant laboured under was due to his own neglect and to other circumstances which left the Council of the Pharmaceutical Society no alternative but to proceed against him.

Taking, in the first place, his own statement, that he paid the sum of five guineas in March, 1871, to be put upon the Register, it becomes evident from that circumstance alone that he neglected to comply with the requirements of the Act providing for the case of persons who had been in business prior to August, 1868. Persons who were chemists and druggists within the meaning of the Act at the time of its passing were, according to Section 5, entitled to be registered without paying any fee for such registration. All that was required of them for that purpose was that they should give notice in writing to the Registrar on or before the 31st December, 1868, and that they should furnish at the same time a certificate, signed by a duly qualified medical practitioner or magistrate, declaring that to their knowledge the claimant was in business as a chemist and druggist, etc. It was only in the event of failure to comply with this very simple requirement that it was provided the person claiming registration should pay the same fee as persons admitted to the Register after examination under the Act.

It is therefore evident that the five guineas paid by the defendant in the case now referred to was to be regarded as a fine, self-imposed by his own negligence, and that no reasonable ground of complaint lies against the officials of the Society on that score.

This, however, is not the only default of the defendant, for his own defence admits that the medical man who signed his certificate subsequently withdrew his name. The fact was that he could not certify as required, that to his knowledge the defendant had been in business before August, 1868. That being the case, there was again no alternative but to proceed under the Act, and remove the name from the Register. Any inconvenience or hardship experienced by the defendant in consequence was therefore really due to his having failed to take proper precautions to secure his own interests. And when it is considered that in the case now referred to, proceedings were taken only quite recently to enforce the provisions of the Act in regard to non-registered persons carrying on the business of chemist and druggist, it will be evident that considerable leniency was manifested.

We have thought it requisite to bring this matter forward thus prominently, because the plea of hardship is often urged in such cases, and it is naturally calculated to produce some impression with the judges who try such cases, although there is no real ground for it. The duty of having to prosecute offenders against the Pharmacy Act in this particular is in itself sufficiently distasteful to a Society whose main objects are rather to promote education and the cultivation of sciences connected with the practice of pharmacy than to take the position of public prosecutor. The function, however, is imposed upon the Pharmaceutical Society and the performance of it is a duty which the Society owes no less to the public at large than to properly registered members of the trade whose interests it is also bound to protect.

CHLORAL HYDRATE.

THE medical papers, in noticing the recent cases of death from overdoses of chloral, express themselves very decidedly as to the necessity of placing this substance in the poison schedule of the Pharmacy Act. The *Lancet* says, "There can be little question that the sale of chloral ought to be placed under the same restrictions as that of opium." The *Medical Times and Gazette* says, "These matters certainly demand immediate attention, and we hope that stringent restrictions will at once be promulgated with a view to the prevention of such lamentable occurrences as those we have recently had to chronicle." The *British Medical Journal* also says, "We believe that the reckless use of chloral and chloroform constitutes a crying abuse, which it is the duty of the medical profession sternly to repress. Patients are too apt to assume a wide discretion in the use of narcotics if the administration be placed at all in their own hands."

At the late inquest at Exeter, moreover, some of the jury expressed the opinion that the sale of chloral should be placed under the same restrictions as the sale of poisons. We understand also, that in reference to this case some of the chemists and druggists in Exeter have had a conference with the Members of Parliament for that city, and represented to them their opinion that the sale of poisons under the Patent Medicine Act, should be in some way assimilated to their sale under the Pharmacy Act, 1868, pointing out the expediency of this being brought under the notice of the Government during the coming session.

PROPOSAL FOR A HANBURY MEDAL.

A COMMUNICATION that we have received from Professor DRAGENDORFF of the University of Dorpat bears fresh testimony to the place which the late DANIEL HANBURY had attained in the esteem of foreign pharmacists. The occasion for the communication was the recent proposal to establish a HANBURY medal; the sufficient justification for it will be best given in his own words: "I incline to the opinion that our science is confined to no single nationality, and that consequently he who labours for the advancement of pharmaceutical science acquires an international importance. Just such an eminent international position, I think, had HANBURY taken. An Englishman by birth he lived and worked for all civilized peoples. If his memory is to be honoured, his international reputation should be taken into consideration." With respect to the institution of some such prize, Professor DRAGENDORFF makes the following propositions:—

"1. That the Pharmaceutical Society of Great Britain should found, eventually with the co-operation of all other English and foreign pharmaceutical associations, a large gold medal, an award of which, under the name of the HANBURY Medal, should be made annually, about the date of Mr. HANBURY'S death, as the highest distinction which the Society can bestow.

"2. That the medal should be adjudged, through a committee appointed by the Pharmaceutical Society, to a scientific man who has especially distinguished himself by genuine *original research* in the domain of pharmaceutical science, or better still, the natural sciences that have a bearing upon pharmacy. The results of such research should have been published either as a separate work or as a memoir in a journal at least one year but not longer than five years before the award of the Medal, and should be written in any one of the principal European languages. In the selection preference should be given to the labours which may have the most lasting influence upon pharmacy or which open up a new field for investigation.

"3. The HANBURY Medal should be open to an author for more than one work, if these were in accordance with the requirements of paragraph 2; and in making the selection from several authors equally worthy, preference should be given to the one who has carried out the most important original investigations within five years.

"4. A person who has obtained one 'HANBURY Medal' should not be eligible to receive another for the next five years.

"5. There should be *no competition* for the HANBURY Medal. The choice by the Committee of the Pharmaceutical Society of the person to receive the medal should be absolutely free; it should be subjected to no pressure either by solicitation or correspondence. It would be well even that the names of the awarders of the medal should not be published, but treated as a matter of confidence. Evidently the decision of the Committee should be under the control of the Pharmaceutical Society and receive its sanction."

THE NEXT EVENING MEETING.

AN Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, February 2nd, when the chair will be taken at half-past eight precisely. The papers to be read are—"The Best Form of Blistering Fluid," by JAMES DEANE, F.L.S., and "The Composition of Pilula Hydrargyri, B.P.," by HAROLD SENIER.

Provincial Transactions.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The first meeting of the eighth session of this Association was held at the new rooms of the Association, Britannia Chambers, Pelham Street, on Friday, Nov. 5th, 1875, the President, Mr. J. H. Atherton, F.C.S., in the chair. There was a large attendance of members and associates.

The Hon. Secretary (Mr. Roberts Jackson) reported that the *Pharmaceutical Journal* had been regularly received, also the 'Year-Book of Pharmacy,' and the 'Calendar of the Pharmaceutical Society,' and that donations to the museum had been received from Mr. Dudgeon and Messrs. Butler and McCulloch, consisting of specimens of dried leaves of plants. A hearty vote of thanks was awarded to the respective donors.

Four new members and thirteen associates were elected.

The President then delivered the following address:—

"Many of you may feel some surprise at my presence in this chair to-night, as again President of the Nottingham and Notts Chemists' Association. I am almost surprised myself, and I should not have been easily induced to again undertake the responsibilities of the position had the society been in a secure and prosperous condition. I am sorry to say such is far from being the case. I feel that a crisis in the affairs of the Association has arrived, and, as the founder, and being, perhaps, more responsible for its success than any other member, I have again undertaken the duty imposed on me at the annual meeting, of making one last expiring effort to resuscitate a society which has been in past years, and may easily be again, of great and lasting benefit to the chemists in this town and district. I feel something like what a captain of a ship may feel in taking the helm when it has drifted amongst breakers and sunken rocks. The ship is good and sound, and if the crew will only support the captain, we may weather the storm, and once more get into smooth water and easy sailing.

"It is my privilege, as your president, to occupy the first meeting by the delivery of an address, on what I consider may be a suitable subject. This is always a difficult matter to decide. My own inclinations would lead me to select a subject of general interest—such as the progress of pharmacy during the year, or the general political aspect of pharmacy in this as compared with other countries; but under the present circumstances it appears to me that the chief matter of interest to-night, as members of this society, is the welfare and even the existence of it. We are assembled here to inaugurate the eighth session, and, as I intend being candid and outspoken in my remarks, I may say this is the most important session in the history of our Association. On the success or failure of the session depends the existence of the society; and I therefore feel it my duty to bring before you to-night an expression of some thoughts and reasons of my own, on the question of "Local Associations: their Uses, Influence, and the Best Means of carrying them to a Successful Issue;" and to address a few words of advice to the students, for whom these societies have been chiefly established. But before entering on that subject, I wish to express my regret, and, I am sure, the regret of every member of this Association, that our late excellent President, Mr. Fitzhugh, would not allow himself to be nominated again to that office. I regret this the more, because I know him to be so thoroughly competent to occupy the position with credit to himself and advantage to the society. No one has taken a warmer interest, none worked harder for its success; and, I say again, that it is a matter of regret to me that owing, as I believe, to the want of support on the part of the members, he has resigned the position I now hold.

"Let us consider for a few moments what is the necessity for societies like this, and in whatever remarks I may make I hope I shall not be accused of "highflying," or of exaggerating the case. We must look at the present aspect of dharmacy generally, and not confine ourselves to the narrow limits of provincial towns.

"Pharmacy of to-day is different to what it was twenty years ago, and it is proable that ten years hence the difference will materially increase. Ten years ago, regardless of position, education, or qualification, any person could open shop for the sale of poison and the dispensing prescriptions. The position of chemists and druggists has always been considered a more respectable one than other trades, and one yielding a large profit on a small outlay. This very circumstance has been the means of producing the hardships many of us have now to bear. The trade has been wofully overstocked by a lower class of men; the legitimate portion for twenty has had to be divided by forty. Competition, whetted by the false economy of the public, effectually reduced prices. The fair-dealing and honest chemist, selling the best things, has had to compete with those who, having little to lose, managed to gain a precarious living by underselling their neighbours. We cannot wonder that our heterogeneous ranks have brought our calling into some disrepute.

"It was in obedience to the law of progression, and to remedy this state of things, that the Pharmaceutical Society was formed, and, as you know, carried on its uphill work, to raise the standard of pharmacy and pharmacists, in the face of enormous difficulties. You know as well as I do how the Society was "pooh, poohed" by the great majority of the trade, who feared the great revolution which has since taken place, and wished to continue as their forefathers had done, regardless of public safety.

"The Pharmaceutical Society obtained its charter of incorporation, and continued as a voluntary educational body to infuse a higher spirit and tone into the trade, and succeeded in a marvellous manner; but it was not until 1868 that compulsory powers were granted to it. But, although the Pharmaceutical Society obtained what it had been struggling for for so many years, the progress of true pharmacy received a severe check by that Act. It was never the intention of the founders and leaders of that Society that the Minor examination should be the qualification for persons in business. The "Minor" was always intended as the qualification for an assistant, the Major examination being the proper qualification for the legitimate practitioners of pharmacy; and it has always been a matter of regret that Parliament interfered to make the lesser qualification the legal one.

"By the passing of the Act of 1868 the aspect of pharmacy was entirely changed. I need not recapitulate the clauses or effects of the Act, as they are well known to you all. After a certain date, all wishing to commence business and keep open shop for the sale of poisons and dispensing prescriptions were bound to pass the Minor examination of the Pharmaceutical Society, the Major examination being for those who wished to take the highest position in pharmacy, as pharmaceutical chemists.

"And now for our position in relation to pharmacy. The discussion as to our claim to be professional has been long, and opinion is still divided. My opinion is that our business or calling is essentially that of tradesmen. We buy in the best and cheapest market, and sell according to our position and opportunities; but we so far differ from ordinary tradesmen that, although we buy and sell, we have responsibilities which do not attach to them. In our hands is the responsibility of carrying out intelligently the intention of the medicial man; on our shoulders rests the responsibility of supplying the necessary drugs and preparations on which the physician relies to palliate and relieve the symptoms he is called upon to watch. The physician relies upon the physiological action of each drug; and upon its purity and the carefulness of its manipulation depends the success of his treatment, and possibly the life or death of a patient.

"To properly select the drugs, make the various pharmaceutical preparations, and dispense the prescriptions, is the duty of a chemist. To carry out his part of the compact, he must have a knowledge of chemistry, botany, materia medica, posology, and a certain amount (the more the better) of Latin. The object of the Act of 1868 was to ensure that those practising pharmacy should really understand their duties, and by means of the prescribed examinations give to the medical profession and the public a sufficient guarantee of their fitness.

"This is the immediate effect of the Pharmacy Act, but our responsibilities go further. Having a certain recognized scientific status, our professional training will be used by the public, as analysts, as advisers in sanitary matters; duties which have previously been performed, often inefficiently, by members of the medical profession, will in time devolve on the pharmacist. Many pharmaceutical chemists now occupy the important and honourable, but badly-paid, position of public analysts; and it is generally admitted that their scientific and practical knowledge, their business habits, and trained qualities of close observation and carefulness, render them particularly fit for such a post.

"Such is the present position of pharmacy, and a brief sketch of what is expected of its followers. It would not become me, in an address of this nature, to confine my remarks to the actual condition and wants of any particular district, or to the experience of those who are carrying on business at the present time. This is a progressive age. We must not only consider our present wants and conditions, but prepare for what pharmacy may and will become.

"So much for the demand for knowledge; what about the supply? Are we all in a position to give our apprentices the necessary scientific information to fit them for their future work? How far is the daily routine in our establishments calculated to prepare those whom we have undertaken to teach the art and science of pharmacy, for the examinations of the Pharmaceutical Society. It was to meet this difficulty that this Association was established in 1868, and or a few years it was well supported by both masters and young men. After a time the novelty seemed to wear off, and so did the attendance at the various meetings. At our evening meetings it was no compliment to ask gentlemen to read papers, on account of the very slight attendance, therefore papers got scarce, and so did our meetings, until last session we had only two, one of which was to discuss the provisions of the Irish Pharmacy Act—which was poorly attended. The other was to discuss the provisions of mine host at the "Maypole" Hotel, on the occasion of the annual supper, at which nearly all the members were present.

"The vitality of the society could not get lower, and a meeting was held to consider whether or not the society should be continued as an educational body. The unanimous voice of that meeting, which was numerously attended, was given in favour of carrying on the society. Officers were appointed, and we are here tonight to inaugurate the eighth session, to see whether, with revived interest on the part of members and associates, and increased energy on the part of the executive, the society cannot, phœnix-like, rise out of its ashes, and be once more the centre of pharmaceutical education in this part of the Midland Counties.

"An agreement, however, to be such, must be between two or more parties. I, as your president, and my colleagues on the council, accept your decision, and will put all the energy we possess on our part to carry out the work for which the Association was established, if you on your part, as members and associates of the society, give your personal sympathy and co-operation in every possible way. We do not stand alone in respect of this want of sympathy, to which I have rather strongly alluded. It is the complaint of nearly all local associations. But I feel most strongly that, within certain limits, the leaders of such associations must keep up as far as they can their educational work. We have no motive but that of providing such education as is required; we have no hope except in the common sense of the members and associates in assisting our efforts—at all events to direct the studies of those for whose future we are in a great measure responsible. I would most earnestly appeal to those gentlemen here to-night, who are members of the Association, to make some little sacrifice in supporting the work. I think we are morally bound to support an Association formed to do the work we cannot do for ourselves. We have already your subscriptions, we now want your presence at the meetings, which are only held monthly; and we want your influence with those in your employ. Give us your presence at first, if you please, as a duty, it will then, I hope and believe, soon become a pleasure as well.

"I believe that this society and its meetings have been a source of real pleasure to all who have attended them. Many sincere friendships have been formed. Gentlemen who had previously only looked upon each other as opponents in business have, by frequent and friendly intercourse, found that these "black sheep" were really good fellows. Misunderstandings and supposed grievances have rolled away like mist, and mutual respect has been the result. It is astonishing the difference in the aspect, when looked at through the eyes of jealousy and friendship! Personally, I may say that by means of this Association I have made friendships which I hope are lifelong.

"I do not want to soar to the unattainable; but I do say that great and general good must result from association. Chemists, as a rule, are a sociable body; by meeting together, sometimes for business and sometimes for pleasure, matters affecting the well-being of the trade may be talked over in a friendly way; hours of business may be curtailed; sharp practices may disappear, and it may in time even be possible to discover that our profits cannot be further reduced, and that a step in the other direction, if *unanimous*, would be *desirable.*

"To our students I would make an appeal as earnest as I have the power.

"No amount of combination or sacrifice on the part of masters will be of service, unless the same spirit is manifest on your part. You have gathered from my remarks what is expected of you in the future. Believe me, it is not exaggerated in the least. We, as masters, sometimes at considerable inconvenience and sacrifice of time, make these educational arrangements for you, because we are convinced of their absolute necessity. Our experience is greater than yours; we know better what is expected of you, and for your own sakes earnestly advise you to get whatever knowledge and education you can while you are young. We wish to draw round us all young men, who in preparing for their examinations are preparing to take up their positions as the pharmacists of the future. The fee is purposely made nominal.

"I should be the last to recommend all study and no recreation. The old adage says that "All work and no play makes Jack a dull boy." We may fairly reverse it, and say that "All play and no work makes Jack a fool;" but a judicious mixture will promote wisdom. I hope and feel sure that masters will make an effort to afford time for both study and recreation. The time of your apprenticeship is golden; you have four or five years in which to ground yourself in the details of your business. In the first place, remember that business is your first consideration. No matter the nature of your work, it must be done with cheerfulness and alacrity. The more you attend to every-day shop work the more will your master feel inclined to increase your opportunities for both study and recreation. Remember always that your work in the shop is all practical knowledge, never thrown away whatever its nature. It is the foundation, the rock on which the superstructure of your education must be founded. Don't look upon your work as a mechanical drudgery, but as a means to an end. Think not so much of the work itself as of the principles involved. Do everything intelligently, and with an inquiring mind; and if there is anything you do not understand, never leave the matter until you have bottomed it.

"As for recreation, each one has his own particular ideas, and I would not put too much pressure on you as to the means you take to procure it, so long as it is healthy and sound. The chief thing to be observed in seeking it is health and relaxation. But as botany is one of your subjects of study, and as you are already studying that science, or about to do so, I would strongly recommend the relaxation of country walks—botanical rambles. In the spring and summer months there cannot be a more fascinating study, or even relaxation, than botany, studied in the fields and lanes. With a small outlay for a pocket lens and a collecting case you are equipped for the most profitable and delightful recreation.

"It may be said that you have little time for such walks. In reply, you must remember that most of you can have two hours in the morning, from six to eight, at least. The country lanes are close by, and a handful or caseful of plants and flowers, gathered during your hours of recreation, will furnish you with plenty of work during your hours of confinement, if such you have, after business.

"The most important point, however, is the nature of your studies, and how to study economically as regards time.

"I will presume that you have passed your Preliminary examination, which ought to be overcome before you are bound as an apprentice. If you have not, devote your time entirely to that one subject.

"To commence with the daily routine of the shop, lose no opportunity of becoming acquainted with the physical characteristics of the drugs, chemicals, etc., with which you come in daily and hourly contact; the old as well as the official names of medicines, the proportion of active ingredients, the action of one drug on another, the solubility of salts. Make a point of going over in the evening or in your leisure, the work you have done during the day, and solidify the practical knowledge thus gained, by reference to your books.

"For example: If you have been making a tincture, notice the physical characters of the drugs, the part of the plant, its appearance, colour, smell, the nature of the menstruum, and afterwards ask yourself why proof or rectified spirit was used, what the action of the menstruum, what constituent of the drugs would be dissolved, the natural order, habitat, and history of the drug. Ask yourself the "Reason Why," and don't rest until you know. Make a point of attending one or more of the courses of lectures, arranged for you, according to your opportunities. Take notes of the lecture, and read up the subject to yourself, when you get home. In our library you will find suitable books, both for reading and reference.

"If convenient, attend one or two evenings in the week at the Rooms of the Society, for mutual improvement and mutual assistance. Examine and study for yourselves the various drugs and chemicals in the museum, until you can detect the true from the false. By working thoroughly and systematically in this way, you will acquire the very best foundation for your future position, and prepare yourself well for your examinations. The examiner can detect at once the difference between this systematic work and that false system which has been so much in vogue the last few years, and which is popularly known as "Cram." If all students going up for examination, who have been fortunately placed where these local associations are in existence, had ground themselves up in the way I have endeavoured to point out, we should not have had to lament a regular failure of 70 per cent. of the students in the Minor examinations during the last two years.

"I have endeavoured to show you how far you may, legitimately, by the aid of the society, get well grounded in your subjects, pass your examinations with credit, and above all retain the knowledge obtained.

"Let us look for a moment at the reverse side of the picture, in which the apprentice (student he is not) goes through his time almost blindfold; cares for nothing so long as he can enjoy himself according to his fancy, after business hours; and regardless of repeated warnings, refuses to study. At the last moment he finds himself face to face with the difficulty, so repeatedly thrust aside. In despair, he looks round for an escape from his dilemma, and at once goes to the professional crammer, under whose guidance, and for a certain or uncertain time, he is prepared for the obnoxious examination. His mind and memory are overladen with condensed matter. He simply becomes a machine in the hands of a mechanic, who is paid to produce certain results in a given time, regardless of the value of the machine afterwards. If he is lucky, and the examiners happen to ask the subjects on which he is crammed, the candidate may pass, and go forth to the world with a false diploma of competence, and is ignorant.

"The object of study is to gain knowledge; the object of examinations to test knowledge—to exclude the unqualified; and to borrow Mr. Giles' words, in a recent address to the students of pharmacy at Bloomsbury Square, the object of "Cram" appears to be to "pass the unqualified."

"Which of these pictures is the most pleasing to you? Adopt that which appears to you the most honourable. I know which that will be. Show during the coming session that you can and will support your master and the council of this Association, in their efforts to start you well from this our good old town of Nottingham; and that no action on your part shall disgrace the Society which has and will continue to give you every help and assistance.

"A few words as to what we purpose to do this session will bring my long and, I fear, rambling dissertation to a close. As you see, we have taken, or partially taken, a room, where we have our museum and library, and in which we hope to have many agreeable evening meetings. The museum is young and lacks contributions, still, as far as it goes, it is efficient. The library is small, but good. It is the intention of the society to appoint a librarian, who shall attend in this room two evenings a week, on which occasions it is intended to have a fire, and make the room useful as a reading room, and for purposes of mutual improvement; and we invite the associates to make good use of it as such. Should the library be much used, we hope to enlarge it.

"The council have connected themselves with the Science and Art Department, and have arranged for special classes on chemistry and botany, to be held on Thursday afternoons, one at three, the other at four o'clock. This arrangement was made because it was considered more to the advantage of the students than at night, when their energies might be more exhausted, and when counter attractions might detract from the attendance. The council have decided to offer two prizes in each class, to be given to the two associates who stand highest in the pass list of the Science and Art Department Examination.

"As the examinations of the Pharmaceutical Society now include a little knowledge of practical chemistry, it is of the greatest importance that the associates should attend the course on practical chemistry, under the direction of Mr. Copley; and, as a special inducement, the council have arranged to present each associate, who either has already attended a course of lectures on chemistry, or who is attending the course now going on, with free admission to the class for laboratory practice. As our work progresses, we hope to arrange for special lectures on materia medica.

"At the evening meetings, subjects will be brought before you which we hope will be interesting and attractive. If any member will undertake to bring any matter forward, no matter how simple, the council will be grateful. We do not aspire to much original work. Any little practical subject, which may afford information, or require explanation, or give rise to discussions, will give members an increased interest in the meetings. New drugs, new preparations, new apparatus, or novelties of any descriptions, which in our diverse trade are so numerous—all are interesting. Under any circumstances the meetings will be held regularly, and thus our part will be carried out; the rest must be left in your hands.

"In conclusion, I have endeavoured to place before you some thoughts, badly and hurriedly expressed, as I feel them to be, on a subject in which I have always taken a deep interest. I now leave them for your consideration and discussion, and throw the responsibility on your shoulders. If you are of opinion that the society can be of any service, after fairly looking our position in the face, I ask you earnestly to give us your active support in carrying on the work to a successful issue. We want your presence and your influence. If we have these, I shall be sanguine of being able to establish this society on a sound and lasting basis.

"Gentlemen, I thank you for your attendance to-night, and for the kindness with which you have at all times received me. May this meeting inaugurate a new era in the history of the society."

The address was listened to with great attention and Mr. Lomas proposed and Mr. White seconded that "The best thanks of the Association be given to Mr. Atherton for his able and exhaustive address," which was carried with applause. An animated discussion ensued, on the salient points of the address, in which Messrs. Rayner, Fitzhugh, Bolton, White, Lomas and others took part and it was ultimately decided that, with the President's permission, the address should be printed and circulated amongst the members of the trade, in the hope that it would induce gentlemen to take greater interest in the welfare of the Association and give it more personal support.

The second meeting of the session was held at the rooms of the Association, Britannia Chambers, on Friday December 3, 1875. The President in the chair.

After the minutes of the last meeting had been read and confirmed, the Hon. Secretary announced donations to the museum and library and the respective donors were thanked.

Mr. G. E. Smith then exhibited and explained at considerable length a new thermo-electrical apparatus for generating ozone, and on the motion of the President, a hearty vote of thanks was awarded to that gentleman.

Mr. J. Rayner then read a most interesting and amusing paper on "Stray Thoughts on the Pharmacy of the Future" which was heartily applauded. Mr. Atherton opened a discussion, which was carried on by various gentlemen, and a unanimous vote of thanks was given to Mr. Rayner at its conclusion.

Mr. Atherton had kindly promised a paper on "Prescriptions" but owing to the lateness of the hour it was postponed until the next meeting.

OLDHAM CHEMISTS AND DRUGGISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The annual meeting of the above Association was held in the Church Institute on the 6th inst. Mr. John Taylor, President, in the chair.

The Secretary read the report, which stated that during the past year the Association had been somewhat successful. At the first meeting it was decided to open the session by the reading of papers in relation to pharmacy. Several essays on botany, chemistry, materia medica and pharmacy have been given by the members as follows:—"On the Vegetable Cell," by Mr. W. Hurst; "On the Pharmacopœia," by Mr. Wood; "Iodine," and another on "Botany," by Mr. W. Burrows; "Chlorine," and another on "Opium," by Mr. Hall; "The Atmosphere," by Mr. E. Richards; "Cinchona and its Preparations," by Mr. T. Pennington; "Dispensing," by Mr. Taylor; "Ipecacuanha and its Preparations," by Mr. Thatcher.

The Treasurer's statements showed a balance in hand of £1 8*s.* 1*d.*, although there had been some exceptional expenses incurred during the year.

The Association had been again indebted to the Pharmaceutical Society for the Journal weekly, and to the Pharmaceutical Conference (through Professor Attfield) for the 'Year-Book of Pharmacy.'

The election of officers for the ensuing year then took place, and resulted as follows:—President, Mr. John Taylor; Vice-President, Mr. John Wood; Secretary, Mr. Edwin Richards; Treasurer, Mr. Walter Hurst; Librarian, Mr. Walter Burrows.

The President said he was pleased to find that the report read by the Secretary (Mr. Richards) was very encouraging, as was also the Treasurer's (Mr. Hurst's) financial statement, and he saw no reason why the Oldham Chemists and Druggists' Assistants and Apprentices' Association should not be on a level with most of the pharmaceutical societies of Great Britain. This end could only be attained by the united energy of each individual member. The Society had already accomplished some good work since its establishment, and not the least valuable was that relating to the earlier closing of the shops, which had been a great boon to the assistants and apprentices. It had also been the means of assisting its members in the passing of the various examinations. He trusted that at the next annual meeting he should be able to report that some more of the members had passed during the year.

A hearty vote of thanks having been given to the retiring officers, the meeting was brought to a close.

LEEDS CHEMISTS' ASSOCIATION.

The sixth general meeting of this Association for the present session was held in the Science Lecture Room of the Mechanics' Institution, on Tuesday evening January 11th, the president, Mr. Yewdall in the chair. After the usual preliminary business, Mr. Yewdall said, he wished in reply to a question put at a previous meeting "as to whether an Irish pharmaceutical chemist could carry on business under that title in England," to explain, that by the 18th clause of the Irish Pharmacy Act as at first proposed, he could have done so; but eventually this objectionable clause was struck out, and in the second clause of the amended bill the title was made to apply to Ireland only.

Mr. Ward then delivered his third lecture on practical pharmacy, entitled—

SOLUTION: DIFFERENT SOLVENTS, EFFECTS OF TEMPERATURE, DETERMINATION OF BOILING POINT OF LIQUIDS.

Mr. Ward said that owing to the lateness of the hour he was unable at the last meeting to finish his remarks on the drying and powdering of drugs, and he would therefore before proceeding to the subject of this evening's lecture, notice a few more important considerations in connection with those operations. The facility with which substances were powdered depended greatly upon the amount of drying to which they were subjected, but it must be borne in mind that this drying is accompanied by loss of weight and increase of strength, as exemplified by powdered opium. The strength of many articles was also increased in the operation of powdering, by the separation of inert fibrous matter, as in the case of ginger and other roots. In the process of drying, also, many substances lost some of their volatile or aromatic principles, but this loss was probably in most cases fully compensated by the fine state of division to which they could then be reduced. The lecturer here gave the percentage of loss sustained by different gums and roots in the process of drying and powdering, and condemned the custom "which is stated to have existed formerly" of some houses returning weight for weight, goods received for powdering. Some substances as camphor, phosphorus and cetaceum required special treatment. He thought the plan suggested in the 'Year-Book of Pharmacy, 1874,' of adding $\frac{1}{30}$ its bulk of castor oil to the spirit used in powdering camphor a very good one, as it prevented in a great measure the powder from after caking. Other, crystalline bodies, as salt of tartar and soluble tartar, were effectually reduced to powder in quantities by evaporating their solutions with constant stirring.

In treating of solution Mr. Ward remarked at the outset that the preparation of solutions was a most important function of the pharmacist, and afforded room for careful thought and scientific manipulation in dispensing; and in chemical analysis the whole course of procedure was based upon the solubility of the substances operated upon. Simple solution was an operation which consisted in dissolving a body in any given liquid, its prevailing characteristic being that all the matter employed disappeared in the menstruum if the proportion of the latter was sufficiently large. Intersoluble fluids were those which dissolved each other in any proportion, as in the case of spirit of wine and water, and to which the incorrect term of *mixture* was frequently applied. Chloroform and ether in water were given as examples of the *limited* solution of liquids. In speaking of the solubility of solids, water was usually understood as the solvent, unless some other was specially named; its action far exceeding that of all other solvents, there being few compounds not soluble to some extent in it. Opposite examples of the solubility of bodies in water were here given, and the limiting line of the terms soluble and insoluble was stated to be sulphate of lime, 140 grains of which dissolve in a gallon. As a rule the density of liquids was increased by solution, and hence their density was often used as a test of their strength; but this rule did not hold good in the case of some gases, nor yet with all liquids and solids; glacial acetic acid when added to water at first causing an increase, and afterwards as more was added a decrease in density. The manner of solution of solids in liquids had not yet been reduced to a definite law. It might be said "that they dissolve most readily in liquids bearing similar chemical composition." At the same time, some solids having similar chemical composition were not equally soluble; for instance, sulphate of calcium and sulphate of magnesium. The conditions affecting solution were: first, the physical condition of the substance to be dissolved; second, the mode of applying the solvent. The lecturer here pointed out and illustrated the advantage of immersing the material to be acted upon in the upper portion of the liquid, which as it becomes saturated would acquire an increased density, fall to the bottom, and make way for the contact of fresh liquid; herein lay the value of the perforated platform of an ordinary infusion jar. The third condition was elevation of temperature; the soluble powers being usually increased by a rise, but not always, the law of increase of solubility by rise of temperature being liable to many exceptions and limitations. Supersaturation:—Many salts exhibited a point of maximum solubility at some particular temperature; a hot solution of sulphate of soda being cited as an instance of this characteristic property.

In regard to the solubility of gases, the rule was, that the more condensible the gas the more soluble. An opposite mode of procedure should be taken in dissolving gases from that in dissolving solids; a low temperature being more favourable to the solution of the former than a high one. They should also generally be delivered at the bottom of a vessel.

The further consideration of this portion of the lecture, and the determination of the boiling point of liquids was postponed to another evening.

MANCHESTER CHEMISTS AND DRUGGISTS ASSOCIATION AND SCHOOL OF PHARMACY.

The fourth ordinary monthly meeting of the session took place at the Memorial Hall, on Friday, January 14th. Tea and coffee were served at 7 o'clock. The President took the chair at 8, and briefly introduced Mr. Plant, F.G.S., who gave a most interesting and instructive lecture on "The Natural Sources of Petroleum." The lecture was fully illustrated by specimens.

The President in moving a vote of thanks to Mr. Plant brought a specimen of "Vaseline" alluded to by the lecturer more particularly before the notice of members as a substance likely to be of much use as a basis for ointments. It appeared to be a paraffin of very low melting point,—odourless, tasteless, and not acted on by either acids or alkalies.

Mr. Bostock (Ashton-under-Lyne) seconded the motion, which was carried unanimously.

The President called attention to the remarks recently published in the newspapers relative to the Sheffield analyst's report on the dispensing of prescriptions. He said that the office of analyst was a very high and honourable one when properly carried out, and believing as he did, that by far the larger proportion of chemists and druggists were honest, and had every desire to avoid adulteration, there was no favour to ask of the analysts, but that they should do their duty without resorting to petty or frivolous prosecutions, and take care that their reports did not imply more than they intended. The retailer might be greatly harassed without benefit to either the analyst or the public. It behoved the retail druggist to exercise the utmost care in the conduct of his business. Some discussion on a recent excise prosecution for an infringement of the stamp duty followed.

A number of revolving stereoscopes and graphoscopes were lent by the President, Messrs. Mottershead and Co., and Mr. J. B. Payne.

THE REGISTERED CHEMISTS' ASSOCIATION OF LIVERPOOL.

A short time ago a brief notice appeared in the *Pharmaceutical Journal* of the formation of a new association under the above title. Since that time the various office bearers have been elected and some of the contemplated objects carried out, viz., the formation of a price list, the promotion of earlier closing, etc. Another of its objects was inaugurated on Tuesday, January 18, by a number of the members and their friends in the trade dining together. The dinner took place at the Adelphi Hotel, the chair being occupied by the President, Mr. John Abraham, and the vice-chair by Mr. A. Redford.

There were also present Messrs. R. Sumner, J. J. Evans, J. A. Raimes, A. H Mason (President of the Liverpool Chemists' Association), D. Wharrie (Hon. Sec.), J. Shaw (Treasurer), J. Agnew, B. Dickins, J. Edisbury, W. D. Foulkes, J. Fletcher, A. E. Tanner, J. Woodcock, J. Fingland, J. Hocken, R. Parkinson, J. A. Turner, W. T. Warhurst, H. Jackson, W. Wright, J. Ball, A. Stewart, etc., etc.

The company having dined and the usual loyal toasts been duly honoured,

The President proposed the toast of "The Liverpool Registered Chemists' Association." He said, the objects of the Association were known to all—it was intended to benefit all, and it was hostile to none. Moreover, whatever raised the chemists and druggists as a body would increase their usefulness to the public. He believed that the society had already done much good; that the hours of business had been shortened and a better general understanding created. The price book had been, he believed, a decided success. He hoped that members of the Association in their efforts to obtain the earlier closing of shops would not easily be discouraged and that they would not experience any pecuniary loss; he was sure that they would realize an advantage in the increased comfort and health both of themselves and of their families. He coupled the toast with the name of the Honorary Secretary, Mr. Wharrie, to whom the Association was greatly indebted for the valuable time which he had devoted to it, especially in the preparation of the price book.

Mr. Wharrie in acknowledging the toast said he thought there could be no doubt of the usefulness of such a trade organization, even for purposes of defence alone, while chemists and druggists found themselves liable to attacks like those contained in the sensational report of the Sheffield borough analyst, upon which the daily press had not been slow to fill its columns with startling comments. There was no knowing to what extent their reputation might suffer if statements like those were allowed to take hold of the public mind. As a body of tradesmen they did not deserve such sweeping condemnation. The utmost care and accuracy in dispensing medicine was exercised by the great majority of chemists throughout the kingdom, and he could not believe that any one of their body would stoop to the degradation of knowingly withholding one atom of an ingredient from a prescription. The Association originated from a meeting of the registered chemists of Liverpool, on the 9th of March last, called to consider the desirability of forming a price list and the subject of early closing. The work of forming the price list was commenced on the 1st of July; 300 copies had now been printed, most of which he was glad to say had been sold to their own members and to the trade generally throughout the town. Their wholesale friends (whom they were all deighted to see there that night) obligingly allowed notices of the publication to be distributed with their circulars, and in consequence very many copies had gone all over the country, he hoped to be a guide and direction to their brethren elsewhere. They could not but do good wherever they might go, because they were the outcome of much labour and careful deliberation. With regard to the efforts in the direction of early closing, what had been done had not been without fruit. He had received gratifying reports from various members stating that there was a decided improvement in that respect in the several districts. He believed that the efforts made by the Committee had resulted in a *bonâ fide* shortening of business hours among the chemists and druggists generally throughout the town. The success of the Association during the past six months augured well for the future; much, however, yet remained to be done. He thanked the company for drinking success to the Registered Chemists' Association of Liverpool, and coupling his name with the toast.

Mr. Redford, who occupied the vice-chair, proposed the next toast. He said the new society whose inaugural dinner they were then celebrating had his best sympathy and he intended to do all he could to make it a power and a success. He hoped the members would all be united and aim at the elevation of their trade; by respecting themselves and being ever moderate and just in their demands they would in the end secure all they required or ought to expect from the public. He was pleased to be able to report union and success in his immediate district at least in early closing. He supposed it was as an old member and former president of the Liverpool Chemists' Association, that he had been asked to give them that toast, which he did with a great deal of pleasure. The Association had done much good for the trade in Liverpool, and occupied a decidedly high place in the esteem of the country. He was powerfully reminded by their gathering that night of another similar occasion when the Association entertained at a farewell dinner two of their best friends when about to leave our shores to reside in Canada, Dr. John Baker Edwards and Mr. Nathan Mercer. On that occasion he had the honour of having those two much prized co-workers on his right and left hand as guests; and some of them he said that night were disposed to think they would "ne'er look on their like again." But while they had missed them greatly, yet the Association lived on and they had not yet seen its palmiest days. The present session showed the vitality and talent that still characterized its proceedings. He concluded by asking the company to receive the toast of the Liverpool Chemists' Association very heartily, coupling it with the name of the President, Mr. Alfred Mason.

Mr. Mason said he felt it a great honour to be called upon to reply to a toast such as had just been proposed and so very kindly received. During the past seven or eight years he had often felt and expressed the want of a purely trade association, such as they were then met to inaugurate. Seeing the utter impossibility of giving trade questions that important consideration which they demanded, and feeling that the Chemists' Association was not intended as a medium for such discussion, he had systematically opposed their introduction. Sometimes he feared he might have rendered himself obnoxious on that account; if so he could assert that it had been done in good faith and with the best interests of the Association at heart. He now congratulated both Associations on the successful formation of the Registered Chemists and Druggists' Association, and he had every confidence that if unanimously supported it would strengthen the position of the Chemists' Association and help to maintain and increase that scientific standard for which it had a well-earned reputation. The Chemists' Association was now composed of different elements—the Chemists and Druggists, the Scientific Chemists, and gentlemen who had a kindred love of the science—and, including these, might it not perhaps at an early date think of the desirability of altering its title to that of the Chemical Society of Liverpool? With such a title he felt sure the Association would draw into its ranks members from the greatest seats of chemical industry in the whole world in the neighbouring towns.

Mr. Tanner said that in being chosen to propose the toast of "Prosperity to the Pharmaceutical Society of Great Britain," he felt a great compliment had been paid him. As an examined member of that distinguished body he looked with pleasure on the results it had accomplished even during the short ten years in which it had been his happiness to be numbered amongst its members. He was convinced that the public would sooner or later recognize the superior claims of those who possessed its qualifications, and instances were frequently occurring in support of that statement. He said the Pharmaceutical Society had done much for chemists and druggists, and he doubted not would do much more. He would urge younger members of the trade not to rest satisfied until they had achieved the highest step of the ladder. The toast was one which he was sure would commend itself most cordially to all; he had much pleasure, therefore, in proposing "Prosperity to the Pharmaceutical Society," and in coupling with it the name of a well-known and appreciated member of its Council, Mr. Shaw.

Mr. Shaw, in reply, said that he esteemed it a very great honour to have his name associated with the toast of the Pharmaceutical Society of Great Britain, which had been so cordially received by the company. He took it for granted that the majority of those present were well acquainted with the history of the Society, so that he need not enter into any particulars beyond observing that it took its rise in 1841, as a defensive association against projected obnoxious legislation, and also as an educational society. He had pleasure in remarking that he joined the Society in November of that year, and had been connected with it ever since. It obtained a charter of incorporation in 1843, granting certain privileges, and a bill was passed through both Houses of Parliament in 1852, intituled an "Act for regulating the qualifications of pharmaceutical chemists." That act simply gave and protected a title which any one in future might acquire by submitting to an examination as to his qualification, such examination being entirely voluntary. The Pharmacy Act of 1868, however, was of a very different character. No person could henceforth open a shop and carry on the business of a chemist and druggist or sell certain poisons, without passing an examination and being registered under that act, all existing rights being respected. Mr. Shaw referred to having had a seat on the council for nearly five years, and the responsibility of such a position. In alluding to the various departments at Bloomsbury Square, he spoke of the facilities and inducements given to students for acquiring a thorough pharmaceutical education, and paid a warm tribute to the ability of the professors, Messrs. Redwood, Bentley, and Attfield. The examinations he believed to be of a most practical and efficient character, and conducted by gentlemen occupying high positions in the pharmaceutical world. Some of the duties imposed upon the Society by the act of 1868 were not quite so congenial to the feelings of the council, as the educational arrangements. He alluded to those of keeping the register correct, and of the occasional necessity of resorting to legal measures to prevent illegal trading. He could assure the company that the council always felt extreme regret in being necessitated to have recourse to law; but parliament having placed the administration of the Pharmacy Act in the hands of the council, it could not neglect its duty without incurring great responsibility. Two cases had been before the Liverpool Court during the previous week, and verdicts in each case given in favour of the Society. Mr. Shaw then appealed to those present, and also to chemists throughout Liverpool and suburbs, who were not members, etc., to connect themselves with the Society, and thus assist financially and otherwise in defence of the rights in which every registered chemist had an especial interest. He added that there were only about one third of those on the register connected with the Society as members or associates. Mr. Shaw then adverted to the Benevolent Fund, in which also all registered chemists, their widows and children, were interested, and stated that only about 12 per cent. of that body were subscribers to the charity, and that Liverpool had not been forgotton in the distribution of the fund.

Mr. J. A. Turner proposed the "Town and Trade of Liverpool" in a humorous and most effective speech, and coupled with the toast the name of Mr. John J. Evans, of Messrs. Evans, Sons and Co.

Mr. Evans expressed his great satisfaction in being present that evening. He briefly reviewed the trade of the port during the past year and alluded to the decrease in the emigration returns and hoped that the coming year would be an improvement on the last.

Mr. Sumner said the toast he was privileged to propose was "The Registered Chemists of Liverpool and its Suburbs." He was glad that last word was added because it was highly necessary, inasmuch as Liverpool widely differed from some large towns, where it would seem as if the sun's rays were wholly focused in their centre. In looking along the board that night he was struck with the thought that it would be well if their public analyst could see the representative respectability of the Liverpool district, for it gave to his mind a guarantee of the confidence which the public might repose in the faithful discharge of the duties confided to them as a body. They had heard of the carnage and horrors of war, and the most revolting of them all was felt to be associated with those camp followers who had been guilty of robbing the dead, the dying, and the wounded. Nature itself recoiled at the thought of such deeds, but if there were men, who in dispensing a prescription would be guilty, for the sake of filthy lucre, of leaving out a potent and vital medicine upon which the life or death of the patient might hang, they would have no hesitation in placing such an one in the same category with those demons of the battle-field. He did not think the articles published in some of the London newspapers would do either Sheffield, or the general body of dispensing chemists, any harm, for there did not appear to have been any doubt as to their qualifications, and as to the comments which the London paper made that everything should centre in the Apothecaries' Hall of London; this only proved how little the writers knew of what they wrote about. There was one feature the new association presented which would appear to be in keeping with the order of the day in which they lived, *i.e.* that the child should outgrow the parent—the Liverpool Chemists' Association, an association which for many years had stood first in the provinces and for long had done good cause for the Liverpool and kindred societies. One great feature in that association, however, was that it had always been self supporting. But although they had been self-supporting in their home institution they had not failed to come under the strictures of Mr. Shaw in regard to the Benevolent Fund of the Pharmaceutical Society, and needed to note his remarks. He looked forward with hope that the two kindred bodies—the big child and the parent—would work well together, and from the talent which had manifested itself that night it was not too much to hope that again Liverpool would come forward to the head of the local associations. He had pleasure in proposing "The Registered Chemists of Liverpool and Suburbs," coupling with it the names of Messrs. Hocken, Warhurst, Dickins, Parkinson, and Fingland.

Mr. Hocken, after acknowledging the compliment and referring with approval to the new price list, said the long desired object of earlier closing had received a good share of attention, and bade fair to be a success, and last and not least the Association had been the means of bringing the members of the trade together and doing away with a certain amount of exclusiveness and jealousy which was supposed to exist.

Mr. Warhurst believed the establishment of the Association to be a step in the right direction, and felt sure that it would gain strength year by year and be productive of the best results, and he most cordially wished it every success.

Mr. Dickins in a few words acknowledged the kind expressions of Mr. Sumner in proposing the toast.

Mr. R. Parkinson said he looked upon the gathering that night as an index of the fraternal feeling which ought to exist between members of the same profession. He was glad to say that in his neighbourhood early closing had become very general, the public to some extent believing that they (the chemists) were necessitated to close at 9 o'clock, and as a consequence, customers would come rushing up a little before that hour. He was glad to observe that his returns during the past seven weeks in which early closing had been in operation had not decreased but rather increased.

Mr. Fingland also acknowledged the compliment.

Mr. J. J. Evans proposed the health of the President. He had known Mr. Abraham for many years, but many of the company had known him before he (Mr. Evans) was born and were consequently more competent to speak of his good qualities. All must feel indebted to Mr. Abraham for the interest he had always taken in the Chemists Association, and if that society had not succeeded to th extent that many of its supporters had desired the fault had not been Mr. Abraham's.

In acknowledging the toast—

The President said he was very much obliged for the very cordial manner in which the company had drunk his health. It was an occassion of much interest and gratification to him. He proposed the health of their treasurer Mr. Shaw and of their secretary Mr. Wharrie who had been indefatigable in their efforts and to whom a large part of their success was due.

Mr. Shaw and Mr. Wharrie acknowledged the compliment, the former stating that the Association now numbered 140 members.

"The Wholesale Trade of Liverpool" was then proposed, and Mr. John A. Raimes acknowleded the toast.

Mr. Woodcock proposed "The Chemists of Birkenhead and Vicinity" which was responded to by Messrs. Ball, Foulkes and Stewart.

During the evening Mr. Nesbit kindly presided at the piano and some excellent songs were sung by Mr. Mason and Mr. Lunt.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL ASSOCIATION.

THE CHEMISTS AND THE BOROUGH ANALYST.

The annual dinner of the Sheffield Pharmaceutical and Chemical Association was held at the Music Hall, Sheffield, on Wednesday, January 19. Mr. W. Jervis, President of the Association, occupied the chair, and the vice-chairs were filled by Mr. J. H. D. Jenkinson, secretary, and Mr. Ellinor. Nearly fifty members and friends were present. After the usual loyal toasts, Mr. E. Birks proposed "The Health of the President," which was supported by Councillor Dobb, and the President appropriately responded.

The Secretary (Mr. Jenkinson), then read the following letter from Mr. A. H. Allen, borough analyst :—

"January 18, 1876.

"W. Jervis, Esq.

"Dear Sir,—It is only to-day that I have heard of your election as President of the Sheffield Pharmaceutical and Chemical Association, and as I shall not have an opportunity of seeing you before to-morrow evening, and cannot possibly be present at the dinner, I think it desirable to offer a few words in explanation of my recent report as Borough Analyst. In the first place, I wish it to be distinctly understood that I received the samples from the inspectors merely distinguished by numbers, and am still quite ignorant of the names of the vendors except in a few instances. It appears that the wording of my report is open to some misconstruction, and it is only fair to say that the care and accuracy of the principal dispensing chemists was never suspected, and I therefore requested the inspectors to visit the second-rate shops. As, however, such of the prescriptions as were stamped by the dispensers showed that they had been made up by well-known pharmacists, I concluded that my instructions had not been carried out. The remark has been made that prosecutions should have preceded the issue of my report. When it is remembered that I am bound by the Act to report my results quarterly, that the authorities have no power to suppress the reports, that the Health Committee only meets once a fortnight. that the last batch of samples, including 12 prescriptions and 12 glycerines, was only received on December 11, while the only Health Committee meeting held after the completion of my analysis was on January 6, and the minutes were published as a matter of course by the papers on the following Monday, it is evident that there has been no opportunity of taking any proceedings. I greatly regret my inability to attend to-morrow evening and explain these matters in person, but I am advertised to deliver a public lecture at the Hull Royal Institution on that day and of course cannot break such an engagement. I regret that my report should have caused so much misapprehension.—I am, dear sir, yours very truly,

"Alfred H. Allen."

Dr. J. C. Hall, who was warmly received, proposed "Success to the Sheffield Pharmaceutical and Chemical Association," and in doing so said he was exceedingly sorry that a friend of his, a very worthy and honourable man, should have attacked that society in the manner in which he had. He very much regretted that Mr. Allen was not present to listen to the remarks he was about to make behind his back, remarks which he should have been glad to have made before his face, and which related to the question which agitated the Association. The formation of that Association had drawn together a body of men actuated by one common feeling, by one common mind and object, actuated by an honourable, upright desire to carry out the great calling in which they were engaged to the advantage of their fatherland, and in truthfulness to their fellow townsmen and to God. But he was sorry to say that there had been an attack made upon that Pharmaceutical Association, and as the oldest practising physician of the town he said there had been such an attack made upon them as was calculated to do them the greatest possible injury and the greatest possible harm. He did not, however, think that attack had been made designedly or unfairly, but he thought if the gentleman who wrote that report had lived to the age he (the speaker) had it would not have appeared in the form in which it had appeared. That report commenced by stating that it was out of anxiety that the test had been made. Now he should like to know by whom that anxiety was manifested. Was the anxiety manifested by the public ? The public was a very large and important body, but he should dearly like to be shown one of the public by whom any anxiety was shown that that investigation should take place. Was that anxiety so manifest that the report should appear in the Sheffield and London papers simultaneously ? He should indeed like to know through whose anxiety the report was trotted from one paper to another, and he should like to know why Dr. Griffiths, the medical officer of health, knew nothing about it, because that gentleman had told him that he knew nothing whatever about it. Why was that report written, and why did it appear in the Sheffield and London papers to the degradation of the pharmacists of Sheffield without one word of explanation ? Whilst he imputed to the borough analyst nothing but the most honourable feelings, he must say that in the manner in which the prescriptions were got and the report issued, he had made a great and grievous mistake. Why, he asked, were not the test prescriptions prescriptions that were ordinarily used ? He had seen some comments in the papers about iodide of potassium and quinine. Now, fifteen grains of iodide of potassium, taken in two table-spoonfuls of water, would make anybody sick. Now, suppose the thief had wanted to cheat the person by whom such a prescription was presented. Now if the thief, who was accused of being a thief, in the making up of that prescription had not put in the whole amount, by his plunder,—and he would pledge his word as senior physician of the hospital, —the fellow would not have got one penny out of the transaction. Old Marwood—(a Voice : "Oh, hang him;" Dr. Hall ; No do not hang him, but hang those who libel you)—did not hang people unless they had committed a fault, and the pharmacists of Sheffield ought not to be condemned when they were faultless. He would ask those present, as rational men, as reasonable men, what earthly reason could there be for any chemist to cheat to the extent represented in the report, when the cheat, in the prescription of iodide of potassium, could only benefit himself to the extent of one penny. He would tell them what his experience was of the dispensing chemists of Sheffield. As a practising physician of twenty-five years' standing he could pledge his professional reputation that the principal chemists of this town were not capable of "scamping" a physician's prescription. It was a libel on the men, a libel on the trade, utterly and altogether false, and utterly and altogether impossible to imagine anything to the contrary. There was no town in the United Kingdom in which physicians' prescriptions were more ably, more honestly, or more efficiently dispensed than in Sheffield, and therefore he could say between his conscience and his God, that from the bottom of his heart he would drink success to the Pharmaceutical and Chemical Association.

Dr. Hime, in supporting the toast, thought that the letter of Mr. Allen threw some light where there had previously been darkness. He knew of some of the circumstances connected with the sending out of the prescriptions, and he would like to tell them all he knew. Various classes of things had been analysed by Mr. Allen in turn, and in the ordinary routine of business it was suggested that the dispensing of medicine was a subject deserving serious attention. It was a matter second to none in importance, and it was considered necessary to look into it. Mr. Allen asked him (the speaker) to prepare some prescriptions, and he did so. Dr. Hall had criticized those prescriptions, and when the criticism came from a gentleman of so much experience, no doubt they would be all convinced that there could be only one opinion on the question, and that would be that Dr. Hall was alone in the right on the subject. The prescriptions were duly sent out; Mr. Allen had previously asked him if he could suggest a good place where they could be sent to. He replied that there was a certain class of persons to whom it would be quite unnecessary to send them. He mentioned some half-dozen of their names saying to Mr. Allen, "You need not go to any of these men. It is the poorer class of chemists in the back part of the town who will compound the prescriptions wrongly if any men in Sheffield will." He did not know where Mr. Allen sent the prescriptions; he only knew of one person who had mentioned the matter at the Town Council meeting. That was as much as he knew of the matter. He thought there was no necessity for speaking about conspiracies and underhand attacks upon them and so forth. He was in ignorance of any attack whatever having been made upon them. So far as he understood the matter there had been analyses of certain prescriptions made in the ordinary routine of business. In some cases they were found to be incorrectly made up, and then a report was made. Whether that was an attack or not upon the members of the Pharmaceutical Association they would be able to judge. He did not at all think it was an attack. When they came to calmly consider the matter he thought they would be of opinion that it was nothing of the kind, but was simply an attack made upon certain individuals who incorrectly compounded certain prescriptions. As to any subsequent events in the matter he was quite in ignorance. He had not seen Mr. Allen since, nor had he communicated with him by letter. The whole thing was done in the ordinary routine of business, and was no conspiracy at all.

Dr. Hall here interrupted the speaker, and said that he neither accused Mr. Allen, or Dr. Hime, or any one else of a conspiracy, or anything approaching to it. He had simply stated what the effect of the report presented by Mr. Allen had been in the eye of the public.

The Chairman ruled that Dr. Hall was out of order, and the latter gentleman having said that when a person stated that which was altogether incorrect, he had a perfect right to protest, sat down.

Dr. Hime, continuing, said that Dr. Hall had preceded him, and he had also succeeded him. He hoped they had all enjoyed Dr. Hall's remarks, and no doubt they would remain deeply impressed upon them for some time to come. In concluding, Dr. Hime said he sincerely trusted that the Pharmaceutical and Chemical Association would flourish in the future as it had done in the past.

Mr. Ward, who responded, stated that the members of the Pharmaceutical Society had great reason to complain of the borough analyst's report, which, he agreed with Dr. Hall, was most cruelly applied to the chemists of Sheffield. At their last meeting, a week ago, he took occasion to express some strong remarks. He spoke feelingly, because he happened to be one of those who were visited. His prescription had been most carefully prepared, and he was ready to submit it to any analysis that might be thought fit. He was certain it contained to the fullest extent the ingredients desired. If he understood Dr. Hime aright, he had had something to do with the instigation. (Cries of "No, no.") He begged pardon; he misunderstood Dr. Hime. There was a great difference between the milkmen and the chemists. The milkmen deliberately put the water in for the purpose of making a profit out of it; but they must remember that the chemists' drugs were liable to deterioration. He objected to this analysis being called a fair test. It was not a fair test. It did not take in the chemists as a body, as it ought to have done. He had already endeavoured to show them, and he still believed, that the whole thing was nothing less than a blunder. He had taken occasion to say that the first opportunity he had of conversation with Mr. Allen on the subject. The letter which had been read expressed very fairly what Mr. Allen had stated to himself. He (Mr. Ward) stated to Mr. Allen what he thought the chemists as a body considered he ought to have done. Mr. Allen said that he regretted the result of his report, promised to make it right, and gave him to understand that the whole thing would be revised, and that it would be put right with the public. At the same time the thing had gone too far. The stigma cast upon the chemists of Sheffield would never be wiped out of the memories of the present generation. Mr. Ward went on to refer to the publicity which the report had obtained, quoting from a Dublin paper in proof of his remarks, and afterwards resumed his seat amid applause.

"The Medical Profession" was proposed by Mr. Radley, and suitably responded to by Mr. W. R. Thomas. The other toasts included "The Honorary Members and Visitors," "The Vice-President and Council," "The Secretary," and "The Ladies."

An exhibition of drugs, chemicals, and specialities was also held, and the council thankfully acknowledged the kindness of Messrs. Southall, Son and Barclay for contribution of a beautiful collection of materia medica specimens, etc.; of Messrs. Hopkin and Williams for a collection of finer chemicals; Messrs. Hodgkinson, Stead and Treacher for rare leaves, barks, etc.; Messrs. Barron, Harveys and Co. for fine drugs; Messrs. Evans, Son and Co. for fine samples of gums and specialities; and Messrs. Maw, Son and Thompson for a new portable galvanic apparatus, etc., etc.

The above were arranged in conjunction with the collection of the society, and created much interest, many of the specimens receiving the closest inspection. Among the chemicals from Messrs. Hopkin and Williams some remarkable crystals of the sulphocarbolates seemed to excite attention; whilst true and *spurious* chiretta, croton bark, carnauba root (*Corypha cerifera*), and a fine jalap resin series, contributed by the Messrs. Southall, received considerable notice. Messrs. Hodgkinson and Co., amongst other things, sent bark and leaves of *Eucalyptus globulus*, leaves of *Boldoa fragrans*, and some remarkable specimens of gums, etc.

Altogether the collection was a very fine one, and proved most interesting. On the advice of some of the visitors permission has been obtained, and it will be again exhibited on the 27th inst. at the Annual Conversazione of the Sheffield Literary and Philosophical Society.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The regular monthly meeting of this society was held in the West Hall, Anderson's University, on Wednesday evening, 19th inst, the President, Mr. William Greig, in the chair.

Amongst the donations announced were six volumes of the 'Year-Book of Pharmacy,' from the executive of the British Pharmaceutical Conference, to the society's library.

On the motion of the Secretary, the hearty thanks of the society were voted to the Conference executive for this handsome donation.

Mr. Robert S. Nelson (of Messrs. George Mason and Co.) exhibited a large collection of chemical and electrical apparatus, which he described in a very lucid and instructive manner, giving practical illustrations regarding their varied uses.

Mr. John C. Hunter, A.P.S. (President of the Assistants' Section), then read a short paper on the "Deposit obtained from the Tinct. Ferri Perchlor. B.P. and L.P." After some remarks by Messrs. Kinninmont, Fairlie, Nelson, Greig, etc., a vote of thanks was passed to Messrs. Nelson and Hunter.

The President specially urged the members to follow Mr. Hunter's example by bringing forward practical papers

Some business having been disposed of connected with the annual festival and other matters, the meeting separated.

Professor Ferguson, of Glasgow University, delivers the next lecture to the Association.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, January 20, 1876. Professor Odling, F.R.S., Vice-President, in the chair. After the ordinary business of the Society, Dr. Armstrong exhibited a specimen of pure crystallized glycerin, from Messrs. Dunn and Co., of Stratford. Mr. E. Neison then communicated a "Note on Sebate of Cobalt"; after which Dr. C. R. A. Wright gave an Abstract of Part IV. of the researches by himself and Mr. G. H. Beckett on "Narcotine, Cotarnine, and Hydrocotarnine; on Oxynarcotine, a new Opium Educt, and its Relationship to Narcotine and Narceine." The last paper was "On a Method for Estimating Bismuth Volumetrically," by Mr. M. M. P. Muir. The meeting was then adjourned until Thursday, February 3, when papers will be read "On the Formation of the Hydrocarbons of the C_nH_{2n} and C_nH_{2n-2} series, and their Combination with the Haloid Acids and other Compounds," by Dr .H. E. Armstrong; "Note on the Formation of Anthrapurpurin" by Mr. W. H. Perkins, F.R.S.; "On High Melting Points with Special Reference to Metallic Salts," by Mr. T. Carnelly; "On Metachromism or Colour Changes" by Mr. W. Ackroyd. The chairman also announced that on February 17, there would be a lecture by Dr. Frankland, F.R.S., "On some Points in Connection with the Analysis of Water."

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* HOWARD.

This case was tried at the Windsor County Court on Thursday, Jan. 20, 1876, before James Whigham, Esq., the judge. The defendant was sued for £10, the amount of two penalties incurred by him, the one of £5 in "keeping an open shop for the retailing, dispensing, and compounding poisons or a poison contrary to the provisions of the Pharmacy Act, 1868," the other of £5 "in taking, using, or exhibiting the name or title 'Chemist,' contrary to the provisions of the same Act."

Mr. Lucas (for Messrs. Flux and Co.) appeared for the plaintiffs. The defendant did not appear, but a clerk from the office of Mr. Sowton, of Bedford Row, London, appeared and said that he was instructed to admit the claim and pay the money into court, which the Judge assented to.

Mr. Lucas said that he had come from London and had brought two witnesses down and therefore was entitled to costs, and in order to obtain them must have judgment.

The Judge: As it is an action for a penalty and not on a contract, and there may be technical difficulties, I think you had better prove your case.

The Registrar remarked that he doubted whether a solicitor could delegate his authority to a clerk in such a matter.

Mr. Lucas then called his Honour's attention to the provisions of the Pharmacy Act, 1868, bearing upon the case, and to the fact that the defendant's name did not appear in the printed Register of Chemists and Druggists.

The witnesses proved that on the 15th December last, the defendant dispensed a prescription, two of the ingredients of which were hydrocyanic acid and opium, and also that he displayed over the window of his shop, at 2, St. Mark's Road, Windsor, a large black board with the word "chemist" in white letters.

The Judge said that the fact of the defendant not appearing afforded strong *primâ facie* evidence that he was guilty of the offences. He thought it important in the interests of the public that unqualified persons should be restrained from dealing in poisons. So far from thinking that there was any vindictive feeling on the part of the Council of the Pharmaceutical Society, he thought it would be failing in its duty if it neglected to put the statute in operation against men trading as chemists and dealing in such deadly poisons without due qualification; therefore there would be judgment for the plaintiffs for the amount claimed with the usual allowance of costs.

DEATH FROM AN OVERDOSE OF A COUGH MIXTURE.

On Friday, Jan. 21, an inquest was held at the Castle Inn, Boston, before Dr. Clegg, coroner, on the body of Mrs. Isabella Margaret Porteous, aged nearly 70, who had died after taking some cough mixture.

Mr. Andrew Porteous deposed that the deceased was his mother. He knew that she had been taking some mixture for a cold and cough, because she showed him the bottle. It was a pale yellow; the bottle would hold a quarter of a pint. The bottle produced was the same. [It was purchased from Mr. Booker, druggist, etc., Main Ridge, and was labelled "Syrup of Chloroform, for colds and coughs; dose for adults, one teaspoonful three times a day."] On Wednesday deceased told him she had taken a dose, and said that it had done her a deal of good. She knew that it was a dangerous medicine, because a woman that was with her cautioned her not to take too much. Yesterday morning he found her lying in an insensible state, and then fetched Dr. Snaith.

Mrs. Daughton deposed that she found deceased asleep and snoring loudly. She thought that it was not like a natural sleep. Andrew Porteous was called, and fetched Dr. Snaith. Deceased continued to breathe heavily, and slept until her death. Her face was darker than the usual colour.

Mrs. Ann Barlow deposed that deceased told her on Wednesday that she had taken two doses of the mixture, and it had made her feel beautiful. Witness said to her "Don't take too much of it"; because she had known her to take two or three doses of medicine for one.

Mr. T. B. J. Booker, chemist and druggist, of Main Ridge, deposed: I am on the Register of Chemists and Druggists. I supplied the medicine produced in the bottle. It is a compound of syrup of chloroform; it contains three grains of morphia, in the 4 ounce bottle; there is also a half of a dram of chloroform; there are 32 doses in the bottle. I sell hundreds of bottles. I consider it is not dangerous if taken in the doses prescribed. The mixture is made from a prescription given by one of the greatest physicians in Lincoln, and was given to a Mr. Gilmore, who has used it. If people take over doses of medicine I do not consider I am responsible. As near as I can remember, Mr. Porteous fetched the mixture about noon on Tuesday. I think deceased took too much. It would not have been dangerous if it had been taken in a moderate way.

Mr. Porteous (husband of the deceased) deposed to fetching the cough mixture.

Dr. Snaith deposed that on Thursday he was called in to attend the deceased, whom he found in an insensible state and apparently dying; she was unable to speak or move. There were symptoms of poisoning from a narcotic medicine. A bottle of mixture was shown him and it was his opinion she had died from the effects of it.

The Coroner said it was clear no blame could be attached to Mr. Booker, who was a registered chemist and druggist, and could supply such medicine. From the evidence of the witnesses, and also the quantity of medicine which was left in the bottle, it was plain that deceased had taken too much, from the time it was purchased. It was quite clear from the appearance of the bottle then, that 12 doses had gone out of it, when there really ought to have been only about 5.

Mr. Booker asked the Coroner whether he might put a question to Dr. Snaith?

The Coroner said it was rather unusual: the inquiry was for the purpose of ascertaining the cause of death.

Mr. Booker said the question had reference to the doses in the bottle.

The Coroner then permitted the interrogation to be made.

Mr. Booker then asked Dr. Snaith whether the 11th part of a grain of morphia was too much to be given in a dose of that medicine to a woman of her age.

Dr. Snaith said "No."

The Coroner said that was scarcely the way to put it, because it was well known that some persons were more susceptible to a narcotic than others; some could take only a small quantity, whilst others could take considerably more.

The Coroner in summing up, remarked that the medicine supplied by Mr. Booker had no doubt caused the death of the unfortunate woman. Mr. Booker was, however, a registered druggist, and licensed to sell such medicines. The bottle was properly labelled, with printed directions as to dose, and, therefore, Mr. Booker could scarcely be held in any way responsible.

The foreman (Mr. Cheney) said he wished to ask Dr. Snaith if morphia was not a dangerous medicine to be publicly sold?

Dr. Snaith said it was a very dangerous medicine. No bottle ought to contain more than six doses, as people might mistake the label and take a tablespoonful instead of a teaspoonful.

Mr. Booker said that could not be so, because he was told that she took a teaspoonful on the Tuesday, three on the Wednesday, and drank some out of the bottle on Thursday morning.

The Coroner said that nearly all cough medicines, even cough lozenges, contained morphia in one form or another, and there were few bottles of medicine left, either in a doctor's surgery or a druggist's counter, that would not prove injurious if the dose was exceeded, and no attention paid to the printed label on the bottle. It seemed highly probable that at first the deceased took the proper dose. She said she felt very much better, and stronger, and her cough was relieved, the probable action of the medicine. Mrs. Barlow knew that she was generally in the habit of taking large doses of drugs, and had actually cautioned her, but the deceased had fallen into the common error of thinking that she could not take too much of a good medicine. Twelve doses had gone out of the bottle, when four or five ought only to have been taken. Dr. Snaith had given his opinion as to the cause of death, and during the last few days, almost every newspaper published had recorded similar fatal cases in various parts of the country, and in all classes of society.

The jury returned a verdict "That Isabella Porteous died from the effects of a narcotic medicine, namely, syrup of chloroform, and that such medicine was self administered."—*Lincolnshire Herald.*

DEATH OF A LADY FROM NARCOTIC MEDICINE.

An inquiry before Mr. Carttar, coroner, took place at Greenwich, on Wednesday, January 20, respecting the death of an independent lady, named Eliza Moore, aged 59.

It appeared that deceased told her servant to bring her medicine which she had been in the habit of taking; and on the girl going into her bedroom she found the bottle (containing a liquid, chiefly composed of laudanum) empty and her mistress very ill.

Dr. Pink was in immediate attendance and resorted to the active means to avert a fatal result; but without success.—*Evening Standard.*

Notes and Queries.

[495]. BARM DROPS, or Balm Drops, is Tinct. Benzoine Co.—JAS. BAYNES.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

ADULTERATION OF QUININE.

Sir,—We beg to enclose copy of an astounding proposition, contained in a letter received from a foreign merchant, to which we of course sent a suitable reply. It may, however, interest some of your readers to know what is going on.

HOWARDS AND SONS.

Stratford, near London, E.

"Yesterday I received a letter from one of my clients abroad, in which he states that your quinine, which I bought from you lately, although it is pure and a good quality, but the price is so high as he cannot sell it; but you must bear in mind that by saying high price I do not mean it is dear, but the article is too good for the market. There is a French sulphate of quinine which goes largely to our market and sells from 30 per cent. to 35 per cent. cheaper, and the secret of this being sold so cheap is this, that each vial contains a trifle more than half ounce, and 60 per cent. is pure quinine and 40 per cent. is magnesia, and it is mixed in such a manner as no one can tell that it is adulterated except by a chemist analysing it. In our country round the year, especially in summer, a large quantity is consumed, and I can buy continually from you largely if you will consent to make this alteration on purpose for me—viz., half ounce vials containing 65 per cent. pure quinine and 35 per cent. magnesia, and what will be your lowest quotation on the base, and if possible please send me two or three vials of half ounce each, two mixed as above and two pure, as I want to forward them to two clients of mine as samples, and if they meet their approval they are sure to place me a large order. Hoping you will attend to this request and favour me with an early reply, I remain, etc.

"*Dec.* 30, 1875."

THE SHEFFIELD ANALYST'S REPORT.

Sir,—I am glad to see the chemists of Sheffield have protested so emphatically against the report of Mr. Allen, although I fear it is too late to undo the mischief caused by it and the remarks of the daily press. Anyone really understanding the facts of the case will not be misled, but the general public are not so likely to be so clear sighted, and it is upon them we depend for support. I must say it seems unfair for Mr. Allen to have made such very partial selections of shops to present his test; if he really only wanted to ascertain if prescriptions were accurately dispensed, why not have taken them more generally and not have selected men who did not profess or wish to be thought dispensing chemists? I have been informed even herbalists were honoured with a visit. I am quite sure no chemist wishes the evil doers to be spared, but it is too bad to class all as black sheep if one or two fail in their duty. I hope to see the Council take this matter up, and not be quite so contented to accept our guineas and make laws, but take a more active interest in the general welfare of the trade. I am frequently asked, especially at the present time, what benefit I derive from belonging to the Society; and I must confess that I have no satisfactory answer to give to the query. It seems to me that the Pharmaceutical Society ought to urge constantly and persistently both to the public and also to medical men that we ought to be the dispensers of medicine, and I hope all chemists will combine and insist upon their representatives in the Council making every effort in this direction.

It is most unfair for medical men to complain of chemists prescribing when they so generally make their own medicines. I am quite confident that no chemist cares to prescribe, but has to do so in self defence, and from my knowledge of the business I am sure they greatly prefer to recommend their customers to consult a medical man, and if they were quite sure that he would write a prescription which they would have to prepare (their legitimate business), they would in every case do so. It is very amusing to read that Dr. Totherick believes the public prefer doctors to make their own medicines, especially as it is a well known fact that frequently it is prepared by the wife or some other perfectly unfit person. I unfortunately live in a neighbourhood where several of the doctors themselves dispense, and I can confidently assert that it is so here. As regards patent medicines, I think no chemist wishes to recommend them, but they must keep and supply them to their customers or grocers and others will only be too glad to do so. Not only that, but we have ample proof that they are absolutely recommended in many cases by medical men.

I hope a more able pen than mine will take up these matters and that we shall find that out of evil cometh good, and eventually become really dispensing chemists.

J. W. F.

CHEMISTRY: ITS RELATION TO MODERN THOUGHT.

Sir,—I do not think you misused the space at your command when you gave insertion to Mr. Baildon's paper. If we all lie under the sorrowful necessity of being taught and lectured, it appears to me, the teaching could hardly be given in a form more interesting and beneficial. Characterized throughout by modesty, by insight, and candour; by a regard for man, and man's best interests; that composition was the work of a gentleman and a scholar. I doubt whether an equal number of columns in the Journal has been more profitably filled, for some time past. Far from discouraging, let us rather say, as Cato the Censor once said to his son, "I would fain have more such." If the hearer, or reader were for a short time carried beyond the puny limits of trade regulation, so much the better for him. On the other hand, Mr. Langham's letter may serve to show the extent of human malice, or stupidity; and to illustrate the superstitious reverence which is felt by some disciples for the names of Mill and Tyndall. Any independent inquirer who declines, even in the politest terms, to follow their guidance, may be accused *ad libitum* of uttering "pretentious nonsense" and "worthless stuff." The mind which from its assumed oracular elevation sneers impatiently at "Young Men's Christian Associations," and receives with docile submission the authority of some modern philosophers is a subject for curious, but not delightful study.

Truro, Jan. 24, 1876. S. FEAVER.

MOVEMENT IN LIVERPOOL FOR EARLIER CLOSING.

Sir,—A very satisfactory meeting of chemists has taken place in Liverpool, of which you will probably have some report from the principal promoters. A considerable number of them dined together at the Adelphi Hotel, and the meeting may be considered an entire success, as there was a manifest spirit of unity amongst all assembled, and a determination to carry out the objects in view, some of which are earlier closing, greater uniformity in changes for dispensing and a more cordial and friendly feeling amongst the members of our calling generally. As an old Liverpool chemist I desire to say that we should all feel greatly obliged to those leading members of our body who have adopted so wise a plan of promoting concord as that of instituting a public dinner. Without more unity than there ever yet has existed in Liverpool amongst chemists the objects in view can never be attained and firmly retained, nor shall we be able effectually to defend ourselves from the many and powerful but unjust attacks made upon us as a body, from so many quarters. The Liverpool Association of Chemists has also published a price book and a common mark for prescriptions. It is not possible nor is it expected that all the prices can at once be adopted in every case; this must be a matter of gradual attainment. I, for one, however, have since the first of this month adopted the mark, and have placed my actual charges upon all new prescriptions dispensed by me. I do not know who else has done so, but it appears to me a right and proper thing to do in the circumstances in which we are placed in order to check the confusing and degrading variations of charge existing for dispensing.

JOSEPH BALL.

P.S.—It is to be regretted that so few Birkenhead chemists were present. So far as the drug trade is concerned the two places are one and their interests identical.

Oxton, Birkenhead, January 24, 1876.

TELLURIUM AS A PROBABLE IMPURITY IN BISMUTH

Sir,—Is not Mr. Brownen mistaken in giving Bunsen instead of Simpson for the effects of small doses of tellurium in the system.? In Gregory's 'Handbook of Inorganic Chemistry,' 3rd edit. 1853, page 246, article "Tellurium" he quotes—"Dr. Simpson has observed that compounds of tellurium in very small doses, communicate to the breath and indeed to the whole person the most intolerable fœtor, lasting for weeks, and even months after one small dose. The person who takes it is unavoidably banished from all society."

R. M. ATKINSON.

Leeds, Jan. 17, 1876.

IN MEMORIAM.

Sir,—On Tuesday the 11th of January, 1876, at Stoke Newington, Robert Alsop—thus runs the obituary.

Although retired from business some years, yet as one of the founders of the Pharmaceutical Society and one of its earliest and most painstaking examiners, a short notice respecting him by one of his old assistants will not be out of place in your Journal. The old-fashioned shop at the corner of Sloane Square, Chelsea, with its palms, ferns, and tree frogs in the window, has long since been pulled down to make room for modern improvements; but it must not be forgotten that in that simple though efficient and profitably conducted pharmacy, several of our recently admitted modes of manipulating pharmacopœic preparations were in force twenty-five years ago. The present excellent method of making Unguentum Hydrargyri Nitratis, the manufacturing of spirit of nitrous æther by passing hyponitrous ether into rectified spirit, were both employed by him whilst I was living with him: these and other instances may be adduced to show that in his day Robert Alsop took no mean place as a pharmacist. His minim measure has certainly never been surpassed, if equalled.

Endued with a keen sense of the beautiful he took great interest in all that pertained to the study of natural history in its several branches; of him it might well be said, "simple are the pleasures of the good man," for a good man he was in every sense of the word, indeed his was a life spent in doing good. The Anti-Slavery society with its relations especially to the free negroes of our West Indian islands and American colonies in British Guiana, in schools at home and abroad, in relief to the sufferers from the effects of the last most disastrous Franco-Prussian war—these formed but a small part of the objects of the thought and care of our late friend. Suddenly taken from among us—no not suddenly, for living as he had the change could not be called sudden—after the usual work of the day, an hour's quiet reading at night, a few minutes of sharp pain, and all of this life ended. But depend upon it, when the voice was heard at midnight, "the Master has come and calleth for thee," his was no unready response.

OCTAVIUS CORDER.

"*Spes.*"—A strong solution of sulphide of barium, made into a paste with starch applied directly, and after five or ten minutes scraped off with a knife.

M. B. C. M. writes to say, in reference to the letter of *I. S. L.*, on p. 580, that the efficacy of the cold douche in cases of poisoning by hydrocyanic acid is well known, and that it is the remedy recommended by all authorities on the subject.

Errata.—In some copies on p. 585, col. ii., line 6 from top, for "physicians," read "physicians'"; and on p. 586, col. ii., line 10 from bottom, for "three" read "one."

G. T. G.—See a paper in vol. i. of the present series of this Journal, p. 544.

"*Sem. Alb.*"—*Sorghum vulgare.*

"*Dispenser*" is thanked for his communication, which we do not think it advisable to publish.

P. C.—The paragraph received with thanks. A report of the case was published in last week's journal.

H. Pollard is thanked for the cutting.

"*Aliquis.*"—We do not think the publication of your letter would be expedient.

"*Carlotta*" is referred to the rule respecting anonymous communications.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Robinson, Mr. Hemsley, Mr. Hunter, Mr. Ward, Professor Flückiger, Mr. Dunn, Inquirer, A.P.S., A.S.

THE BEST FORM OF BLISTERING LIQUID.[*]

BY JAMES DEANE, F.L.S.

The introduction of acetic ether into the Supplement to the British Pharmacopœia has brought into prominence the question of its use as a solvent of the active principles of cantharides in the preparation of blistering liquid. I, therefore, made a few experiments with the object of determining whether it was superior or not to a mixture of acetic acid and ether in its power of exhausting the cantharides. The results of my investigations are the subject of this paper.

I. I prepared 20 fl. ozs. of Liq. epispasticus, B. P., the formula for which is:—

Cantharides	8 oz.
Acetic Acid	4 fl. oz.
Ether	a sufficiency.

The cantharides are moistened with the acid, and the ether passed through in a percolator till 20 fl. ozs. of liquor is obtained. The liquid thus prepared had a sp. gr. of ·769 and the marc yielded to pressure about 5 fl. ozs. of ethereal liquid, and weighed after exposure for some days to the air more than 8 ozs.; after drying in a water bath it weighed 6½ ozs.

2 fl. ozs. of the liquor evaporated yielded 37·8 grs. of extractive, which was entirely soluble in chloroform, and yielded 0·8 gr. of cantharidin.

2 fl. ozs. of the expressed liquid treated in the same way yielded 6·2 grs. extractive, of which 0·7 gr. was cantharidin.

II. I made a liquor in the following manner:—

8 ozs. of cantharides were moistened with 4 fl. ozs. of acetic ether, allowed to stand in a closely covered vessel for about twelve hours, packed in a percolator, and acetic ether poured on till 20 fl. ozs. were obtained. The product had a sp. gr. of ·898. The marc yielded about 5 ozs. of pressings, and weighed, when dry, 6¼ ozs.

2 fl. ozs. of the liquor yielded an extract weighing 47·5 grs., this differed from the former in not being entirely soluble in chloroform, and in giving 2·2 grs. of cantharidine.

2 fl. ozs. of the pressings yielded 4·1 grs. extract, in which were visible small crystals of cantharidin, but not in sufficient quantity for estimation.

III. Professor Tichborne has before pointed out the fact of the water of the acetic acid in the B. P. preparation being retained in the marc, and recommended the employment of glacial acid instead of acid of the ordinary strength. I therefore prepared some according to his directions, with the exception of mixing the acid with an equal quantity of ether before moistening the cantharides. The product had a sp. gr. ·782. 2 fl. ozs. yielded 43·3 grs. extract, and 1·8 gr. cantharidin. 2 fl. ozs. of the pressings gave 2·7 grs. extractive and ·8 gr. cantharidin.

It will be seen from these results that the three preparations (judging from the amount of cantharidin they contain) stand in the following relation to each other with regard to efficiency:—B. P., ·8; Tichborne, 1·8; acetic ether, 2·2, the number of grains respectively contained in 2 fl. ozs., which corresponds to 350 grs. of cantharides.

The cantharides employed in these experiments were freshly powdered: 500 grs. exhausted with ether, the ether distilled off, and the residue treated with bisulphide of carbon gave cantharidin, which after washing with a few drops of alcohol weighed 2·9 grs. This is equivalent to 2·0 grs. from 350, the excess of ·2 gr. in experiment II., I attributed to the great difficulty in obtaining the cantharidin quite clean when acetic ether is used. The employment of chloroform in the estimation I found to be attended with disadvantages, it being very difficult to exhaust the cantharides by percolation with that menstruum, in consequence of the sp. gr. of the oil they contain being much less than that of the chloroform, and the first portion that passes through being therefore lighter than that which follows. To confirm my results I exhausted 500 grs. with acetic ether, and set the liquor aside to evaporate spontaneously; from this I obtained 2·9 grs. in large crystals.

It has been found in practice that a preparation made in the proportions of the B. P. formula is stronger than necessary; 4 or 5 ozs. to the pint being sufficient. If made of this strength, either acetic ether or the mixture of glacial acid and ether would extract all the virtue from the cantharides; and the question as to which is the better of these two menstrua becomes medical rather than pharmaceutical.

Mr. Brady, who experimented on the subject many years ago, says, "The objection to mixed fluids is that as the more volatile evaporates it causes a sort of centrifugal tendency in the atoms, and instead of drying evenly leaves a thick film at the circumference, whilst the centre is bare; the resulting vesicle being a ring, not an even circle, and surrounded by an areola of inflamed tissue of very painful sort."

It appears to me, therefore, that we have in acetic ether a compound admirably adapted to the preparation of blistering liquid; it thoroughly exhausts the cantharides, has a pleasant odour, and is free from the objection above mentioned to the use of acetic acid and ether. Further, it may, if required, be used in the preparation of vesicating collodion, pyroxylin being readily soluble in it.

[*The discussion on this paper is printed at p.* 636.]

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[*] Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, February 2, 1876.

THE COMPOSITION OF PILULA HYDRARGYRI, B.P.[*]

BY HAROLD SENIER.

Student in the Laboratories of the Pharmaceutical Society of Great Britain.

It has often been stated that the medicinal activity of those mercurials in which the mercury is used in the metallic form, and in a minute state of division, is due chiefly to a small quantity of oxide formed by contact with the air.

Thus, as regards Pilula hydrargyri, "Donovan,[†] cited by Thomson (*Pharmaceutical Journal*, vol. iv., p. 413), states that when made with oxide of mercury instead of metallic mercury, it is quite as efficacious; and Thomson himself long thought that the efficacy of the old pill depended in great measure on the presence of a portion of oxide of mercury derived from oxidation of the metallic mercury, when in that fine state of division to which it is necessarily brought by long trituration with the confection of rose and liquorice. Tyson, an excellent therapeutist, as well as a good practical chemist, states (*Pharmaceutical Journal*, vol. i. p. 451) that the Pharmacopœia blue pill is, under the best management, a very uncertain preparation. He made Pilula hydrargyri with the black oxide, and communicated his formula to the *Pharmaceutical Journal*."

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[*] Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, February 2, 1876.

[†] I quote from Professor Attfield's critical examination of the British Pharmacopœia of 1864, *Pharmaceutical Journal and Transactions*, 1863-4, p. 631.

For the purpose of ascertaining, if possible, the amount of oxide or oxides and other substances which generally exist in Pilula hydrargyri, B. P., I obtained from leading London manufacturers several samples and submitted them to chemical examination. It appeared probable, at first, that the organic matter present would interfere with the accuracy of the estimation of the mineral substances. To find out how far this might be so, the bulk of the organic matter was removed from a sample by washing it with water, then with cold solution of potash, and afterwards with water, and an analysis made. A similar analysis was made of another portion of the same sample from which the organic matter had not been removed, and the result was practically the same. The separation of organic matter was, therefore, dispensed with, and the various samples examined in the manner described below for (*a*) *mercuric oxide;* (*b*) *mercurous oxide*; (*c*) *metallic mercury*; (*d*) *ash*, and (*e*) *organic matter*, together with whatever amount of moisture might originally be united with the organic matter.

(*a*) *Mercuric oxide.*—Two grams of the mass, fairly averaged, was weighed and digested in dilute hydrochloric acid, the whole placed upon a filter and the residue washed with warm water, the washings being added to the filtrate. Excess of acid in the filtrate was carefully neutralized by ammonia, stannous chloride added and the whole warmed. The precipitated metallic mercury was collected on a balanced filter, dried over sulphuric acid, and weighed. This weight calculated into mercuric oxide (HgO) represented *the weight of mercuric oxide* present.

(*b*) *Mercurous oxide.*—A fresh portion of two grams was digested in solution of hydrocyanic acid, of about 5 per cent., the mixture filtered, the residue on the filter washed with water, and the washings added to the filtrate. Excess of acid in the filtrate was neutralized by ammonia, and stannous chloride added, the whole warmed, and the mercury collected, dried, and weighed as already described. From this weight the weight of mercury existing as mercuric oxide was subtracted and the remainder doubled, giving the weight of mercury in the mercurous form. This weight calculated into mercurous oxide (Hg_2O) gave *the weight of mercurous oxide* present. This method is founded on Scheele's observations of the action of hydrocyanic acid on the oxides of mercury. It was employed in some experiments "On the composition of Hydrargyrum cum cretâ," by Professor Redwood (*Pharmaceutical Journal and Transactions*, 1859–60, p. 504). The hydrocyanic acid converts the mercury of the mercuric oxide into mercuric cyanide; it also thus attacks half the mercury of the mercurous oxide, leaving the remainder as metallic mercury, thus:—

$$HgO + 2HCy = HgCy_2 + H_2O.$$
$$Hg_2O + 2HCy = HgCy_2 + H_2O + Hg.$$

(*c*) *Metallic mercury.*—Another portion of two grams was placed in a mortar with six or seven times its weight of quick lime, and triturated until a homogeneous dry powder was obtained. The powder was transferred to a combustion tube closed at one end, into which previously had been introduced some bicarbonate of sodium and chalk; more lime was now added and the open end drawn out in the usual manner for mercury combustions (*vide* engravings in 'Attfield's Chemistry,' 6th ed., p. 652). The apparatus was now placed in a Hofmann's gas furnace, and heat applied gradually in the usual manner. At first the lighter hydrocarbons coming over passed through the bulb, then the mercury condensing with the heavier hydrocarbons and moisture. The combustion having been completed and the bulb detached, the contents were washed with hot water from a wash bottle, the bulb being held in a horizontal position, until all oily substances were removed. The bulb and contents were then dried over sulphuric acid and weighed. The mercury having been removed the bulb was again weighed, the latter weight subtracted from the former gave the weight of total mercury; from this was subtracted the sum of the weight of mercury which existed as mercuric and mercurous oxides, the remainder representing *the weight of metallic mercury.*

(*d*) *Ash.*—Two grams were incinerated and the weight of ash determined.

(*e*) *Organic matter* and moisture.—Having added together the weights of mercurous and mercuric oxides, of metallic mercury, and of ash, the difference between their sum and the weight taken, was considered as the *organic matter* of the Pilula hydrargyri.

The following table gives a *résumé* of the results, calculated into percentages, obtained in the case of nine samples. The second column gives the age as nearly as it could be ascertained:—

Composition of Pilula Hydrargyri.

	Age.	Metallic Mercury,	Mercuric oxide.	Mercurous Oxide.	Ash.	Organic matter.
1	18 hours.	32·49	none.	a trace.	1·20	66·31
2	5 weeks.	32·26	·09	·25	1·20	66·20
3	3 months.	31·60	·24	·62	1·18	66·36
4	3 months.	31·15	·44	1·60	1·12	65·69
5	6 months.	32·44	·50	·80	1·70	64·56
6	14 months	29·86	·98	2·60	1·20	65·36
7	19 months	31·59	·50	2·50	1·00	64·41
8	2 years.	28·40	1·80	4·22	2·10	63·48
9	?	30·23	1·06	3·24	1·05	64·42

The proportion of mercury present, considering that which occurs combined with oxygen as well as that existing in the uncombined state, does not vary much from the requirements of the Pharmacopœia, one-third mercury, two-thirds organic matter.

It will be noticed that, relatively, the proportion of mercurous oxide very much exceeds the mercuric, and that the proportion of both increases with the age of the sample; thus, No. 1 (18 hours), contained no mercuric oxide, and only a trace of mercurous oxide, while No. 8 (2 years), contained 4·22 per cent. of mercurous oxide, and 1·8 per cent. of mercuric. No. 7 is somewhat exceptional as regards this relation of age to proportion of oxides, but in this case globules of mercury were plainly visible to the naked eye, which fact may account for the slowness of the specimen in becoming oxidized. No. 3 is the only sample of hand-made mass, hence might be expected to be less oxidized than the others, all the others having been made by machinery.

In conclusion, then, it is clear from these experiments, that if, as has been stated, the therapeutic action of Pilula hydrargyri depends largely upon the proportion of oxides present, the age of the mass becomes a matter of primary importance. I have known the dose of Hydrargyrum cum cretâ to be modified in accordance with its age, and it would seem probable that a similar course should be followed with regard to this preparation. At all events the pharmacist is now in a position to assure the therapeutist that in prescribing Pilula hydrargyri he is ordering a medicine liable to vary considerably in composition, and probably liable to vary as considerably in medicinal efficacy.

[*The discussion on this paper is printed at p.* 636.]

VASELINE.*

BY JOHN MOSS,

Fellow of the Chemical Societies of London and Berlin.

Two days ago I had no thought of reading a paper at this meeting. It was my intention then, merely to place specimens of Vaseline and Cosmoline on the table, and make a few general remarks upon them. It appeared to me afterwards, however, that the subject was worthy of further development, and I determined on a few experiments which should tend to throw light on the nature of one of these bodies—Vaseline. The experiments and the conclusions deduced from them are embodied in this paper.

Vaseline was first brought directly before my notice at Edinburgh, some seven months ago, by Professor Otis, of New York. This gentleman informed me that vaseline was largely used in the United States as a basis for ointments, and by himself for lubricating surgical instruments and so facilitating their introduction into the passages.. I had previously made acquaintance with the literature of cosmoline and vaseline through the medium of the American journals, but these bodies were presented in an aspect so little complimentary that no attention was paid to them at the time, and the papers (by Dr. A. W. Miller) were not again referred to until yesterday. The remarks of Miller suggested, to my mind, his conviction that vaseline and cosmoline were merely artificial mixtures of paraffin wax with bodies of an allied nature, or with common lard; indeed he went so far as to submit a formula which should produce an equivalent to cosmoline if not that body itself. The formula was only a partial success. His remarks on Cosmoline were copied into the *Pharmaceutical Journal*,† but with this exception I have met with no notice of either of these bodies in any of the chief publications devoted to pharmacy in this country, in France, or in Germany. This may be accounted for by the uncertainty and doubt which attached to them, and as far as one of them at least was concerned, by the character of the advertisements which proclaimed its virtues. They were offered to the profession under names, and to some extent in a manner, which strongly suggested a relation to nostrums. In justice to the manufacturer of vaseline it should be stated that on inquiry he makes no secret of the origin and mode of preparation of his specialty,‡ or of what he conceives to be its nature. He states that it is the residue of the distillation of petroleum purified by filtration through animal charcoal, and calls it "petroleum jelly." He further says distinctly that it contains no paraffin. Having regard to its source and the process by which it is obtained, it is difficult to agree with him on this point. In expressing my conviction that it does contain paraffin, if it consists not entirely of a mixture of paraffins, I distinctly disclaim all intention of impugning his sincerity. I merely understand him to mean that vaseline is not a made-up article, not an artificial mixture of what is commonly known as paraffin, i.e., paraffin wax, with other substances. It is unfortunate that the commodity was not introduced by a complete chemical examination into its nature and properties, so that the profession might be assured of its not being a nostrum, a *sine quâ non* to any proposed remedy being generally prescribed. If a mixture of paraffins possesses in every respect advantages over other bodies such as lard, simple cerate, etc., for the purposes for which these are employed, there can be no reason, if the price suits, why it should not be used; but it should be known to be a mixture of paraffins, and not be introduced with a certain amount of mystery, unintentional though it be, under a seemingly fancy name.

Vaseline is a pale yellow, translucent, slightly fluorescent semi-solid, melting at 37° C. (uncorrected for temperature and pressure, but sufficiently accurate for most pharmaceutical purposes). Specific gravity 840 at 55° C. It is inodorous, non-volatile at ordinary temperatures, but distils with slight decomposition under pressure. It is insoluble in water, slightly soluble in alcohol, freely in ether, and miscible in all proportions when melted with fixed or volatile oils. It mixes in all proportions with glycerine of the ordinary strength, but the mixture is destroyed by addition of water. Hydrochoric acid and liquor potassæ are without action upon it.

I at first thought that vaseline might be a mixture of paraffin and glycerine. A quantity was accordingly boiled with water for some time, the aqueous liquid filtered from the seeming oily portion, and evaporated to dryness, when it became apparent that not only was the body free from glycerine, but also from all but very minute traces of anything soluble in water. Before evaporating, the liquid was found to be without action on red and blue litmus.

Paraffin is a name originally given to the solid members of the C_nH_{2n+2} series on account of their chemical indifference, but in compliance with a suggestion by Henry Watts it is now applied as a generic term to all the members of that series, whether solid, liquid, or gaseous. Paraffins are *saturated hydrocarbons* and hence are incapable of uniting with other bodies. The properties of vaseline on which greatest stress is laid, are its indifference to reagents and its unchangeableness on exposure to the air. Ointments which are liable to change, such as those of iodide of potassium and of sulphur, when prepared with vaseline as the basis and kept in loosely covered pots, are not altered at the end of ten weeks. Vaseline does not become rancid on exposure to the air under circumstances highly favourable to the development of rancidity. A sheet of paper was smeared with vaseline ten weeks ago, and suspended in a laboratory where experiments are constantly being made, near a door always on the swing; it is as devoid of odour now as some which first saw the light yesterday since its arrival from America in a hermetically closed tin canister. Here then is one feature in which vaseline resembles paraffin.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, February 2, 1876.

† January 17, 1874, p. 581.

‡ Letters patent have been taken out for the manufacture and sale of vaseline.

Byasson,* whose name is known to pharmacists in connection with recent researches on jaborandi, succeeded four years ago in separating from American petroleum a number of solid paraffins, of which the melting points ranged between 30° and 68° C. Such paraffins pass over in the last distillations, or they remain behind in the retort, according to the temperature employed. Vaseline may be distilled, and it is obtained from the residue of the distillation of American petroleum. Here is a second feature of resemblance to paraffin.

Paraffin does not form a soap when boiled with caustic lye. A rough experiment was made by boiling 100 grains of vaseline with 7 fluid ounces of solution of potash (1·15) for half an hour. A little vaseline was lost by spirting, but that recovered weighed 97 grains, after washing and drying. No soap was found in the lye. Vaseline, therefore, does not saponify. Here, again, it resembles paraffin.

Solid paraffins, when distilled under pressure, undergo decomposition into less complex hydrocarbons, and as the operation is repeated these tend more and more to remain liquid when cooled to the ordinary temperature. By the kindness of Professor Attfield I am enabled to show you the effect of distillation under pressure on Vaseline. The success of the experiment is due to the skill of his assistant, Mr. Alfred Senier. The vaseline was introduced into a piece of ordinary combustion tubing about a foot long, closed at one end and bent at an obtuse angle. The open end of the tube was then closed in the blowpipe flame, and the distillation effected by heating the limb containing the vaseline. The vapours are condensed in the other limb of the apparatus, and though the whole has been standing at the ordinary temperature for about thirty hours, both the portion which distilled over and that which remained behind are still liquid. The distillation was not repeated. Here is, a very strong feature of resemblance to paraffin.

The above experiments all point in the same direction, and show that the term *Vaseline* must be regarded as a distinctive name for a mixture of paraffins obtained by a known process, and recommended as a substitute for lard and other similar substances for pharmaceutical purposes. It seems to me to supply what has been a desideratum ever since the first unguent was used—a bland, inodorous, unchangeable, agreeable basis. The manufacturer puts forward other claims for it, and urges that as a simple application it possesses curative properties of its own, and taken internally is good for coughs, colds, sore throat, etc. He informs me that it is largely used in the United States as a pomade; it will take any perfume. Dr. E. Guernsey, of New York, editor of the *Medical Union*, testifies to its value in various forms of eczema, tetter, and ulcerated surfaces, with or without discharge. He says, "In nasal, laryngeal and bronchial catarrh it ranks among the very best of our remedies, often giving relief when all else have failed. It is in my estimation one of the most valuable remedies in our armament of drugs." It is highly probable that at a reasonable price vaseline will receive many applications in pharmacy.

[*The discussion on this paper is printed at p.* 637.]

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* *Comptes Rendus*, lxiii., 609.

VASELINE, AND ITS APPLICATION TO SUPPOSITORY MAKING.*

BY A. W. GERRARD, F.C.S.

Under the name of vaseline a substance has recently been introduced into this country from America as possessing properties which recommend it as a basis in many respects superior to ordinary fats and oils for ointments, cerates, and like preparations. This body is said to be the purified residue remaining after the fractional distillation of petroleum or rock oil. In colour it is a pale translucent yellow; its consistence is that of a slight jelly, being soft and unctuous to the touch; it is tasteless and odourless, and possesses a melting point of 94° F. It is chemically neutral and unoxidizable, and has, therefore, the desirable and important quality of freedom from rancidity, which is the most objectionable characteristic of the fats in ordinary use. In its behaviour to reagents it may be likened to paraffin, which is characterized by the obstinacy with which it resists change. Applied to the skin or an open wound it is readily absorbed, occasioning neither pain nor irritation.

Obviously, therefore, the uses to which this preparation may be advantageously applied are many and varied, but in that matter I will principally leave those who may use it to their own conceptions, experiments, and opinions. A sample of it coming before my notice, a probable use thereof which suggested itself to me was, as a basis for suppositories and pessaries, and several experiments were made to test its suitability. Vaseline alone is of too soft a character for this purpose, requiring the addition of some denser body to give it solidity. In seeking this hardening substance it was necessary to bear in mind that its melting point must not be so high, neither should it be used in such quantity as to render the preparations when made so that they would not melt at the temperature of the body. Such a substance I found in paraffin. This, when melted with vaseline in the proportions of one of the former to four of the latter, forms on cooling an excellent basis of firm consistence and elegant appearance, melting at the temperature of the human body. Suppositories made therefrom readily harden in and easily leave the moulds. They are somewhat more greasy to the touch than those prepared from oil of theobroma, but they possess some advantages over it. 1st. Having a melting point near the temperature of the body they melt slowly into an unctuous mass which is cleanly and causes no inconvenience to the patient. 2nd. Its absence from rancidity and liability to change give its preparations a more reliable and permanent character. 3rd. By reason of its power of contraction being greater than that of oil of theobroma, the suppositories leave the moulds with greater ease.

The price of the article is somewhat high compared with the substances for which it is intended as a substitute, it being 4*s*. 6*d*. per pound. I believe, however, there is a chance of its becoming cheaper.

[*The discussion on this paper is printed at p.* 637.]

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, February 2, 1876.

ANTIMALARIAL PROPERTIES OF THE EUCALYPTUS.*

BY R. D. GLOVER.

In perhaps the most desolate part of the desolate Campagna, some three miles from Rome, lies a cluster of monastic buildings which arose in the early ages of Christianity upon a spot consecrated by tradition as the exact locality of the martyrdom of St. Paul. The spot is called St. Paolo a la trè Fontana, and tradition says that on the decapitation of the saint his head bounded on the earth three times, and that three fountains of the purest water at once sprang into existence: hence the name. This desolate spot is further consecrated by tradition as being the burial place of the Christians who are said to have been compelled to work as slaves at the building of the Flavian amphitheatre.

Upon the same ground three magnificent churches arose, and in a monastery adjacent a band of monks battled for existence with the dread malaria which gradually depopulated the Campagna. Centuries passed and still the fever-stricken monks endeavoured to hold their own against their mysterious assailant, until worn out and decimated, towards the close of the last century, the monastery was deserted and the few remaining monks migrated elsewhere.

The principal church dismantled and the buildings of the monastery in a ruinous condition became merely a show place for visitors during the winter, until some six years ago the great repute of the Australian gum tree, the *Eucalyptus globulus*, attracted the attention of some Trappist monks residing in France, who at once determined to put the powers of this wonderful tree to the test. They begged to be allowed to occupy the long-deserted buildings, and began with marvellous energy and skill to make the old and ruinous buildings habitable once more. Further they obtained some plants of the *Eucalyptus* and placed them in the cloisters. To the delight of the monks the plants throve, and at this moment these plants of scarcely six years' growth have developed into trees over thirty feet in height. Having as yet, however, no experience of the marvellous absorbing properties of the tree, the monks did not venture to remain during the malaria season upon this hitherto accursed spot, but during the summer and autumn a devoted band might be seen towards evening, tramping their weary way into the city to avoid sleeping in the dreaded locality.

This condition of things continued for the first four years of their occupancy, when not only had their first plantation grown into trees of goodly size, but the whole of the ground within the monastery enclosure had also been planted, and flourishing groves had succeeded to the previous desolation.

In addition, moreover, to planting the ground the monks, many of them able chemists as well as agriculturists, set to work to extract an essence from the tree which it was hoped might prove a valuable febrifuge; this was accomplished with marked success, and the result has been very remarkable. For the last two years all the monks have inhabited the hitherto fatal spot, not one of the community sleeping away from the monastery, but remaining day and night during the whole year in the most fever-stricken part of the Campagna. Such has been the marvellous results effected through the energy and perseverance of these Trappist monks, two of them, the Padrè Gildas and the Fra Orsi, having devoted themselves not only to the cultivation of the trees but also to the perfection of the extract, and these two simple monks may well be satisfied with the result they have obtained.

Whether this grand result has been obtained through the efficacy of the extract taken each morning with their cup of black coffee, or whether it is to be attributed to the effects of the plantations, I leave to scientific men to determine; but the great fact remains, that whereas for nearly a century the spot where they now live had been condemned as fatal to human life during a great portion of the year, these monks, many of them past the prime of life, have not only existed during the entire year in the hot bed of malaria, but have kept their health, and have every hope that the malarious demon has been finally expelled from their dreary habitation.

It now only remains for the Italian government to take up the question with energy, and if the same single-minded devotion can be brought to bear upon the whole of the dreary waste of the Campagna, there appears little reason to doubt that this desolate plain would soon return to the condition in which it unquestionably was in the brightest days of the Roman Empire.

[*The discussion on this paper is printed at p.* 638].

OCCURRENCE OF ETHYLIC ALCOHOL IN THE VEGETABLE KINGDOM.*

BY H. GUTZEIT.

The author has investigated the fruit and umbel-stalks of *Heracleum giganteum*, the fruit of *Pastinaca sativa*, L., and the unripe fruit of *Anthriscus cerefolium*, Hoffn., and has found that ethyl-compounds (alcohol, or compound ethers) are present in each case.

From 6¼ kilos. of imperfectly ripe fruit of *Heracleum giganteum* (summer 1873), a distillate was obtained by distillation with 18 kilos. of water, consisting of about 12 kilos. of faintly acid aqueous liquid, and some few grams of oil. By distillation of the former, a distillate was obtained, from which a little more oil separated, leaving an aqueous liquid exhibiting the same character on fresh distillation; after this process had been repeated a few times, a spirituous substance, boiling under 100°, and burning with a pure blue flame, passed over first; finally, about 12—15 grams of the body were obtained, and after repeated cohobation with caustic lime this was reduced to 5·2 grams of anhydrous liquid, or about 0·1 per cent. of the fruit; this portion boiled between 72° and 77°, and by fractionation yielded a few drops boiling at 78°—79°, and giving numbers agreeing with the formula, C_2H_6O. In another specimen, the first portions gave numbers approximating to those required for the formula CH_4O, whilst the liquid, as a whole, gave numbers agreeing with a mixture of methylic and ethylic alcohols.

The total oil obtained weighed about 35 grams (0·56 per cent.), and by fractionation yielded about 3½ grams of distillate at 130°—170°, 8 at 210°—250°, and 19 at 200°—210°. The first fraction had the odour of ethyl butyrate, and after saponification by means of strong aqueous caustic soda, yielded a minute quantity of distillate resembling alcohol in properties, and giving the odour of acetic ether with sodium acetate and sulphuric acid; whilst butyric acid was found to be present in the sodium salt thus formed.

The residue left in the still by the first distillation of the unripe fruit was strongly acid; after saturation with soda and subjection to distillation, a volatile base and the soda salts of acids now under investigation were obtained, together with about another gram of oil, but no further trace of methylic or ethylic alcohol.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, February 2, 1876.

* *Annalen der Chemie*, clxxvii., pp. 344—384. Reprinted from the *Journal of the Chemical Society*,

These experiments were repeated with $4\frac{1}{8}$ kilos. of ripe fruit (summer 1873). A volatile base came over in the aqueous distillate, together with a spirituous substance which possessed the properties of, and gave on analysis numbers agreeing with a mixture of about $\frac{4}{5}$ methylic alcohol, and $\frac{1}{5}$ ethylic alcohol (in the unripe fruit the latter predominated): the oil weighed about 83 grams (2 per cent.), and yielded a portion of distillate at 130—170, from which a spirituous substance was obtained by saponification with soda, but in so small a quantity that the presence of ethylic alcohol could not be numerically determined; butyrate of sodium was present in the sodium salt thus formed. A larger yield of oil is thus given by the fully than by the imperfectly ripe fruit; this is partly due to the smaller quantity of water contained in the latter. The umbel-stalks when freed from fruit gave by distillation with water excessively little oil, but a little of the volatile base referred to above; young fruit (summer 1874) yielded 0·6 per cent. of oil, and 0·33 per cent. of a mixture of methylic and ethylic alcohols, the latter greatly predominating; a larger quantity of material being here at the author's disposal, he succeeded in isolating and numerically determining ethylic alcohol, ethylic iodide, and methyl oxalate, with satisfactory results.

From a mixture of ripe and unripe fruit (summer 1874) similar results were obtained; the following figures represent the relative yield of the mixtures of alcohols obtained as above:—

1874. Very young fruit, 0·33 per cent. of mixture boiling at 74°—78°.

1874. Partly ripe, partly unripe fruit, 0·14 per cent. of mixture boiling at 74·5°—78°.

1873. Imperfectly ripe fruit 0·08 per cent. of mixture boiling at 72°—77°.

1873. Quite ripe fruit, 0·04 per cent. of mixture boiling at 66°—72°.

The volatile bases obtained from these different specimens were carefully examined, but proved to be nothing but ammonia in each case.

Pastinaca sativa being botanically allied to *Heracleum giganteum*, the author also examined the fruit of this umbellifer; $3\frac{1}{8}$ kilos. of fruit (half ripe and half partially ripe) were distilled with 15 kilos. of water until 6 kilos. of distillate were obtained; from the aqueous portion of this by repeated distillation a spirituous distillate was finally obtained, giving numbers agreeing with a mixture of methylic and ethylic alcohols, and boiling between 72° and 77° after dehydration by quicklime; the highest boiling portion of this gave numbers agreeing with ethylic alcohol, the quantity of mixed alcohols obtained being 4·1 grams, or about 0·08 per cent. The total oil obtained (after a second distillation) constituted about 1·1 per cent., but did not possess any constant boiling point, 17 grams passing at 195°—210°, 8·5 at 233°—240°, and 3·5 at 240°—270° (Renesse found the great majority distilled at 244°—245°; he, however, used only ripe fruit). The acid residue in the still was again distilled with caustic soda solution, whereby a volatile base was obtained; this appeared, however, to consist only of ammonia with a minute trace of something else of higher molecular weight; a spirituous liquid also passed, from which a small quantity of methylic alcohol was isolated.

By similar treatment, 10 kilos of the unripe fruit of *Anthriscus cerefolium*, Hoffn., yielded 0·27 per cent. of a mixture of ethylic and methylic alcohols, in which the former greatly predominated, and the boiling point of which lay between 75° and 78°.

From these results the author concludes that ethylic alcohol is in certain cases a normal constituent of *unfermented* plant juice, existing either as a compound ether or a alcohol itself.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual supper of the members of this Association took place at the "Maypole Hotel," Nottingham, on Tuesday evening, the 25th ult. The chair was occupied by the president, Mr. Atherton, F.C.S., and the vice-chair by Mr. Lewis. After the cloth was removed the usual loyal toasts were given by the chairman. Mr. R. Fitzhugh then proposed in complimentary terms, "The Pharmaceutical Society," and coupled with the toast the name of Mr. Atherton, a member of the council, who suitably responded. The toast of the evening, "Success to the Nottingham and Notts Chemists' Association," was proposed by Mr. Major, B.A., who spoke at considerable length on the great value of such associations in raising the position of the chemist and druggist, both educationally and commercially. Mr. Bolton proposed the health of the "Teachers of the Science Classes," which was acknowledged by Mr. Major. The remaining toasts were "The President," by Mr. Rayner, replied to by Mr. Atherton; "The Treasurer," by Mr. White, replied to by Mr. Rayner; "The Secretary and Council," by Mr. Humphreys, responded to by Mr. Jackson; "The Vice-Chairman," by Mr. Atherton, responded to by Mr. Lewis; and "The Visitors," by Mr. Wilford, responded to by Mr. Des Forges. The evening was agreeably enlivened by some songs and recitations.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.—ANNUAL FESTIVAL.

The annual *réunion* under the auspices of this society was held in the Crown Halls, Sauchiehall Street, Glasgow, on Thursday evening, January 27. The chair was occupied by the President of the Association, Mr. William Greig, who was supported on the platform by Bailie Blanchard (Edinburgh), Councillor Mowat (Glasgow), Drs. A. M. Robertson, F. D. Moffat, R. Bell, A. T. Machattie, John Clark (City Analyst), Messrs. F. Davison, A. Kinninmont, John Jaap, J. L. Hatrick, R. McAdam, W. Whyte, Schmitz, R. S. Nelson, Henderson, A. McNaught (Greenock), J. M. Fairlie (Hon. Sec.), etc.

After tea and viands had been served, the chairman delivered an address, in the course of which he referred to the operations of the society, strongly advocating shorter hours of work, and more diligent and systematic study; as the business was one of progress, and its followers required to keep ahead, the result would no doubt be more appreciation and better remuneration for their labours by the public. In concluding he alluded to the forthcoming visit of the British Pharmaceutical Conference in August next, urging upon all present to become members, and the employers especially to be liberal in their donations to the society, that a hearty reception may be given to the officers and members of the Conference on this their third visit to Scotland.

A short address was also given by Mr. Blanchard, of Raimes, Blanchards, and Co., Edinburgh, in the course of which he expressed regret that he was the only representative from Edinburgh to the annual gathering. He said he had great pleasure in being one of their number on that occasion, and he hoped the Glasgow society would go on flourishing in the future as it had done in the past.

An enjoyable concert was sustained by Miss Valance (soprano), Mr. Ogilvie (tenor), and Mr. Wolfe Stuart (comique), the latter an old Edinburgh druggists' assistant, who kept the audience in good humour by recounting in an inimitable manner some of his adventures during his apprenticeship. The chairman in his concluding remarks thanked the friends from a distance for their presence, and hoped the remaining part of the programme would be as enjoyable as that just finished. Votes of thanks were then passed to the committee, ladies, and chairman, after which the whole company sang "Auld Lang Syne."

An assembly followed, dancing being kept up with spirit till an early hour.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 5, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed " Pharm. Journ."*

THE CONFUSION OF MEDICINE AND PHARMACY.

ALTHOUGH it has always been our endeavour to urge the desirability of not giving medical practitioners reasonable ground for complaint that their legitimate functions were interferred with by the practice of what has been termed "Counter prescribing," and though we have maintained that it is to the interest of the chemist and druggist to restrict himself to those duties which properly come within the scope of his business as a practical pharmacist, it is impossible to ignore the fact that there are many grounds for doubting whether the realization of such a state of things can be hoped for, otherwise than as a remote eventuality. No one who is cognizant of the circumstances that have given rise to the practice of "Counter prescribing," and takes an impartial view of the matter, can fail to recognize that however much he may disapprove of the practice in the abstract, there are many facts which powerfully tend to its maintenance, and in some instances place the chemist and druggist under the necessity of adhering to it, or at least provoke him to its continuance.

In the first place there is the fact that to the apprehensions of a very large class of the community no distinction is known between the doctor's shop and the druggist's shop. It is mainly among this class that the demand for medical aid regardless of medical qualification exists and that the services of the chemist and druggist are sought for, in cases of minor ailments, in such a way that it is scarcely possible to avoid concurrence in the demand. A strong stimulus to the practice of "Counter prescribing" is also furnished in many places by the fact that there is really no obvious, or to the ordinary appreciation, recognizable difference between the shop of the druggist and that of his neighbour the doctor. In some towns and in certain parts of the metropolis even, the open shops kept by medical men for the exercise of the druggist's business as well as their own, are so numerous as to interfere seriously with the trade of properly registered chemists and druggists. The proprietor of the "medical hall" is under no necessity to have gone through the examination which the chemist and druggist must pass before he can carry on business for himself, and when the latter finds not only his retail trade but his chance of dispensing being taken from him by a person who is virtually free from the restrictions of the Pharmacy Act to which he is bound to conform, it is not to be wondered at that the chemist should follow the bad example of confounding another man's business with his own, and seek to equalize the competition he experiences, by performing some of the functions of the medical man, for which he finds ample opportunity.

We point to these unquestionable influences not in any way with the desire of justifying the practice of "Counter prescribing" by druggists, but as illustrating the fact that whatever blame attaches to it, medical men are as much open to reproach as chemists and druggists. Under such conditions as we have mentioned above, it is little wonder that occasionally cases should be met with in which both medical men and chemists combine for the purpose of setting at more thorough defiance the principles that should regulate their respective action, and thus we find developed various forms of "secret alliances" which on various occasions we have done our best to discourage.

If we may judge from the case reported in this week's Journal, the Medical Defence Association seems to be resolved to take vigorous action from the medical point of view, and the letters of our Glasgow correspondents "Anti-Sham," and "J. G." likewise indicate a disposition to attack the evil from the opposite side. Believing that the judicious endeavour to establish a proper line of demarcation between the functions of the druggist and those of the doctor would eventually conduce to the general benefit of both medical men and pharmacists, we, so far, wish them both success and earnestly hope that in striving to attain that object their zeal will be tempered with discretion.

In regard to this subject it is gratifying to find that one at least of the medical journals takes a very rational view of it. Besides admitting that both by usage and the too common incapability to distinguish between a doctor and a druggist, a natural basis exists for the practice of "Counter prescribing," the *Medical Press and Circular* refers to the fact that medical men are partly responsible for the existence of the practice they complain of. It adds, also, that the profession has never adopted any well concerted measures to put a check upon this practice, and that, moreover, by so many of its members keeping open shops and dispensing their own medicines, it has laid itself open to the retort that if chemists now and then trespass upon the province of medical men, the latter interfere far more openly and to a much greater extent with the business and profits of the chemist and druggist.

Our contemporary acknowledges that the difficulties of the case are such that it doubts whether the druggist and medical practitioner will ever be able to keep entirely within their respective provinces, and limit their practice exclusively to that for which they are respectively best qualified. On the contrary it considers that if each endeavoured to do so, there is reason to believe the good intentions of the druggist would sometimes have to yield to strong pressure from without.

We congratulate our readers that views so reasonable have found expression in the columns of a medical journal, and we would suggest that in dealing with the subject a similar consideration and regard for the determining influence of special circumstances should be manifested also from the druggist's point of view.

THE PAPACY AND A PHARMACIST.

According to the correspondent of the *Daily News* at Rome, a very pretty quarrel has sprung up over the grave of the late Signor Ettore Rolli, professor of botany at the Sapienza, a distinguished pharmacist, vice-president of the Pharmaceutical College, and member of many scientific and literary bodies. It appears that the Signor, who had made himself rather notorious by his apostacy from Romanism and outspoken latitudinarianism, died rather suddenly. Shortly afterwards Roman society was a little startled by the announcement in the pontifical papers that his death had been an edifying one, and that after a solemn retractation of his heresies he had expired fortified by all the comforts of the Catholic church. It was stated that at the urgent request of the dying professor, Monsignor Tizzani had hurried to his bedside, received his confession, and embodied it in a document, which, although the professor was unable to sign, received the attestation of the Cardinal, and two other witnesses. The Cardinal himself having been blind for twenty years, some curiosity was excited as to the identity of the co-signitaries. The mystery was solved in an unexpected fashion by the publication of a letter, signed by two friends of the deceased, alleging that Monsignor Tizzani had been called in upon their responsibility, and not at the professor's request, and that on his second visit, when Professor Rolli was in a delirium, Monsignor Tizzani produced a document from his pocket which he "surprised" them into signing, but that Professor Rolli made no retractation or confession. How these two friends were "surprised" into signing such a misrepresentation of the opinions of their "beloved master" has not been made quite apparent.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, February 10th, at 8 o'clock, when the following papers will be read:—

"Notes on some Branches of Physical Science" by Mr. E. Cardwell; and "Notes upon Hydriodate of Quinia" by Mr. A. Hunt.

We are requested to announce that the annual general meeting of the National Chamber of Trade, will take place at half-past seven on Wednesday next, at the offices of the association, 446, Strand.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, February 2, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present,—Messrs. Atherton, Baynes, Betty, Cracknell, Frazer, Greenish, Hampson, Mackay, Owen, Rimmington, Robbins, Sandford, Savage, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read.

The Prize Examinations.

Mr. Mackay, while thoroughly approving of the regulations proposed with regard to prizes, thought the Board of Examiners in Scotland had not been fairly treated—because in the paragraph which he now asked permission to read it was provided that the questions were to be set and the answers valued by the London Board of Examiners, to the entire exclusion of the Edinburgh Board, excepting that it was proposed one or two of their number should act more as policemen than examiners. He thought, considering the harmony which prevailed between the two boards, that this was scarcely fair, and that some arrangement might be made by which a committee from both boards—say two from London and one from Edinburgh—might so arrange as to conduct the examinations for the prizes simultaneously at the two centres.

Mr. Sandford assured Mr. Mackay there was not the slightest intention to cast any slight on the Edinburgh Board. He had no objection to the course suggested. It was practically found best to commit the drawing up of questions on each particular subject to one person. It would probably be better to have only one member from each board, as although there were three subjects, chemistry, materia medica, and botany, the two latter might with advantage be entrusted to one gentleman.

After some consideration, during which other business was proceeded with, Mr. Mackay moved—

> "That the resolution of the Council of January 5th, to the effect that the questions for the Prize Examinations should be set and the answers thereto determined by the Board of Examiners in London, be rescinded, and that in lieu thereof the Council shall from year to year appoint two gentlemen, taking one from the Board of Examiners in London and one from the Board in Edinburgh, to set the questions and determine the value of the answers, reporting the same to the Council for final adjudication. The two gentlemen appointed by this resolution shall be present during the time the candidates are engaged in answering the questions."

Mr. Schacht said it was quite new to him that candidates for these prizes would have to go to London or Edinburgh. It was his understanding that this system was meant to compensate those men who might have passed in honours for the loss of credit occasioned to them by publishing the names in an alphabetical list; but this would not be the case if they had to come up on purpose to pass the prize examination, perhaps from the extreme end of the kingdom. It had been pointed out that this examination must be a written one, and he did not see why it should not be conducted in local centres.

Mr. Greenish said his view quite coincided with that just expressed. He had opposed doing away with honours because now the men who passed were all put on one dead level. He hoped this motion would not be carried, and should be glad to see the whole subject postponed until the next meeting for further consideration. It was too important a matter to be decided off-hand.

Mr. Rimmington also agreed with Mr. Schacht, because he felt sure that not one-fourth of those entitled to compete for the prizes would be at the trouble and expense necessary to do so.

Mr. **Hampson**, could not vote for the motion, but neither did he see the necessity for re-opening the whole question, as Mr. Schacht desired, or think it was quite in order to do so. No doubt a change, perhaps in some respects an unfortunate change, had been introduced, but he hoped the inducements now held out would be sufficient to attract men to the examinations for prizes. If they found the regulations did not work, they could be altered; but he thought they should be tried.

Mr. **Atherton** thought it a pity this matter had been decided so hastily.

Mr. **Shaw** did not see why the examination for prizes, being a written one, should not take place at all the centres throughout the country. The present regulations would give immense advantages to candidates resident in London.

Mr. **Schacht** hoped the whole matter might be remitted to the committee for further consideration. It was not merely the question of the expense, but many employers would not allow their young men the necessary leave of absence to come up for the prize examinations. He would move an amendment, that the subject be referred again to the committee.

Mr. **Hampson** thought such an amendment was out of order, the matter having been already decided at the previous meeting.

Mr. **Schacht** submitted that it was as much in order as the motion of Mr. Mackay.

Mr. **Mackay** said his original idea was to remit the subject to the committee, but he had been overruled.

Mr. **Betty** said the Council had given a deliberate vote upon the question last month, and he hoped Mr. Schacht would not ask it to rescind the vote then given until at least a year's trial had been given.

Mr. **Sandford**, although strongly deprecating the proposal of Mr. Schacht, suggested that Mr. Mackay should omit the last sentence of his motion, which was not really essential to it, and it would then be open to Mr. Schacht at any future meeting to move that the regulation requiring the prize examinations to take place in London and Edinburgh only be rescinded, and that the examinations be held at all the centres.

Mr. **Cracknell** said his experience as an examiner led him to the conclusion that the fewer the number of places where examinations were conducted the better. Irregularities had occurred even through miscarriage of letters, and his conviction was that no precautions were too great to keep the questions in the hands of the examiners themselves until the very last moment. He objected to the resolution, as it involved an unnecessary postal correspondence between London and Edinburgh.

Mr. **Williams** said this ought not to be treated as a national question at all. He considered that the questions should be set by one, or at most two examiners, who should also be entrusted with the valuation of the answers. He pointed out that the prize represented the highest honours which the Society could confer. If it were not worth the while of persons desiring to compete to travel to London or Edinburgh, from where they might reside, the Society would hardly be justified in giving the prize at all. Under the old regulations men had to come to London, and in this respect there had been no fresh difficulty imposed; the only difference being that the examination was now thrown open to all men who had passed the Major, instead of being confined to those who passed in honours.

Mr. **Mackay** having replied, saying that the objections were only matters of detail which could easily be got over, and that so long as Scotland formed part of the Society, and the Scotch Board was recognized by Act of Parliament, the Council was bound to put the two boards as much as possible on an equality. He did not object to remove the last sentence of his resolution as suggested.

The motion was then put and negatived.

Mr. **Schacht** said he should bring forward a notice on the subject at the next meeting.

The late Mr. Daniel Hanbury.

The **President** drew the attention of the Council to a very fine portrait in oil of the late Mr. Daniel Hanbury, which had been sent by Mr. Thomas Hanbury, who intended to present it to the Society if approved, but had expressed his willingness to have any alteration made in it which might be thought desirable. For his own part he thought it impossible to improve the likeness, and with the consent of the Council he would write to Mr. Thomas Hanbury, who was now at Mentone, to that effect. This view being at once acceded to, the President went on to speak of a matter which had been suggested by Mr. Greenish, and further referred to in a letter by Professor Dragendorff to the Editor of the Society's Journal, and which he was sure would be in accord with the wish of every member of the Council, viz., the desirability of raising a memorial to Mr. Hanbury. He would therefore move—

> "That a committee be formed, to be called the Daniel Hanbury Memorial Committee, consisting of the Council, Examiners, and Professors, with power to add to their number, and that subscriptions be commenced for the purpose of raising a fund, the details to be left to the general committee."

The **Vice-President** seconded the resolution.

Mr. **Greenish** said he hoped the initiative would, without hesitation, be taken by the Council of the Pharmaceutical Society, whose duty and privilege it was; Mr. Hanbury was a Fellow of the Royal Society and also of the Linnean Society, but he was essentially a pharmacist.

After some discussion the motion was unanimously agreed to.

The Board of Examiners for 1876.

The **Secretary** read a letter from the Medical Officer of the Privy Council, approving the names of the examiners submitted by the Council.

Honorary Member.

The **Secretary** read the following letter from Professor von Trapp, thanking the Council for his election as honorary member:—

"48, Liternaja Prospect, St. Petersburg,
"17th December, 1875.

"To the Secretary of the
"Pharmaceutical Society of Great Britain, London.

"Dear Sir,—Acknowledging receipt of your esteemed letter of the 24th inst., I beg to express my warmest thanks to the members of your Society for electing me honorary and corresponding member of the same.

"Laying, as I do, a particularly high value upon this appointment, I can assure you I shall always show myself worthy of the honour you have conferred upon me.

"Your esteemed favour of the 8th June arrived here during my absence abroad, nor was I aware of its being here until the arrival of the second letter, the official of the Pharmaceutical Society in whose custody it was having omitted to deliver it to me on my return. Kindly, therefore, excuse the delay which has taken place.

"In compliance with your request I beg to annex at foot my full name and title, and remain,

"Dear sir,
"Yours faithfully,

"Professor Emeritus, Academicus, Imperial Russian Privy Councillor, and Knight of the Orders of Wladimir, Anne, etc., etc.,

"Dr. Julius Trapp,
"Director der pharm. Gesellschaft in St. Petersburg, Prof. Emeritus Pharmaciæ an der Medico-Chirurg Academie, Medicinalrath, etc."

RETIRING MEMBERS OF COUNCIL.

The lot being taken in the usual manner for the seven members of Council who should retire in May, the following gentlemen's names were drawn:—

Atherton.
Bottle.
Cracknell.
Frazer.
Greenish.
Mackay.
Savage.

The following, who remained in by lot last year, now retire by rotation:—

Hills.
Owen.
Sandford.
Schacht.
Shaw.
Sutton.
Williams.

The following remain in office for another year:—

Baynes.
Betty.
Brown.
Hampson.
Hanbury.
Rimmington.
Robbins.

REGISTRAR'S FEES FOR CERTIFICATES OF DEATH.

The SECRETARY reported that the President, in company with the Solicitor and himself, had had a very satisfactory interview with the Registrar-General on the subject of the recent correspondence as to the extra fee demanded in some cases for certificates of death. It appeared that the term used in one of the letters, "registered pharmaceutical chemist and druggist," was so used by mistake, the instructions given to registrars being to send certificates of the deaths of "registered chemists and druggists."

Mr. SHAW said he had called on the Registrar at Liverpool, who was a neighbour of his, and found that the instructions sent out were apparently quite satisfactory and sufficient for the purpose.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

Anderson, Alexander	Brighton.
Beale, James H. T.	Weymouth.
Blake, Charles Alexander	London.
Bumpstead, Robert George	Great Yarmouth.
Coles, William	London.
Palmer, William Joseph	King's Lynn.

Chemists and Druggists.

Butler, Robert James	Leeds.
Forbes, James Wallwork	Bolton.
Horne, Edward	Barnsley.
Newzam, Henry Samuel	Islington.
Ord, John	Westminster.
Shields, Thomas	Peckham.
Wakeham, Charles	Helston.
White, Thomas	Launceston.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations, and being in business on their own account, were elected "Associates in Business" of the Society:—

Minor.

Brouard, Ernest James	Guernsey.
Brunt, Francis	Coalville.
Cox, Edwin Joseph	Greenhithe.
Davies, Thomas	Liverpool.
Dawson, Francis Robert	Wigan.
Drury, Sydney	Notting Hill.
Fingland, James	Thornhill.
Fowler, Edwin	Hull.
Geldart, John	Liverpool.
Grayson, Charles	Swineshead.
Hall, Peter	Newcastle-on-Tyne.
Heath, Frederick Devon	Highbury Park.
Hensby, Robert Place	Newington Causeway
Jones, Owen	Bangor.
Lunan, Alexander	Banchory Ternan.
Parker, William	Lancaster.
Selley, John	West Brompton.
Smith, Mark	Louth.
Smith, Tenison	Ryde (Isle of Wight).
Snow, William	Birkenhead.
Sparshott, Harry	Birmingham.
Waddell, Andrew M.	Glasgow.

Modified.

Bullock, Frederick	Anerley.
Cullen, Robert Henry	Bayswater.
Dunn, George	Waltham Abbey.
Fenner, Edwin	Shoreham.
Griffits, John Alonzo	Woodstock.
Howard, John	Ely.
Kershaw, William	Luddenden Foot.
Michelmore, Philip William	Totnes.
Monkhouse, Henry	Derby.
Shackleton, George William	Abergavenny.
Shaw, John	Oldham.
Smith, Robert John	Horseleydown.
Spinney, Frank	Bournemouth.
Williams, William Frederick	Sherborne.

ASSOCIATES.

The following having passed their respective examinations were elected "Associates" of the Society:—

Minor.

Cattell, John Thomas	Coventry.
Cook, Robert, jun.	Great Grimsby.
Edward, John Hutchison	Edinburgh.
Heald, Samuel Haldane	Wakefield.
Hughes, Evan Grismond	Llandilo.
Laing, Richard William	Cape Town.
Phillips, Charles Lloyd	Tredegar.
Rogers, Sydney	Newport Pagnell.
Snow, Arthur Legge	Ross.
Winpenny, Frank Walker	Barnard Castle.

Modified.

Knight, John Edward	London.
Warrington, Charles Bower	Woolwich.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Abington, Leonard Yates	Newcastle-under-Lyne.
Anderson, James Johnstone	Epworth.
Arblaster, Charles	Birmingham.
Atkinson, John Robert	Adwick-le-Street.
Baines, Francis	Corsham.
Barlow, Arthur	Hull.
Blagg, Arthur Frederick	Kilburn.
Chaloner, William Francis	Birmingham.
Chifney, George Pearmain	Mildenhall.
Cholerton, Alfred Foster	Leicester.
Clayton, William Kitson	Wakefield.
Cunningham, Oscar William	Norwich.
Daniel James	Stonehaven.
David, Martin Sinclair	Laugharne.
Dickson, William	Kirriemuir.
Earp, Richard Thomas	Melbourne.
Fox, William	Grantham.
Furness, Thomas	Chesterfield.
Gardner, Valentine Frederick	Ty-derwen.
Gibbs, John	Worcester.
Groves, Richard Henry	Blandford.
Harris, Walter Scott	Canterbury.
Harrison, William Salisbury, jun.	Sunderland.
Hendy, Albert Henry	Bristol.
Higson, John	Blackburn.
Hogg, Robert William	Gateshead.
Holwell, Alfred	Loughborough.

Howse, Charles Turk	Cheltenham.
Humphreys, William Carr	Bromsgrove.
Jary, Joseph James	South Shields.
Jenkins, Thomas	Swansea.
Jepson, Xeno	Sheffield.
Jones, William Harris	Abergavenny.
Lissaman, Alaric Alexander	Foleshill,
Livesey, James Thomas	Preston.
Martin, William Lee	Derby.
Mason, George Henry	Levenshulme.
Melville, William	Langholm.
Moore, Jonathan Reuben	Kettering.
Morson, Albert Robert	London.
Needham, Thomas	Manchester.
Peck, Frederick William	Cambridge.
Powell, Samuel John	Swansea.
Ray, Frederick James	Maidstone.
Rhodes, John Mitchell	Sheffield.
Ridley, Thomas	Brampton.
Roberts, Joseph	Liverpool.
Rouw, Theodore John	Ruthin.
Rundle, Charles	St. Blazey.
Saunders, James Ambler	Oswestry.
Selleck, William Robert	Bovey Tracey.
Shaw, Herbert	Grantham.
Sibthorp, Stephen Shurmer	Liverpool.
Sime, Thomas	Edinburgh.
Simpson, Alexander Henderson	Rubislaw.
Stevens, George	Cannock.
Stevenson, John Joseph	London.
Stewart, Duncan	Crieff.
Udale, Septimus	Hornsey Rise.
Wilkinson-Newsholme, Geo. T.	Huddersfield.
Williamson, James	Ash.
Wookey, Edgar	Bristol.
Wooldridge, Elijah	Cradley Heath,

Several individuals were restored to their former status in the Society on payment of the current year's subscription and a fine.

Amongst the list of the proposed apprentices and students was included the name of a lady, and on the resolution being moved for their election,

The VICE-PRESIDENT moved an amendment that the name be omitted.

This was seconded by Mr. SANDFORD, and after some discussion carried by a majority of 11 to 8, the names being as follows:—

For—Atherton, Baynes, Betty, Bottle, Cracknell, Hills, Mackay, Rimmington, Robbins, Sandford, and Williams.

Against—Frazer, Greenish, Hampson, Owen, Savage, Schacht, Shaw, and Sutton.

REGISTRAR'S REPORT.

The Registrar's annual report showing the numerical strength of the Society was placed on the table.

This Report is printed on pp. 632 and 633.

EXAMINATION FEES.

Mr. WILLIAMS moved the following of which he had given notice:—

> "That the Bye-laws be altered as follows:—The fee payable by each candidate, on presenting himself for the Minor examination, shall be five guineas; and the fee payable by each candidate, on presenting himself for the Major examination, shall be three guineas. This scale of fees to come into operation on January 1, 1877."
>
> "That on and after January 1, 1877, it be a regulation of the Council—
>
> "That in the event of the failure of a candidate to pass the examination for which he presented himself, he shall be permitted to present himself for examination at any subsequent meeting of the Board, on payment of two guineas for the Minor or Major examination, or one guinea for the Preliminary or Modified examination."

Mr. Williams said that although in times past a revenue had been derived by the Society from examination fees yet last year the balance accruing to the Society fell to such a point as showed that no revenue from this source was derived. Now he thought it only fair that those who came forward to enter the trade should be required to pay at least the expenses of their examinations. The Society spent its money liberally in defending the interests of the trade by prosecuting persons who infringed the Pharmacy Act, in watching legislation in parliament, and in other ways; and, therefore, it was necessary that means should be provided to meet the expenses. At present three guineas was the fee paid for the Minor examination, which gave a person the privilege of starting in business, whilst the fee for the mere honour examination, the Major, was five guineas. His suggestion was that these fees should be altered, still retaining the total amount of the fees for Preliminary, Minor, and Major, at ten guineas as at present, though he thought the time might come when both the Major and Minor fee would have to be made five guineas. He did not know that he need go *seriatim* through the figures which had been prepared, and laid upon the table, but having found some difficulty in understanding the printed statistics he had prepared a table from them himself which he had afterwards got verified in the office, and which he now held in his hand. From this it appeared that the balances remaining in favour of the Society from fees paid for Major and Minor examinations had been as follows:—In 1872, £709; in 1873, £1017; 1874, £570; and in 1875, which he contended might be taken as a fair average of what might be expected in future, the balance was only £205 1*s.* 9*d.* Even these balances were only apparent, as no allowance was made in them for official and other expenses, such as stationery, postage, specimens, etc., etc. A sum of £205 was obviously not sufficient to meet these charges, and certainly left no balance in favour of the Society as ought to be the case. The average cost of examining the candidates, including both Major and Minor, was, in 1872, £1 4*s.*; 1873, £1 4*s.*; 1874, £1 8*s.*; 1875, £1 18*s.*, showing that the payment of a guinea by candidates who failed to pass did not meet the bare expenses of the examinations. He had made an estimate of the benefit which the Society would have derived had the change he now proposed been made last year; from which it appeared that last year there would have been a balance of £586, instead of £205. It might also be urged that as the Preliminary examination yielded a fair proportion of revenue it was only reasonable that the Minor and Major examinations should also contribute their proportionate share to the common fund. With respect to the second part of the motion he must remind the Council that it was notorious that candidates presented themselves without due or proper preparation, on the mere chance of passing or seeing what the examination was like, to the great annoyance of the examiners and injury to the Society. This he thought would be checked by refraining from returning any part of the fee to those who failed, but permitting them to present themselves again on payment of a modified fee.

Mr. ROBBINS seconded the motion.

Mr. SAVAGE, after going into the figures, saw no sufficient reason for altering the present regulations.

Mr. FRAZER moved the following amendment, of which he had given notice:—

> "That while it is inexpedient to disturb the existing arrangements as to the *amount* of the fees payable by candidates for the various examinations of the Society, until the effects of the recent changes in the character of the examinations, and in the age of the candidates eligible for entering on them, be more fully tested than they have yet been: It is now resolved that after the 31st of December next no part of the fees payable for the Preliminary, Minor, or Major examinations be returned to the candidates, but that in lieu of the amount of the fees so retained,

REGISTRAR'S REPORT.

MEMBERS, ASSOCIATES, AND APPRENTICES OF THE SOCIETY FOR THE YEAR 1875.

MEMBERS AND ASSOCIATES IN BUSINESS.

	Members.		Associates in Business.
	Pharmaceutical Chemists.	Chemists and Druggists.	
Number of Subscribers, 1874 ...	1832	811	459
„ restored, 1875...	7	3	0
„ elected, 1875...	53	50	148
	1892	864	607
Deaths, secessions, etc. ...	69	29	30
Total number of Subscribers, 1875 ...	1823	835	577
Summary:—			
1874 ...	1832	811	459
1875 ...	1823	835	577
Increase ...	...	24	118
Decrease ...	9	...	...

ASSOCIATES AND APPRENTICES.

	Associates.	Apprentices.
Number of Subscribers, 1874 ...	819	795
„ „ „ 1875 ...	874	852
Increase ...	55	57

COMPARATIVE STATEMENT OF THE NUMERICAL STRENGTH OF THE SOCIETY FOR 5 YEARS: 1871-75.

MEMBERS.—PHARMACEUTICAL CHEMISTS.

	1871	1872	1873	1874	1875
Restored to Membership ...	6	9	8	1	7
Elected „ ...	63	34	143	55	53
(Total additions) ...	69	43	151	56	60
Deaths, Secessions, etc. ...	74	74	69	72	69
Increase ...	...	...	82	...	...
Decrease ...	5	31	...	16	9
Total number of Subscribing Members ...	1797	1766	1848	1832	1823

MEMBERS.—CHEMISTS AND DRUGGISTS.

	1871	1872	1873	1874	1875
Restored to Membership ...	1	2	2	4	3
Elected „ ...	106	97	54	53	50
(Total additions) ...	107	99	56	57	53
Deaths, Secessions, etc. ...	20	19	27	24	29
Increase ...	87	80	29	33	24
Total number of Subscribing Members ...	669	749	778	811	835

ASSOCIATES IN BUSINESS.

	1871	1872	1873	1874	1875
Restored ...	...	1	...	1	...
Elected ...	90	105	141	110	148
(Total additions) ...	90	106	141	111	148
Deaths, Secessions, etc. ...	12	19	17	23	30
Increase ...	78	87	124	88	118
Total number of Associates in Business ...	160	247	371	459	577

ASSOCIATES NOT IN BUSINESS.

	1871	1872	1873	1874	1875
Increase ...	108	90	25	149	54
Total number of Associates not in Business ...	566	656	681	830	884

APPRENTICES OR STUDENTS.

	1871	1872	1873	1874	1875
Increase ...	49	31	83	68	57
Total number of Apprentices or Students ...	613	644	727	795	852

LIFE MEMBERS.

	1871.	1872.	1873.	1874.	1875.
Pharmaceutical Chemists	278	273	272	269	261
Decrease	3	0	6	3	8
Chemists and Druggists	3	3	3	3	3

ANALYSIS OF EXAMINATIONS FOR THE YEAR 1875.

ENGLAND AND WALES.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations... 16
Average attendance of the Board of Examiners ... ... 14·12

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of Rejections at each Meeting	Percentage of Rejections.
Major	72	46	26	9	8	2·88	36·11
Minor	221	104	117	9	24·55	13	52·94
Modified	49	29	20	3	16·33	6·66	40·81
Preliminary ...	717	345	372	4	179·25	93	51·88

SCOTLAND.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations... 8
Average attendance of the Board of Examiners ... ... 7·62

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of Rejections at each Meeting.	Percentage of Rejections.
Major	10	8	2	4	2·5	·5	20
Minor	64	37	27	6	10·66	4·5	42·18
Modified	8	4	4	6	1·33	·66	50
Preliminary ...	107	71	36	4	26·75	9	33·64

THE REGISTER OF PHARMACEUTICAL CHEMISTS AND CHEMISTS AND DRUGGISTS, 1875

Additions during the year:—	
Number of persons who have passed the Modified Examination	33
Minor ,, ...	141
Major ,, ...	54*
Number of persons registered on payment of the Registration Fee, having been in business before August 1, 1868.........................	29
Number of persons restored to the Register on payment of a fine	16
Placed on the Register by virtue of restoration to membership—Pharmaceutical Chemist	1
An Associate of the Society before July, 1842, restored and elected a Member—Pharmaceutical Chemist	1
Name previously omitted in error from the Register—Chemist and Druggist	1
Decrease of numbers on the Register	10
	232

*These having already been included in the number who passed the Minor, do not increase the numbers on the Register

Erasures during the year:—	
Deaths:—	
Notices from Registrars	202
Other sources	18
Erased at the request of registered persons themselves............................	12
	2

Number of Pharmaceutical Chemists on the Register, December 31st, 1875	2,335
,, ,, Chemists and Druggists	10,941
	1 , 76

> every unsuccessful candidate shall have *two* further opportunities of passing, free of charge."

Mr. FRAZER said he was by no means wedded to the solution of the question offered in his present amendment. If the one he proposed in December were judged a better solution of the difficulty, he was quite willing to substitute it, or to so modify it as to meet the view of those who agreed with him in objecting to the proposed increase on the Minor fee. One objection he had to the motion of Mr. Williams was that it was another change. The changes as to the age of the candidates, the character of the examinations they have to pass, and the places where the examinations are to be held, had followed each other with such bewildering rapidity that students and young men could have no assurance how any of them would stand when their turn to enter on them came about. The promoters of those alterations were bound in all fairness to give them a proper trial, and not by propounding fresh changes to virtually condemn their own previous action. He was himself hopeful that if time were allowed, considerably larger numbers would be entering for the Major than had hitherto been the case, because of the little comparative extra work required to pass it after getting through with the new and harder Minor. The effect of all the recent changes had already been seen in the great numbers of young men leaving the ranks for other pursuits, and in the greatly increased difficulty almost everywhere felt in getting fresh recruits or apprentices. With such an addition as that proposed by Mr. Williams to the amount of the Minor examination fee, he anticipated a still greater difficulty in obtaining hands with which to conduct business. Testimony in support of this view of the question could be found in the advertising columns of the *Pharmaceutical Journal*, in the large increase in the number of advertisements for assistants during the last five years. The proposed increase in the fees was said to be necessary because of a diminished revenue, and a still further expected elimination from these fees. But he would ask, What warrant had they to tax the examinations in this way? If this law were to be applied to one branch of expenditure, it ought to be applied to every branch of it. But he did not think there existed any necessity for doing so. A common purse, as in the past, for a common expenditure. The revenue from examinations and from memberships, etc., going into one purse—from that purse pay all outlay. Supposing that the whole ordinary income of the Society should come to be less than the whole ordinary outlay, would it not be wiser to try some other means of getting the two ends to meet? There are in round numbers 1800 pharmaceutical paying members; suppose they were asked for 25*s.* a-year from each, that would give an increase of £360, and he did not think 25*s.* would be a high charge for membership considering members got a Journal weekly, in addition to all the other privileges connected with the Society. Rather than further tax poor students, might not the expenditure in conducting the examinations themselves and in other directions be somewhat reduced? The December motion was easy in its terms in comparison with the one now brought forward. By it the Minor and Major candidates respectively risked £2 2*s.* instead of £1 1*s.* as at present. By the new scale the Minor candidate risks £5 5*s.*, and the Major £3 3*s.* By it one examination will cost the candidate £5 5*s.*, two will cost him £7 7*s.*, and three will cost him £9 9*s.*, instead of £3 3*s.*, £4 4*s.*, or £5 5*s.* as at present. Such terms he held would not only be fatal to the prosperity of the Society, but were out of all proportion too dear for the value received. He felt assured the Privy Council would refuse to sanction the change if carried. In conclusion, Mr. Frazer said he thought it a pity that Mr. Williams had omitted to take into account the proceeds from the Preliminary examinations, which would make a considerable item.

Mr. HAMPSON seconded the amendment, *pro formâ*, though he could not say he entirely agreed with it, and should have preferred some other amendment of a similar tendency. Mr. Williams admitted, notwithstanding the array of figures he had brought forward, that the improved revenue which would accrue from carrying his resolution would be very small, only £200 or £300 at the outside. It certainly was not worth while to alter the bye-laws for such a purpose, nor did he think it necessary to alter them at all. The loss appeared to him to arise chiefly from the unsuccessful candidates, and he would therefore make them pay a little more for the privilege of being rejected; and he thought the result would be quite equal to that from Mr. Williams' proposed regulations. These would also lead to a loss of £100 on the Major examinations, which was totally unnecessary, and he thought undesirable, He thought it was very questionable whether they, as a society with some voluntary functions, ought to derive a revenue by increased fees from compulsory examinations. He also disapproved of the exclusion in Mr. Williams's estimate of the profits derived from other sources, some of which were directly traceable to the examinations, especially to the Preliminary examination fees. He thought they could not do better than provide that every unsuccessful candidate, Major or Minor, should leave two guineas instead of one in the hands of the Society.

Mr. MACKAY thought it would be better not to make any alteration in the bye-laws. He feared it would cause a great deal of bad feeling amongst young men who were preparing for the Minor examination if they found the fees were going to be increased; nor did he think these young men were the proper persons to make up any loss which might accrue under the present system. He had in his hand an abstract showing the results for 1874 and 1875, from which it appeared that in England and Wales the net surplus for the Major and Minor examinations in 1874 was £419 11*s.* 1*d.*; in 1875, £144 12*s.* 6*d.* In Scotland, during the same years, the surplus was, in 1874, £151 6*s.* 7*d.*; in 1875, £60 19*s.* 3*d.* At every meeting there had been a slight loss on the Modified examinations, both in London and Edinburgh, but this as well as the Preliminary, he had left entirely out of calculation. There was no doubt that the examinations were at present not paying their expenses, and the question was, How should the deficiency be made up? He had been present at every examination held in Scotland, and had been struck with the very unprepared state in which some young men came up. Such persons certainly ought to pay at least the whole expense of their examination. He had, therefore, intended to propose a resolution to the effect that only one guinea should be returned to each unsuccessful candidate, and that they should pay the full fee on again presenting themselves. If, however, the second proposition of Mr. Williams were carried, it would come to nearly the same thing, and therefore he should be prepared to vote for it rather than divide the Council.

Mr. WILLIAMS said he would withdraw that portion of the motion which would require an alteration of the bye-laws, as it appeared to be the general feeling in the Council that it was not desirable to press it. The latter portion of the motion, with a slight alteration, would in a great measure meet his wishes, and he would therefore move it in the following form:—

> "That on and after January 1st, 1877, it be a regulation of the Council—
>
> "That in the event of the failure of a candidate to pass the examination for which he presented himself, the fee shall not be returned, but he shall be permitted to present himself for examination at any subsequent meeting of the Board on payment of Two Guineas for the Major or Minor examination, or One Guinea for the Preliminary or Modified examination, provided he present himself within one year from the date of his failure."

The PRESIDENT hoped Mr. Frazer would withdraw his amendment, and thus the question would be settled

Mr. FRAZER said he must press the amendment.

The VICE-PRESIDENT was very glad Mr. Williams had withdrawn the first portion of the motion; the portion remaining quite met his views, after considering the subject a good deal. He regretted that Mr. Frazer also had not consented to withdraw his amendment. The Secretary had just given him the particulars of the February examination, showing 27 entries for the Minor, and 7 for the Major. Against these figures the cost of examining these men, and the fees, which would be paid under Mr. Frazer's system, amounting altogether to £121 16*s*., which would not meet the expenses. The fact was that a great many candidates always came up, not expecting to pass, but simply to see what it was like, and it was only fair that they should pay at least the cost of their examination.

Mr. FRAZER said he would withdraw his amendment.

Mr. SANDFORD said the expenses of the Society had greatly increased of late, in consequence of having to prosecute offenders, and this would continue in the future. This was done for the protection of those who entered the trade, and it was but fair that they should contribute towards the expenses thus incurred, by means of the fees paid on entry. The figures which had been given in the papers before them only referred to the direct payment to the examiners, and did not include the office expenses, postages, and many other matters connected with keeping the register, which ought really to be provided for before there could be said to be any surplus.

The concluding portion of the motion moved by Mr. Williams, as altered, was then put and carried unanimously.

COMMITTEES.

FINANCE.

The report of this Committee was read and adopted and various accounts were ordered to be paid.

BENEVOLENT FUND.

The report of this Committee was read, including a recommendation of the following grants:—

£20 to the widow of a late member in Tasmania.

£15 to one of the unsuccessful candidates for an annuity in October last.

£10 to another unsuccessful candidate at the late election.

Some other applications the Committee had declined to entertain, and one had been deferred for further consideration. The recommendations of the Committee were adopted and another grant of £10 was also made to a chemist and druggist at Norwich, advanced in age, and in ill health, further particulars of his case having been given by a member of Council.

LIBRARY, MUSEUM AND LABORATORY.

The report of this Committee included the following statements:—

The Librarian had reported that the average attendance in the library had been, day 24·5; evening, 8·7. In the conversation room there had been attendance on four evenings only. Circulation of books, in town 116; country 40. One of the missing books had been returned.

The Committee recommended that the conversation room should be closed, it being so little used.

Professor Bentley had reported that there had been 57 entries in his class.

Professor Redwood had reported 49 entries in his class.

Professor Attfield had reported that there had been 78 entries in the laboratory since the commencement of the session, 67 students being then at work. All the benches were occupied, and 5 gentlemen were waiting for vacancies.

The remainder of the report referred to the supply of bottles for the museum, for which an estimate had been obtained.

The report was read and adopted.

Mr. GREENISH, referring to the closing of the conversation room, explained that the room had not been used so much as had been expected because of the old Council room having been granted for the use of students once a fortnight for the purpose of reading papers; that having been the principal object for which the use of the room was originally requested. These meetings he understood were well attended and were very successful.

HOUSE.

This Committee had held two meetings, when plans were considered for certain alterations in the rooms allotted to the professors in accordance with arrangements lately sanctioned by the Council. Estimates had been obtained for doing the work at a cost of £79 10*s*. The report was received and adopted.

The SECRETARY also read a letter he had received from Professor Attfield describing the method of ventilating the laboratory which had been found successful, and requesting authority to extend it. This was acceded to.

PARLIAMENTARY.

A letter from the Solicitor had been received by this Committee, stating results of various actions in which the Society was plaintiff, which had already been reported in the pages of the Journal, and also giving information respecting the state of the proceedings which were still in progress. Several unregistered persons had been reported to the Committee as being in the habit of selling poisons, and the Secretary had been instructed to caution them accordingly.

A memorial had also been laid before the Committee from Exeter, signed by 31 members of the trade, and presented to the members of parliament for the borough, calling attention to a recent death from chloral hydrate, and suggesting the desirability of including chloral hydrate and patent medicines in the Poison Schedule of the Pharmacy Act. The Committee had not been able, as yet, to take the matter into consideration.

The report was adopted, and the Exeter memorial was referred to the Committee for consideration and report.

GENERAL PURPOSES.

Two applications for grants from provincial associations had to be laid before this Committee, one from Manchester asking for £25 to supplement the lecture fees paid by the students; the other from Leicester asking for £7 for the purchase of books, and £8 for the purchase of a book-case. The applications gave the details of the associations, number of members, etc., which were considered by the Committee to be satisfactory, and it was recommended that the grants should be made.

The report was received and adopted.

REPORT OF EXAMINERS.

The report of the Board of Examiners on the recent Preliminary examination was read, received, and adopted, and the Council expressed satisfaction with the remarks by the College of Preceptors on the result of the examination.

Examined.	Passed.	Failed.
230	124	106

ERRATUM.—Omit, No. 289, p. 549, "Tweedie, John Jackson, Carriden," from list of Associates, and insert the same in list of Apprentices or Students, p. 550.

PHARMACEUTICAL MEETING.

Wednesday, February 2, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting were read and confirmed.

The following donations were announced, and the thanks of the Society awarded to the donors:—

To the Library:—'Year-Book of Pharmacy, with

Transactions of the British Pharmaceutical Conference, 1875,' from the Conference; 'Guide pour l'Analyse de l'Eau, par Dr. E. Reichardt, traduit par G. E. Strohl,' from Professor Attfield; 'Ein Beitrag zur pharmakognostischen und chemischen Kenntniss des Cacaos, von P. Trojanowsky,' from Professor Dragendorff; 'Annuaire de la Pharmacie française et étrangère, premiere année, 1875, rédigé par le Dr. C. Méhu,' from Dr. Méhu; 'Ozone, by F. E. Twemlow,' from the author.

To the Museum:—Fine specimen of Gallic acid, from Messrs. Morson and Son; Three specimens of Damiana, from Professor P. W. Bedford of New York; Specimens of Damiana, from Messrs. Allen and Hanbury, and of the same with fruit, from Mr. A. Macintosh of Rothesay; Specimens of Jaborandi Bark, from Messrs. Hearon, Squire and Francis; Specimen of Jaborandi Seeds, from Mr. A. Preston; Specimen of Crystallized Sulphate of Copper, from Mr. E. Richardson, laboratory student; Specimen of leaves of *Empleurum serrulatum*, and of true Zedoary root, from Messrs. Cyriax and Farries; Specimen of Mogador Colocynth fruits, from Dr. A. Leared; Specimens of large tears of Assafœtida, fine Turkey Myrrh, fine tears of Ammoniacum, E. I. Tamarinds, African Copal, English Rhubarb, Arnatto fruits, Pistacia Galls, Fruits of *Vernonia anthelmintica*, Black boy Gum, Gum Acroides, Safed Musli, Mechoachan root, Musk seeds, from Mr. Cesar Chantré; and specimens illustrating the formation of Chromic Chloride, from Mr. H. A. Thomas, laboratory student; Specimens of Vaseline and Cosmoline, from Messrs. Corbyn and Co.

To the Herbarium:—Specimen of *Meconopsis cambrica*, from Mr. W. M. Paterson; Specimen of *Xanthium spinosum*, from Mr A. W. Wheatley.

A paper was then read on—

THE BEST FORM OF BLISTERING LIQUID.

BY JAMES DEANE, F.L.S.

The paper is printed at p. 621, and gave rise to the following discussion:—

The **CHAIRMAN** asked whether the blistering liquid prepared with acetic ether had been tried by medical men.

Mr. **DEANE**, in reply, stated that his father made the liquid with acetic ether nearly twenty years ago, and he believed that medical men in Clapham had always found it efficient; he never heard any complaints of it. He thought, too, that Mr. Brady had made it for even a longer time.

Mr. **UMNEY** said that some five years ago he discarded the use of the ordinary acetic acid of the Pharmacopœia in making blistering fluid. It was soon after Professor Tichborne published his paper on the subject. He did so because several complaints reached him that the official liquor epispasticus did not blister with sufficient rapidity. He made several experiments, and tried it practically upon the men in the laboratory, and as far as he could remember the liquor epispasticus of the Pharmacopœia containing acetic acid (33 °/₀) would produce a blister in something like eleven or twelve hours, when applied with a camel's hair brush to the arm. But that made by moistening the cantharides with glacial acetic acid, and allowing the whole to digest in a percolating apparatus for three or four days, then displacing by ether, would produce a blister in four or five hours. For some years he had manufactured such a preparation, and he had never had a complaint respecting it. The facts communicated by Mr. Deane contained the secret of the whole matter, as they showed the proportion in which the cantharidin existed in the different preparations. There could be no doubt that acetic ether would be an improvement upon the glacial acetic acid and ether, and certainly both were preferable to the ordinary acetic acid and ether as ordered in the Pharmacopœia.

Mr. **GERRARD** said that the remark of Mr. Umney, that the whole secret lay in the liberation of the cantharidin, applied not only to what he had stated in reference to blistering fluid but also to blistering plaster. A continental pharmacist had proposed that the blister plaister should be made by taking finely divided cantharides, moistening the powder and making it into a paste with water, adding a little caustic potash, and allowing it to stand for several days, and then making it slightly acid with hydrochloric acid. This caused the formation of chloride of potassium, and cantharidin was thus set free. It was found that a plaster made with cantharides prepared in this way would blister with considerably less of the powdered cantharides thus prepared and applied to the surface of the body.

The next paper read was on—

THE COMPOSITION OF PILULA HYDRARGYRI, B. P.

BY HAROLD SENIER.

The paper is printed at p. 621, and gave rise to the following discussion:—

Mr. **UMNEY** said that manufacturers were to be congratulated on the great integrity which the tables before them evidenced. The blue pills there represented were not like the specimen examined some thirty or thirty-five years ago, which was said to be made of powdered slate. In every case represented on the table it would appear that the proper quantity of mercury was originally used, viz. 33·3 per cent. The other points which Mr. Senier had brought forward would be looked upon with great interest, and he (Mr. Umney) would take this opportunity of expressing his thanks to him for the very valuable paper which he had put before them.

Professor **REDWOOD** said the points deserving special notice related, first, to the extent to which oxidation appeared to take place in blue pill, and secondly, to the conditions which seemed to favour that oxidation. Mr. Senier had referred to an inquiry which he (Professor Redwood) had made fourteen or fifteen years ago with reference to grey powder, hydrargyrum cum cretâ; and, certainly, if they compared those results with the results obtained by Mr. Senier, blue pill would appear to present a very marked advantage over the other preparation, inasmuch as there was no evidence, from the present experiments, that oxidation in blue pill took place to any very material extent, or to such an extent as to justify the conclusion that the action of the pill was dependent upon the oxide contained in it. With reference to the mercury with chalk, he had put down on the blackboard the result of the experiments which he had made on the occasion referred to, and it would be seen that the extent of oxidation was very much greater than in any of the cases which were adduced with regard to blue pill. He found in some specimens that the mercury in the metallic state had fallen from thirty-three parts per cent. down to thirteen; whilst of the mercuric oxide there was as much as fourteen per cent., and of the mercurous oxide between eleven and twelve per cent. That was a very marked difference as compared with anything that was represented in reference to blue pill. The investigation which he undertook with reference to mercury with chalk originated in complaints having been made that that preparation, which had been formerly looked upon as a mild one suitable for administration to children, was found in later years to produce somewhat violent effects of griping and sickness which caused many physicians to hesitate to prescribe it. His object was to ascertain what the cause could be. It appeared that whilst some specimens contained only a trace of the highest oxide, and not much of the lower and milder oxide, in other specimens the mercuric oxide existed to a considerable extent. The conclusion to which he came was, that its presence was mainly due to the method adopted in its manufacture, and he still remained of that opinion. Formerly, mercury with chalk used to be made with a pestle and mortar, and many pharmacists prepared it themselves. He had never found that any specimen so prepared underwent any great amount of oxidation. But of late years it had been the practice to make it by machinery, worked by steam; the ingredients being put together in a cylinder or cask, revolving upon an axis, and containing a few round pebbles, to aid the trituration, by which means the mercury was brought more thoroughly into contact with atmospheric air, and the process was carried on for a greater length of time. In that way, probably, a more intimate admixture was effected, but certainly, oxidation took place to a far greater extent than occurred when manual labour was employed. As the result of his investigation, he recommended that the mode of preparing mercury with chalk by machinery should be discontinued, or, at any rate, that it should be regulated to a greater extent. To the best of his recollection, he could not trace the difference of oxidation to the age of the product, but traced it rather to the manner of manufacture, and the extent to which trituration had been employed. With reference to blue pill, it seemed an important question whether the difference in oxidation, which had been indicated, was due to age, or, to some considerable extent, if not wholly, to the manner in which the preparation had been made. He understood from Mr. Senier that sample No. 3 had been made by manual labour, and No. 4 by machinery. They appeared to be both of one age, both having been kept for three months, and yet one had undergone a much greater amount of oxidation than the other. The oxide in the one made by machinery appeared to be fully double that which was contained in the pill made by manual labour. That would seem to justify a conclusion similar to what he had arrived at in his investigation of mercury with chalk. The opinion he had formed with reference to blue pill was that the mercury was in a condition of subdivision in which it was probably coated with an oxide, principally the lowest oxide, or was in some state of oxidation perhaps even lower than that, because, when microscopically examined, the globules of mercury were not found to present a metallic lustre upon their surface. They had always a dull appearance, as if each globule was coated with a film of some matter which he concluded to be a condition of oxidation. Still the mercury in blue pill was almost wholly in the metallic state, and the minute quantity of oxide which in most cases was present would hardly account for the efficacious action of a five grain blue pill.

Professor **Attfield** said that he would ask his colleague whether he did not think that probably age, as well as minuteness of division, was a factor in this case. Although, unquestionably, of the two samples which had been kept for a similar time, that which had been made by machinery was the most oxidized, still all the other samples which had been made by machinery seemed to vary in their proportion of oxide according to their age. Then, again, he thought that Thomson, who had expressed himself, perhaps, more strongly than any one else regarding the therapeutic action of blue pill, considered, not that the action was due to oxide of mercury rather than to metallic mercury, but, as he said, was due in a great measure to oxide of mercury rather than to metallic mercury.

Mr. **Greenish** said that several years ago Dr. Squibb, of New York, made some interesting experiments on hydrargyrum cum cretâ, which led him to the conclusion that the drastic qualities of hydrargyrum cum cretâ were due to the presence of oxide of mercury; and he considered that the preparation should contain, as far as possible, only mercury in a minute state of division. He went further, and came to the conclusion that when the mercury was rubbed up to a certain point, that point being when it was no longer visible to the naked eye, it was in a proper condition for its full therapeutic action. Beyond that point it oxidized very rapidly indeed by contact with the air. Dr. Squibb considered that the preparation deteriorated in proportion to its oxidation.

A paper was then read on—

The Chemistry of Vaseline.

BY JOHN MOSS, F.C.S.

This was followed by a paper on—

Vaseline and its Application to Suppository Making.

BY A. W. GERRARD.

These papers are printed at pp. 623 and 624.

Mr. **Martindale** also exhibited some samples of preparations of vaseline which had been kept for some two or three months. He said that he was very much obliged to Mr. Moss for his investigation of the subject. He (Mr. Martindale) had not had a chance of going further into the matter than what he had published in his circular. He believed that the manufacturers were entirely at one with Mr. Moss in stating that vaseline did contain paraffin, that is, that paraffin could be got out of it. What they disclaimed was, using paraffin wax in making it, or that it was an artificial compound made with paraffin wax and some other of the hydrocarbons similar to it. He believed it to be a purified by-product got in the preparation of the petroleum oils for burning, which were largely imported into this country. He would draw attention to one preparation for which he thought it had special merits, and that was diluted nitrate of mercury ointment. This was an ointment which, when prepared in the usual way, became rancid in about twenty-four hours. If one part of nitrate of mercury ointment was diluted with seven of vaseline, it formed a preparation which would keep. The sample on the table was made on the 14th November, and still had a bright colour, and was unoxidized. The mercury had not been reduced to the metallic state, which would have been the case if the ointment had been made according to the Pharmacopœia formula. Then it was known that the ordinary ointments of zinc and lead soon became rancid; but when prepared with vaseline they would keep fresh for any length of time. There was on the table a specimen of red oxide of mercury ointment, which had been made ever since the 13th of November; also an acetate of lead ointment, containing two grains to the drachm, which was quite free from any rancidity. The latter substance was prepared with a vaseline of a paler colour than the other samples. The manufacturers had a purer preparation but they did not make it on a large scale. It was a form of vaseline entirely void of yellow colour, it was a pure pale opal, and bore a great resemblance to glycerine starch. There was also some yellow oxide of mercury ointment, which had been made about two months. Vaseline would mix with glycerine, as Mr. Moss had stated, but only mechanically. There was no perfect homogeneous blending, and the substances could be separated by melting the mixture, in which case the glycerine went to the bottom and the vaseline came to the surface. Vaseline was largely employed in the United States as a pomade; and a perfumer in London had on hand a large quantity of the substance, and would, probably, very soon have a quantity of it prepared for the heads of the people of this country. It undoubtedly made a very elegant pomade. Cosmoline was made of two consistences, one of which resembled the preparation of vaseline, and had a melting point of about 90°. The other preparation of cosmoline had a melting point of somewhere about 105°. Undoubtedly the harder consistence of one preparation of cosmoline was due to its containing more of the paraffin wax. That could be added to the vaseline, and it formed a mixture which he called ceratum petrolei. That mixture was not like vaseline itself. On cooling, the paraffin separated from it, and the mixture required beating to form a homogeneous ointment afterwards, and to form it anything like a presentable preparation for pharmaceutical use. Vaseline took the colour from alkanet root very readily, and with a little perfume, such as otto of rose, formed an elegant lip-salve. He could scarcely agree with Mr. Gerrard that it was suitable for forming suppositories. In the ceratum petrolei he had one-seventh of paraffin wax. He took the melting point and he found it to be somewhere about 100° Fahrenheit, which was slightly above the temperature of the body. It was desirable that the melting point of suppositories should be decidedly and definitely below the temperature of the body. He did not think that the substance could be brought into use so as to surpass the ordinary oil of theobroma for the purpose of making suppositories.

Mr. Gale exhibited some samples of preparations which he had made from vaseline. He could confirm what Mr. Martindale had just said on the subject, and he thanked Mr. Moss for his investigation. Among the samples were nitrate of mercury ointment diluted with vaseline, zinc ointment made as far back as the 4th of October, and red oxide of mercury ointment. These samples were in capital preservation.

The President, in expressing the thanks of the meeting to the gentlemen who had contributed information on the subject, said that vaseline seemed to be a very useful vehicle for various preparations and ointments, or a useful material, at least, in those ointments in which lard was generally used.

Professor Redwood remarked that vaseline appeared to give promise of being a very useful substance. It certainly was a very elegant one. All he had to say was that before they recommended it they should know a little more of its history.

Mr. Allchin said that he had heard of many bodies being brought forward as substitutes for lard, and this was another such substitute. His own experience was that, if they wanted the medicinal property of any one of those agents, such as nitrate of mercury or zinc, there was no better menstruum than lard. Paraffin, of all substances, appeared to be most objectionable, inasmuch as he felt quite certain that it would be found not to be absorbed by the skin. He knew of no body which was so readily absorbed by the skin as lard, and which, consequently, presented such advantages as a vehicle for the various agents. These substitutes for lard were not wanted. He knew that lard was a despised thing, but any one who had observed its qualities as much as he had would be of opinion that there was no substitute for it if they wanted the medicaments to be absorbed into the kin or the surrounding parts.

Mr. Williams said that he was himself going to make almost the same remark as Mr. Allchin had just made. He hoped that pharmacists would not permit themselves to recommend an article for medical use before it had been thoroughly investigated medicinally as well as practically. Paraffin might be a very beautiful thing for mixing such things as oxide of mercury, oxide of zinc, and oxide of lead ointments, but it was another question whether it would be good medicinally, and he believed that that question must be settled by the medical profession before they, as pharmacists, recommended the new substances. Paraffin was not one of the substances which, by well-known physical laws, would be indicated as likely to be absorbed by the system; whereas lard was admirably adapted for absorption, and oleic acid was still better. When, however, they came to the paraffins, they were using bodies of a different character altogether. He appealed to anybody who was acquainted with the laws of physics whether it was probable that such substances would be useful as vehicles for active principles which were to be absorbed by the skin; and he, therefore, hoped that as pharmacists they would hesitate to appear to recommend in any way, by the authority or the name of the Society, these new American preparations until they were very much better convinced by experience that their use as vehicles for medicinal agents was advantageous.

Professor Attfield said that the name of "vaseline" was one which would suggest that it had definite properties, and the termination of the name was such as was commonly given to the name of an alkaloid, although he supposed no one would mistake vaseline for an alkaloid. Still, the fact of its having a definite name suggested a definite character, whereas they had heard that night that the melting point of vaseline varied very considerably, so that it was obviously a mixture of substances and not a definite substance, as its name would indicate. Mr. Martindale appeared to have worked with a sample which melted at 92°; Mr. Gerrard with one which melted at 94°; and Mr. Moss with one which melted at 37° Centigrade, which was equal to 98·6° Fahrenheit. Mr. Martindale had referred to a variety which melted at a temperature as high as 105°.

Mr. Greenish wished to ask Mr. Gerrard a question. He had said that with three-fourths of vaseline and one-fourth paraffin he made a suppository of a melting point equal to the temperature of the body. He should have thought that the high melting point of the paraffin would have raised that of the mixture beyond the temperature of the human body.

Mr. Gerrard said that he had stated that the suppository contained one-fifth of paraffin. The suppositories he had referred to had been tried that day in University College Hospital, and were found to be perfectly soluble.

Mr. Greenish said that he had made a great many suppositories with different mixtures of paraffin, and he had found that paraffin made prettier suppositories than any substance he had ever met with, but he believed that, medicinally, paraffin, in any form, would be the worst possible substance for such preparations.

Mr. Martindale, in correction of Dr. Attfield, said that when he spoke of varying melting points he was referring to cosmoline, The melting point of vaseline was pretty uniform, about 94°. There were two kinds of vaseline, one having a pale yellow colour, and another opaline. Both had about the same melting point.

Mr. Moss said that in speaking of the mixture of vaseline and glycerine he did not intend it to be understood that it was other than a mechanical one; he had said that it could be made in any proportion. The separation observed by Mr. Martindale when the mixture was heated so as to liquefy the vaseline, was just what one would expect to occur from a consideration of the very different nature and specific gravity of the two liquids. Mr. Allchin and Mr. Williams had both said that vaseline and cosmoline would not do for external applications in place of lard, because paraffin was not readily absorbed by the skin. As a matter of fact, paraffin and vaseline were used very generally for external applications in the United States, and they were, indeed, used alone. They possessed properties which physicians found extremely useful, and which showed that they must be absorbable by the skin to some extent, or, if not absorbed this negative property might perhaps be an advantage. As to recommending vaseline, he, for one, did not go so far. Indeed, it was not the province of himself, or any chemist or pharmacist, to recommend a body for medical use. He had simply made an investigation of its physical properties, and some of its chemical ones, and detailed the results as plainly as possible, adding a little of what had been said by others.

Mr. Kingzett said it gave him pleasure to be able to confirm the conclusions his friend Mr. Moss had arrived at. Until the previous evening he had not heard even of vaseline, but since then he had examined, as far as time permitted, a sample of this body given to him by Mr. Moss, and unaccompanied with any information regarding its nature. He found it to have a melting point of about 35° C. (=95° F.); at higher temperatures it volatilized and the white fumes burnt with a luminous flame like paraffin. Although it gave a greasy stain to paper it was free from fats and fatty acids, as shown by the facts that caustic potash failed to saponify it, and the filtrate gave with hydrochloric acid no precipitate of fatty acid. On boiling it with alcohol it melted, but little dissolved and that which dissolved was reprecipitated on cooling, in flakes (crystalline?). In ether it for the most part dissolved at the ordinary temperature, giving a solution having a powerful blue fluorescence, but flakes of perfectly white matter were left undissolved, and this on isolation was found to resemble ordinary white paraffin wax. The melting point, therefore, of the vaseline would vary according to the amount of this substance present, for being a solid paraffin it would have a higher melting point than the other semi-solid constituents. From these facts and from the observation that sulphuric acid had no action on the substance, he had concluded that vaseline was a mixture of at least two paraffins and possibly more. In regard to the observations made by Mr. Williams and Mr. Allchin, he as a physiological chemist would remark that whether lard or vaseline was used as the basis of ointments, they served a common purpose, of presenting to body surfaces the desired medicines, but exercised no specific actions themselves. At any rate the vaseline possessed many advantages over lard, the most striking of which was its inability to absorb oxygen, a property which would render it especially useful in protecting surgical instruments, etc., from rust.

Professor **Attfield** then read a Note on "The Anti-Malarial Effects of Eucalyptus Globulus," by Mr. R. G. Glover.

The note, which was accompanied by a specimen of the preparation referred to, is printed at p. 625.

Mr. **Greenish** said that when he was in Portugal last year he stayed one night in a valley near the banks of the Douro, and which from its appearance, seemed to be a very unhealthy spot. A Spanish gentleman told him that the place had been most unhealthy, but that some Eucalypti had been planted there, and that since the trees had grown up, the sanitary condition had very much improved.

The next meeting was announced for Wednesday, March 1.

NORTH BRITISH BRANCH—EDINBURGH.

The fourth scientific meeting of the session was held in the Society's Rooms, on Friday evening, 28th January. The attendance was very large.

Mr. Gilmour, President of the Branch, opened the meeting by introducing Mr. William Inglis Clark, who read a paper on "Perchloride of Iron."

The paper, which will be printed in a future number, was illustrated by diagrams of the different formulæ used in the course of the experiments. At the close of the paper Mr. J. R. Young and Dr. Craig made a few remarks on the subject. Mr. Blanchard moved a vote of thanks to Mr. Clark, which being seconded by Mr. Ainslie, was heartily responded to.

Mr. Baildon then took the chair while Mr. Gilmour gave a short but very interesting lecture "On some of the Properties of Glass," illustrating the arrangement of the molecules in connection with their radiating power by means of the polariscope and oxyhydrogen light. Mr. Gilmour's experiments were very beautiful and much appreciated by those present. Messrs. Young and Mackay joined in the conversation elicited by some of Mr. Gilmour's remarks, and Mr. Mackay, who had seen some specimens of toughened glass, gave a most interesting account of the wonderful properties which it possessed. A vote of thanks proposed by Mr. Young and seconded by Mr. Baildon was awarded to Mr. Gilmour.

The Secretary next presented to the meeting a specimen of marabel nuts, used in India for tanning purposes, the gift of Mr. H. Hyne, chemist, London. He also intimated a further addition of new books from the Society in London, consisting of 'Huxley's Classification of Animals'; 'Grove's Correlation of Forces'; 'Letheby on Food'; Last Supplement to Watt's Dictionary of Chemistry. There were also other 17 bound volumes, being the remainder of the accumulated serial works, and these, with those mentioned at last meeting, made the very handsome addition of nearly 60 volumes to the library. The Secretary thought that by the time of the next meeting a complete catalogue would be ready for distribution. The *Pharmacist* for January, from the Chicago College of Pharmacy, and the *Canadian Pharmaceutical Journal*, from the Ontario College of Pharmacy were also on the table.

A vote of thanks to the Chairman brought the meeting to a close.

Parliamentary and Law Proceedings.

Prosecution under the Apothecaries' Act.

EXCHEQUER DIVISION, SECOND DIVISIONAL COURT.

Sittings at Nisi Prius, before Baron Bramwell *and Common Juries, Thursday, Jan.* 27.

THE MASTER, WARDENS, AND SOCIETY OF APOTHECARIES OF THE CITY OF LONDON V. NOTTINGHAM.

This was an action brought by the Apothecaries' Company against the defendant, a chemist and druggist, at 223, High Street, Shadwell, to recover a penalty of £20 under the provisions of the Apothecaries' Act, 1815, for an alleged infringement of that Act by practising as an apothecary without having obtained the necessary certificate from the company. The defendant denied that he had infringed the provisions of the statute.

Mr. Lewis Glyn appeared for the Apothecaries' Company; Mr. Rose for the defendant.

This case raised a very important question as to the right of chemists and druggists to prescribe medicines over their counters in cases of illness—a practice which, it was admitted, is very general throughout the kingdom, especially in the poorer districts. The case on the part of the Apothecaries Company was that the defendant, acting under the name of a qualified practitioner, had practised as a medical man without having the necessary legal qualification to do so.

Mr. Rose, on behalf of the defendant submitted that under the 28th section chemists and druggists were specially excepted from the operation of the Act, and that there had been no acting or practising as an apothecary within the meaning of the 22d section.

His Lordship, however, refused to stop the case on that ground.

Mr. Rose then addressed the jury for the defence, and contended that the mere fact of a chemist having given kindly and gratuitous advice to a poor woman with her bottle of medicine, did not bring him within the operation of the Act.

The defendant, on being called, stated that in all serious cases the parties were attended by the regular practitioner who was in partnership with him, but he admitted that in minor cases he had inquired the nature of the illness and had given the medicine suited to it without the intervention of his partner.

His Lordship, in summing up, remarked that the Act was strict in its terms, and that, whether they liked it or not, the jury were bound by it. If a man entered a chemist's shop and asked for something to cure a bad headache, and the chemist gave him a draught, without doubt the chemist would technically infringe the terms of the Act, but it would be very unreasonable if the Apothecaries Company were to interfere in such a case. In the present case it was for the jury to say whether or not the defendant had infringed the Act.

The jury returned a verdict for the plaintiffs.

His Lordship refused to give leave to move.—*Times.*

How the Vigilance of Chemists is Evaded.

An inquest was held in Leeds, before Mr. W. Emsley, deputy-coroner, on the body of William Nicholson, 44, a mechanic.

For some time the deceased had been addicted to drinking, and since the death of his wife about a fortnight ago, he has been in a desponding state of mind. On Tuesday he was found suffering from the effects of narcotic poison, and in the room were five bottles that had contained laudanum. These had been procured from different chemists under the plea of toothache, etc., and in most cases had contained only a drachm each; the largest held half an ounce.

The verdict of the jury was that he had committed suicide whilst suffering from temporary insanity.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

UNREGISTERED CHEMISTS AND DRUGGISTS IN GLASGOW.

Sir,—Your leader in to-day's Journal on "The Rectification of the Register" deserves something more than passing comment. So far as this district is concerned the remarks of the judge who tried the case you particularly refer to—that: "so far from thinking there was any vindictive feeling on the part of the Council of the Pharmaceutical Society, he thought it would be failing in its duty if it neglected to put the statute in operation against men trading as chemists and dealing in such deadly poisons without due qualification"—will receive hearty approbation from the registered chemists here, and they deserve the careful consideration of every official, honorary or otherwise, connected with the Society. The case you refer to is nothing compared with the grievance the registered chemists of the West of Scotland have been loudly complaining of for years, and notwithstanding numerous complaints made to the Secretary and others, the system of evasion carried on here is to all appearance being blinked at. True, two successful prosecutions were made some two years ago, but instead of being a warning to the evaders (or invaders I was going to call them) they have become more bold, and are carrying the system to a far greater degree. At that time we knew of some six places that were open under the title "Medical Hall," or "Apothecary Hall," which were being carried on by unqualified men; in the space of two years the number has increased to fifteen within the boundaries of the city of Glasgow—two of which, at least, are under the very nose of the local secretary of the Pharmaceutical Society. But his hands are tied, I understand, by an amount of red tapism, which throws most, if not all, the worry and responsibility of prosecution on his shoulders. This is not as it should be! If the local secretary, or any other member of the Society residing in the district, lodges information at head quarters that so and so, at such and such a place, is evading the Act, that ought to be sufficient for investigation by the paid officials of the Society; and if a visit of inspection was made occasionally by our excellent Solicitor I doubt not it would terrify some of those fifteen into shutting up or getting through their necessary examinations.

This "Medical Hall" and "Apothecary Hall" business, however, is a bugbear for which some stronger measures than prosecution will be required before it is completely knocked on the head. It so happens that our principal establishments in the city are known as "The Glasgow Apothecaries' Hall," "The New Apothecaries' Hall," "The Old Drug Hall," etc. No one doubts that duly registered men are at the head of those establishments, but they are—unwittingly, I doubt not—by continuing this name, lending themselves to the system of evasion which is now becoming so alarming, and which will no doubt in time affect considerably the whole trade as well as the position of the Pharmaceutical Society itself. It is all very well for the worthy President of our local Association, for example, to say "the name 'New Apothecaries' Hall,' or 'Company,' has been attached to our establishments for over half a century, and we could not change it without the risk of misleading many of our old customers." I would urge not the taking down the old name in their case all at once, but that they should have prominently on all labels, invoices, and above the shop door, "so and so, registered," just as a spirit merchant, who adopts such a name as "Greenhead Vaults," requires also to paint over his door, "John Smith, licensed." Medical men, who give their protection under the present system to unqualified men, would be a little wary about having their names over the shop door, for then they would be held responsible for all connected with the business.

I think the present powers of the Council of the Pharmaceutical Society are sufficient to enable it to insist on this being done. If not at present, then a bye-law could be passed, with the consent of the Privy Council, making it imperative that all registered dispensers of medicine, whether qualified by the Pharmacy Act or the medical acts, should exhibit on all labels, and prominently in their shops, their name in full and the title that enables them to sell poisons. I put this before your readers in all earnestness, because the condition of our city at present in this matter is something to be alarmed at, and I earnestly trust the members of the Council will see it to be their duty to look seriously into the question and endeavour to make the Pharmacy Act a real protection, both to the public and the legitimate trader, and not, as at present in very many instances, a mere sham.

ANTI-SHAM.

Glasgow, January 29, 1876.

Sir,—In matters pharmaceutical Glasgow appears to be gaining notoriety. Some months ago the pharmaceutical mind was startled from its wonted stillness by seeing the second city of the empire leading on an ignoble crusade, whose intention was to open up broader and freer fields of ignorance for the rising generation of druggists and—finding the attempt hopeless—it was truly piteous to hear her whines over the fate of some few unfortunates who could not pass their examinations, and to see her weeping like another Niobe because examiners could not blink at the stupid condition of her children.

Having failed to gain her point by fair means, foul ones are now being resorted to. The Pharmacy Act is fast becoming a nonentity, or at worst, a harmless scarecrow, which the foul birds know to be such. Every other day some one is putting tongue in cheek at all its machinery by opening shop without the faintest intention of passing the examinations. In most of our streets there can be found one or two unhealthy druggists who graft themselves upon the friendship of some needy medical man, and borrowing, or mayhap changing, his name, open an establishment called a "Medical Hall," with or without a window card intimating that so and so can be consulted within. Of course this is a flimsy pretext, it being well known that the shops do not belong to the medical men but to the druggists. Now, I should like to ask if it is some laxity in the Act, or in the working of it, which encourages this practice? Is the local secretary powerless in cases such as these? If he can do nothing on account of defective Act machinery in cases that are so glaringly antagonistic to the spirit of the Act, the sooner that machinery is put into working order the better, both for the trade and for the Pharmaceutical Society.

What encouragement is there for young men to study with the intention of passing examinations enabling them to open shop, when they daily see their companions open, without passing or intending to pass? Or what boots it for the patient, trusting members of the Society to send yearly their subscriptions that are supposed to keep in healthy and active life a Society which shall have the interest and protection of the legitimate members of the drug trade at heart, and shall spend and be spent in bold endeavours to measure out justice?

It may be said that the good common sense of the public will discover the genuine from the spurious druggist, and give each his deserts. Unfortunately the public is hopelessly incurious regarding the specific distinction between a medical hall, and a chemist and druggist's.

Of course, though medical men may be blamed for this—blameworthy they doubtless are to a great extent—something more than blame is now needed—viz., action.

I have frequently looked for our Glasgow representative to illuminate the wonderful darkness of the Council regarding the state of matters here, but he keeps strangely silent and dark upon this point. Surely he cannot be destitute of the faculty of observation, nor of that of representing courageously what he sees.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Kemsley, Mr. B. S. Proctor, Mr. Hall, Mr. Robinson, Mr. Hardcastle, Mr. Sieboid, Mr. Towerzey, Mr. Clark, Mr. Wilkinson, Mr. Hawthorne, Mr. Chipperfield, Mr. Bateman, Mr. Jackson, Mr. Oldham, Mr. Reynolds, Mr. Holmes, Mr. Taylor, Mr. Underdown, Mr. Frazer, Mr. Clark, Mr. Gildart, Mr. Priestley, W. P., M. P .S., A. P. S., Pessary, Registered Apprentice, Swedenborgian, Student, Enitar, Country M. P. S , One in the Trade, Laboratory Student, Gadus, Pax, Nil.

In consequence of the length to which the official report extends, we are compelled to defer the publication of several reports and other communications.

STUDIES UPON ESSENTIAL OILS.

BY G. DRAGENDORFF.

Professor in the University of Dorpat, and Honorary Member of the Pharmaceutical Society of Great Britain.

(*Continued from page* 583.)

II. THE RECTIFICATION OF ESSENTIAL OILS.

In pharmacy we have a number of volatile oils—such as Ol. Tereb. Rect. and Ol. Cajeputi Rect.—which should be prepared by rectification from commercial oils. For this purpose, they may either be carried over by a current of steam, as before described, or the oil may be distilled with about six volumes of water, so that one part of the oil shall remain behind in the retort. In the former case, it must be laid down as a rule that the current of steam shall reach the oil under a pressure exceeding one atmosphere, or at a temperature above 100° C. The fact that the oil, of which the boiling point often lies far beyond 100° C., will pass over with the aqueous vapour has in it nothing surprising. It is otherwise in the distillation of oils which contain water dissolved in them. If in this case water and oil occur together in the distillate, they pass over at a pressure of one atmosphere and at a temperature not over but under 100° C., as I have myself proved. The oil, therefore, becomes modified in its boiling point by the water present; and this is in accordance with what has already been observed by Magnus that liquids which are not miscible with each other, when heated together, will distil at a temperature lower than the boiling point of the most volatile. This proposition has been supplemented some years since by Pierre and Puchot, who have demonstrated by experiments with water on the one hand, and amylic and butylic alcohols and amyl valerianate on the other,* that the two liquids pass over into the distillate in definite proportions. I have been able to establish the correctness of both proportions with respect to essential oils.

(1) A mixture of 100 parts of oil of turpentine and 100 parts of water was submitted to distillation and the distillate collected in graduated tubes. The following were the proportions that passed over:—

In the first 20 c.c.: Oil 10 5 c.c.: Water 9·5 c.c.
In the second 20 c.c.: Oil 10·5 c.c.: Water 9·5 c.c.

The boiling point was 96·5° C.

(2) A second experiment similarly conducted gave the following results:—

In the first	20 c.c. :	Oil 10·5 c.c. :	Water 9·5 cc.
In the second	20 ,,	,, 10·5 ,,	,, 9·5 ,,
In the third	20 ,,	,, 10·0 ,,	,, 10·0 ,,
In the fourth	20 ,,	,, 10·0 ,,	,, 10·0 ,,
In the fifth	20 ,,	,, 10·0 ,,	,, 10·5 ,,
In the last	72 ,,	,, 30·5 ,,	,, 41·5 ,,

The boiling point was between 96·5° and 98·5° C.

In this case, consequently, the proportion between the water and the oil is first altered when the greater part of the latter has already passed over. The explanation of the change may either be that during the distillation a part of the oil has been polymerized into a hydrocarbon, the higher boiling point and altered latent heat of which lead to an altered relation with the water; or that of the unequally volatile constituents of the oils, at first those of the lowest boiling point pass over more plentifully and afterwards those that boil with more difficulty.

That the proportions in which the water and oil are distilled together exercise no great influence upon the result may be seen from the following two experiments:

(3) Distillation of 75 c.c. of oil of turpentine with 150 c.c. of water. The distillate contained—

	Oil.	Water.	Temp.
1st 20 c.c.	9·5 c.c.	10·2 c.c.	95·6-97° C.
2nd 20 ,,	9·5 ,,	10·5 ,,	,,
3rd 20 ,,	9·5 ,,	10·5 ,,	,,
4th 20 ,,	9·5 ,,	10·5 ,,	,,
5th 20 ,,	8·5 ,,	11·5 ,,	,,

The oil residue in this and the preceding experiments was a thick yellow fluid.

(4) Distillation of 200 c.c. of oil of turpentine with 100 c.c. of water.

	Oil.	Water.	Temp.
1st 20 c.c.	11 c.c.	9 c.c.	96·5° C.
2nd 20 ,,	11 ,,	9 ,,	,,
3rd 20 ,,	10·5 ,,	9·5 ,,	,,
4th 20 ,,	10 ,,	10 ,,	,,
5th 20 ,,	11 ,,	9 ,,	,,

All these distillations were effected from a glass retort, and in order to avoid spirting of the oil, several coils of wire were put into it.

Neither is the proportion between the oil and water in the distillate essentially altered by distillation under diminished atmospheric pressure, as is shown by an experiment in which I exhausted the distillatory apparatus by connecting it with a Bunsen pump to about 200 mm.

(5) 150 c.c. of oil of turpentine and 100 c.c. of water were distilled with strong ebullition at between 55° and 68° C.; when 40 c.c. of oil had passed over there were also found 43 c.c. of water.

With other oils similar results were obtained, but the proportions in which the oil and water pass over varied, as is shown by the following experiments:—

(6) 100 c.c. of a sample of oil of orange peel that was five years old, somewhat resinified, but still almost colourless, were rectified with 100 c.c. of water.

	Oil.	Water.	Temp.
1st distillate	8·0 c.c.	12·0 c.c.	97° C.
2nd ,,	8·4 ,,	11·6 ,,	97·5 C.
3rd ,,	8·6 ,,	11·4 ,,	,,
4th ,,	7·4 ,,	12·6 ,,	97·75 C.
5th ,,	4·1 ,,	5·9 ,,	,,
Total . . .	36·5 c.c.	53·5 c.c.	

To the oil residue in the retort, which had already acquired a yellow colour, a fresh 100 c.c. of water was added, and it was again distilled.

	Oil.	Water.	Temp.
6th distillate	6·0 c.c.	14·0 c.c.	98·3° C.
7th ,,	5 6 ,,	14·4 ,,	98·5° C.
8th ,,	4·8 ,,	15·2 ,,	98·8° C.
9th ,,	4·4 ,,	15·6 ,,	99 C.
10th ,,	1·7 ,,	9·8 ,,	,,
Total . . .	22·5 c.c.	69·0 c.c.	

After this another 100 c.c. of water was added, when there passed over—

Oil, 5·3 c.c.; Water, 86·6 c.c. Temp., 99°
,, 2·5 ,, ,, 50·5 ,, ,,

The question now arises, how the distillation is affected when a current of steam at about 100° C., and consequently at a tension not exceeding one atmosphere, is passed into a retort containing oil heated in a water-bath to about 100° C.

(7) An experiment was carried on in a tubulated glass retort containing 200 c.c. of oil of turpentine, and into which a glass tube passed almost to the bottom. The latter was connected by means of tubing, as short as possible and packed with cotton, with a

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* *Pharm. Journ.* [3], vol. ii., p. 528.

flask in which water was heated to strong ebullition. The cooled distillate contained—

	Oil.	Water.	Temp. in Retort.
1st 20 c.c.	10·5 c.c.	9·5 c.c.	97·0° C.
2nd „	11·0 „	9·0 „	„
3rd „	10·5 „	9·5 „	„
4th „	10·5 „	9·5 „	„
5th „	10·5 „	9·5 „	„
6th „	10·25 „	9·75 „	97·5° C.
7th „	10·25 „	9·75 „	„
8th „	10·25 „	9·75 „	„
9th „	10·25 „	9·75 „	„
10th „	9·4 „	10·6 „	„

Oil and water, therefore, distilled over in the proportion of 103·4 : 96·6. In the retort was found 95 c.c. of oil and 71 c.c. of water.

(8) A second similar but somewhat more slowly executed experiment gave—

	Oil.	Water.	Temp.
1st distillate	11·5 c.c.	8·5 c.c.	97·5° C.
2nd „	11·0 „	9·5 „	„
3rd „	10·0 „	10·0 „	„
4th „	10·5 „	9·5 „	„
5th „	10·0 „	10·0 „	„
Total . . .	53·0 c.c.	47·5 c.c.	

Or 100 parts of oil to 90 parts of water.

It follows from the foregoing that in practice the rectification of essential oils can be very well carried out with a current of steam at a pressure of not more than one atmosphere. That it is judicious to carry it out in the manner described by me I believe I may safely assert, because, first, the distillate is colourless, mobile, and of good odour; and, secondly, seeing that only the exact quantity of water required is used, the loss through becoming dissolved in the water distilling over is the smallest possible.* From this point of view, and also as a matter of practice to the pharmacist, who often has to deal with long kept and partly resinified oils in his pharmacy, I recommend this method as worthy of attention. It is very handy, since such a distillation can be carried out with quite a small retort, and with a few cubic centimetres of oil. How far this is possible is shown by the following experiment:—

(9) 200 c.c. of oil of orange peel was submitted to vapour distillation. The different portions of the distillate contained as follows:—

	Oil.	Water.	Temp.
1st distillate	9·0 c.c.	12·0 c.c.	96·5° C.
2nd „	8·0 „	11·0 „	97° C.
3rd „	9·0 „	12·0 „	97·5° C.
4th „	8·5 „	10·5 „	„
5th „	8·5 „	11·5 „	„
6th „	20·0 „	29·0 „	„
7th „	31·0 „	42·0 „	98° C.
8th „	9·0 „	13·0 „	„
9th „	7·0 „	11·0 „	„
10th „	4·5 „	7·5 „	„
11th „	5·5 „	8·5 „	„
12th „	5·0 „	9·0 „	„
13th „	4·0 „	9·0 „	98·5° C.
14th „	4·5 „	8·5 „	„
15th „	4·5 „	18·5 „	„
16th „	2·0 „	16·0 „	99° C.

A seventeenth portion had 2 c.c. of oil and 23 c.c. of water; an eighteenth 3 c.c. of oil and 38 of water. In the first eleven portions 120 c.c., or 60 per cent. of the oil distilled over; at first it passed over in the proportion of about 3 parts of oil to 4 parts of water, but later it approached the proportion 2 to 3. In the average of the whole of the eleven experiments 100 parts of oil to 140 of water passed over. The 120 c.c. of oil was a satisfactory product, but in that which followed a somewhat unpleasant smell was noticed. Altogether 145 c.c. of the oil distilled over. The remainder in the retort was thick and resinous; and I conclude from observations upon balsamum copaivæ, that it is the resin which holds fast a portion of the oil and protects it from volatilization.

(10) 37 c.c. of a sample of oil of rosemary, which has been kept three years, gave upon vaporous distillation:—

	Oil.	Water.
1st distillate . .	5·0 c.c.	5·4 c.c.
2nd „ . .	11·0 „	14·6 „
3rd „ . .	3·0 „	5·0 „
4th „ . .	0·5 „	2·2 „

Altogether, 25 c.c., or 68 per cent. of oil was recovered; it was quite colourless, mobile, and as good as freshly prepared oil. The residue in the retort consisted principally of rosemary camphor. The distillation occupied one hour and twenty minutes.

(11) 18 c.c. of oil of savin, considerably resinified, yielded 11·5 c.c. of rectified oil, of which the first 4 c.c. passed over with 6 c.c. of water. The rectification was effected in one hour and thirty-five minutes.

(12) 20 c.c. of oil of caraway yielded in fifty minutes 18 c.c. of distillate (90 per cent.); the first 6 c.c. passing over with 7·8 c.c. of water.

(13) 12 c.c. of oil of juniper gave in forty minutes 8·5 c.c. (71 per cent.) of distillate. The product in this and the previous experiment was colourless, and fit for use.

(*To be continued.*)

PERCHLORIDE OF IRON.*

BY WILLIAM INGLIS CLARK.

The subject of perchloride of iron is one of great interest both to the practical pharmacist and the theoretical chemist, and it is one about which much has been said and written. I cannot add much to the admirable researches which have preceded my own (as for instance, those of Professor Attfield), but I purpose embodying the various facts which have accumulated, in as short a paper as possible, and placing along with these the results of my own investigations.

First, with regard to the general chemical history of Perchloride of Iron. Iron combines with oxygen in several proportions, forming oxides, and of those which are basic, we have two, called respectively, ferrous and ferric oxide, in which the metal plays the part of a dyad and a triad. These readily combine with acids forming ferrous and ferric salts.

We have two chlorides, corresponding to the two above mentioned oxides. These are ferrous or protochloride, $FeCl_2$, and ferric or perchloride, Fe_2Cl_6, and owing to a general property of the salts of iron, we can readily change the one into the other. This property is their instability, or the readiness with which they can be changed into a higher or lower state of oxidation. Thus ferrous may be converted into ferric salts by a process of oxidation (as it is called); and on the other hand, by suitable reducing agents, we can produce a ferrous from a ferric salt. It may be said that ferric chloride is always obtained by the oxidation of the ferrous chloride, except when ferric oxide or some suitable salt is dissolved in hydrochloric acid. An apparent contradiction to this statement will be found in the first method for the preparation of this substance which I shall now mention.

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* I have made, with Herr Osse, some experiments to ascertain the quantity of oil present in aromatic waters. The results of this work were published in the *Archiv f. Pharmacie*, vol. vii., p. 104.

They showed that in a litre of water distilled over with oil, the following quantities of oil may be lost:—Ol. Caryophyllorum, 1·5 gram; Ol. Rosmarinæ, 0·9 gram; Ol. Lavandulæ, 0·5 gram; Ol. Menth. Crisp., 0·8 gram; Ol. Menth. Pip., 0·2 gram; Ol. Sabinæ, 0·4 gram; Ol. Copaivæ, 0·12 gram; Ol. Amygdalarum, 2·2 grams, etc.

* Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, January 28th, 1876.

If a piece of watch-spring be heated and plunged into chlorine, or if chlorine be passed into a vessel containing heated iron, a slight glow is noticed, union takes place, and scales of a greenish brown colour are deposited on the sides of the vessel. These consist of pure ferric chloride, and indeed this process has been recommended as a desirable method for obtaining the substance, by Professor Attfield.

I may remark that this method seems to be unsurpassed, when a preparation for analytical use is wanted, its neutrality and purity rendering it specially suitable for morphia testing. It is, however, not suited for general adoption in the pharmacy, and this renders it unnecessary for me to say more on the subject.

At first it is natural to suppose that here we have the production of ferric, without the preliminary stage of ferrous chloride, but this is very doubtful, as we shall see. If there be excess of chlorine, the ferric salt is the result; but if the supply be deficient, or present only in the proportion to form ferrous chloride, then the latter is produced. It is probable, therefore, that at first a film of ferrous salt is always formed, which may or may not be changed into ferric by further contact with chlorine.

It is usually in solution, however, that perchloride of iron is used in the laboratory, and we will now glance briefly at the various ways of obtaining it as such.

The first is the one which was adopted previous to 1864 (British), in all the three Pharmacopœias. In this an excess of ferric oxide, or ferri rubigo as it is called, was macerated with hydrochloric acid, at a gentle heat, in order to ensure complete saturation, if possible, and by this means a solution of perchloride of iron of considerable purity was obtained, the action proceeding according to the equation—

$$Fe_2O_3+6\ HCl=Fe_2Cl_6+3\ H_2O.$$

This method possesses considerable advantages, such as the simplicity of the operation, and the avoidance of any oxidizing agent, necessarily foreign to the substance in question, which advantages, however, are to some extent neutralized by the presence of free hydrochloric acid, owing to the insolubility of the ferric oxide of commerce. This insolubility, I believe, is owing to the fact that certain of the salts and the oxides of iron are readily soluble in dilute acids, when freshly precipitated, but after a few days the molecular condition changes, rendering them insoluble. This is noticed in the solution of the phosphates of iron, or lime, in dilute phosphoric acid, or similarly in dissolving magnesic carbonate in excess of carbonic acid.

Second process. This consists in passing chlorine gas into a solution of ferrous chloride till no more is absorbed. The pale green liquid becomes brown, then darker in tint, and finally forms a deep orange red solution of ferric chloride. This, however, has the disadvantage of containing excess of chlorine, and in order to remove this, ebullition must be resorted to, and when a solution of the chloride is boiled, decomposition sets in, hydrochloric acid is given off, neutrality or even basicity being the result, and a large quantity of ferric oxide is either thrown down, or dissolved in the liquid, the ferric chloride itself being even volatilized in small quantity along with the steam and hydrochloric acid. It is also rather an expensive process, but the absence of nitric acid and free hydrochloric acid recommend it when the presence of chlorine is no objection.

Third, the official process. This consists in dissolving a given weight of iron wire in dilute hydrochloric acid, oxidizing by means of nitromuriatic acid, and evaporating in a water-bath, till a solution is obtained of sp. gr. 1440.

The chemical changes which take place are, first, the formation of protochloride, and second, the production of perchloride.

The iron of commerce contains more or less carbon, in two different conditions, as carbide of iron, FeC_4, and as graphitöid carbon, and we will therefore expect to have the latter at least left behind upon solution of the iron. If some varieties of white cast iron be used, and the acid be strong, no residue is left, both the conditions of carbon becoming converted into volatile hydrocarbons, but with ordinary iron wire it is found that the carbon present as carbide is entirely volatilized as the hydrocarbons previously referred to, and forms an oily layer on the surface of the liquid, having a composition similar to that of petroleum, and a very disagreeable odour. The graphitöid carbon, on the other hand, is left in hard scales. This is best seen when a block of iron is taken. The hard black substance we notice does not consist entirely of carbon, but also contains silicon, and a certain amount of ferric oxide. It is partially soluble in potash, and when exposed to the air becomes heated, according to some being even raised to ignition, ferric oxide being left behind. It is also magnetic as we might expect.

When iron of any kind is dissolved in hydrochloric acid of considerable strength, the action does not go on so rapidly as if it were more dilute, because the protochloride which is first formed, being insoluble to any great extent in concentrated hydrochloric acid, forms a crystalline film over the iron, thus preventing contact of metal and acid. To obviate this, a certain amount of water is added, which keeps the salt in solution, thus allowing the action to go on, and we get a liquor of blackish colour, owing to the particles of carbon, separated from the iron, being diffused through it in a fine state of division.

Having filtered the solution thus obtained, we get it green and bright, or if it has been left exposed to the air for some time after the disengagement of hydrogen ceased, a brownish colour is noticed, or a large quantity of brown sediment is left in the filter. This deposit consists of a hydrated ferric oxychloride, the composition of which is variable, and it should not be thrown away, for the addition of the acid necessary to convert the ferrous into ferric salt will be found to dissolve it up again to the clear bright solution, and as far as I have noticed, its presence does not interfere with the subsequent process.

Second stage. In this our object is to alter the iron from the dyad to the triad condition, and this may be done in several ways, as we shall shortly see, but at present we will confine ourselves to the official process.

This consists in the addition of half as much more hydrochloric acid to the solution as was originally used in its preparation, and the subsequent oxidation by means of nitric acid. This depends on the fact that nitric acid readily oxidizes, becoming itself reduced to the condition of a lower oxide, so that when it is placed in contact with ferrous chloride, in presence of sufficient hydrochloric acid, it is quickly reduced to the state of nitric oxide, the nascent oxygen uniting with the hydrogen of the hydrochloric acid to form water, and the chlorine and ferrous chloride forming ferric chloride.

$$6\ FeCl_2+2\ HNO_3+6\ HCl=3\ Fe_2Cl_6+4\ H_2O+2\ NO.$$

The nitric oxide liberated, immediately dissolves in the unchanged ferrous salt, forming a brownish black compound with it, having the formula $4FeCl_2,2NO$, but the liquid having been rapidly heated, and gradually becoming converted into ferric chloride, loses the power of dissolving the nitric oxide, so that as the last traces of ferrous salt disappear, the gas is given off with violent effervescence, and meeting with the oxygen of the air produces "nitrous fumes," consisting of nitrous acid and nitrogen peroxide NO_2.

In the Pharmacopœia a considerable excess of nitric acid is ordered, that the liquor may be oxidized without excessive evaporation, and this is generally found to be the case. This excess may be most easily appreciated by looking at the theoretical amount necessary, which is 12 ounces, the Pharmacopœia requiring 18 ounces, while I find 15 sufficient.

The above is one of the most serious objections urged against this process, since the presence of free nitric acid and consequent ferric nitrate must be objectionable.

The solution as above obtained is of an orange red colour, and is then subjected to evaporation, at a temperature below 212°F. Although this point be not approached very closely, evaporation cannot be carried on very far, as the chloride is readily decomposed, when it approaches the crystallizing point, in a manner similar to the chlorides of aluminium and magnesium, forming ferric oxide and hydrochloric acid. Thus—

$$Fe_2Cl_6 + 3\ H_2O = Fe_2O_3 + 6\ HCl.$$

So also Aluminic chloride + Water = Alumina + Hydrochloric acid,

$$Al_2Cl_6 + 3\ H_2O = Al_2O_3 + 6\ HCl.$$

And Magnesic chloride + Water = Magnesia + Hydrochloric acid,

$$MgCl_2 + H_2O = MgO + 2\ HCl.$$

The following modifications of this process are worthy of our notice.

It has been proposed to dissolve the iron in the whole of the hydrochloric acid, necessary for the preparation of the perchloride, thus ensuring the speedy solution of the metal, but I have never experienced any difficulty with the ordinary way, and the larger amount of liquid to work with and filter, as well as its highly acid character, render this proposal objectionable.

The next modification is one which differs from the official process only in a few particulars, and is the one which I have found most satisfactory in practice. It is briefly as follows: Saturate a definite quantity of aqueous hydrochloric acid with iron, and having filtered the solution, add five-eighths as much more acid as was used at first, along with one-eighth part of nitric acid. Thus, if we started with 128 ounces of hydrochloric acid, in order to oxidize it, 80 ounces more, as well as 16 ounces of nitric acid are added, there being thus an excess of hydrochloric acid over the B.P. quantity, amounting to 16 ounces. The liquor being allowed to stand for several hours, is partially oxidized, the compound of ferrous chloride and nitric oxide, $4FeCl_2, 2NO$, forming thick masses at the bottom of the vessel. A portion of the solution is then heated till the oxide is evolved, and as the remainder is added in successive portions to the hot liquid, the gas is given off at once, and ferric chloride left. The chief advantages of this process are—1st. The avoidance of ferric oxide in the resulting liquor, the excess of hydrochloric acid preventing this. 2nd. That owing to the smaller quantity of nitric acid added, namely, 16, as compared with 18 ounces, and the fact that the nitric acid is not heated along with the ferric chloride for any length of time, there is less chance of having any ferric nitrate present in the liquor.

In Mr. Proctor's valuable work on 'Practical Pharmacy' a recommendation is made to the effect that if the solution of protochloride be added in small quantities to the nitric acid, instead of the reverse, it is oxidized at once, violently and completely. In practice he adds the nitric acid to one-eighth of the proto-solution, brings the whole to ebullition, which is at a much lower temperature than 212°F., and then adds the remainder of the protochloride gradually, boiling the liquid between each addition. This may also be done at first without heating, completing the oxidation by heat, but the nitric oxide remaining in the solution gradually accumulates, till a point is reached, when the whole is disengaged at once, and with great violence, some of the nitric acid being volatilized before it is reduced to nitric oxide. If Mr. Proctor's directions, furnished to me personally, be strictly followed, I find that 17 ounces of nitric acid are necessary, as compared with 16 ounces by the last process.

Another method, by which we dispense with nitric acid oxidation altogether, was proposed by Mr. Rother, in the *Pharmaceutical Journal*, and this was in the use of potassic chlorate as an oxidizing agent. The simplicity of the process, namely, in adding the required amount of the salt to the protochloride solution, mixed with the extra quantity of the acid, is greatly in its favour, but the presence of a considerable quantity of potassic chloride in the resulting liquor, renders it unfit for preparing tincture, as we shall see hereafter. The changes involved depend on the fact that when potassic chlorate is acted on by hydrochloric acid, it is decomposed, forming potassic chloride and euchlorine, a mixture of chlorine and peroxide of chlorine, according to Professor Crum-Brown, or chlorine and chlorochloric acid, according to Miller. This is a powerful oxidizer, and rapidly changes the ferrous into ferric salt. If excess of potassic chlorate be added, and free hydrochloric acid be present, some euchlorine remains free, and may be recognized by its peculiar odour.

In order to avoid the evaporation of the ferric chloride solution, and consequent production of ferric oxide, some have proposed to use concentrated solutions of the ferrous salt for oxidation, but this is open to the objections that (as we before mentioned) iron is only soluble with difficulty in concentrated hydrochloric acid, and that if a solution of ferrous chloride is evaporated some of the salt is volatilized along with the steam, while another portion is decomposed, chlorine escaping, and ferric oxide remaining behind.

$$4\ FeCl_2 + 3\ O_2 = 2\ Fe_2O_3 + 4\ Cl_2.$$

Having thus briefly touched on these various processes, we will notice some points necessary to the full appreciation of them.

It is a common error to imagine that the hydrochloric acid in the official process is saturated with iron, and as a result, that in a case where excess of the metal has been used in order to ensure rapid saturation, it is only necessary to add half as much more acid, for the preparation of the ferric salt. This is quite true, if a theoretical quantity is what we look to, but in order to ensure a satisfactory result, an excess of hydrochloric acid is necessary. This is advantageous in several ways. First, it assists in decomposing the compound, $4\ FeCl_2, 2NO$, previously referred to; this body being comparatively stable in slightly acid solutions, but readily spilt up if the solution be strongly acid. Second, it decomposes any ferric nitrate which may result from the action of the nitric acid on ferric chloride, a fact to which I will again allude. Third, the amount of hydrochloric acid used seems to exercise a marked influenoe on the yield of liquor. In support of this statement, I quote the following results, extracted from my laboratory note-book.

	1.	2.	3.	4.
Muriatic Acid	192 oz.	192 oz.	192 oz.	208 oz.
Nitric „	18 „	18 „	15 „	16 „
Iron	2 lb.	Excess.	Excess.	Excess.
Yield	14½ „	13 lb.	13 lb.	16 lb.

Several things will strike the observer of these statements. First, that in Nos. 1 and 2, which contain the official quantity, there is a considerable excess of nitric acid. This was introduced in order that the liquid might be oxidized without being evaporated to a high specific gravity. Such had been the case with the B. P. 1864 preparation, in which only six drachms of nitric acid were used where nine are now ordered, and which had therefore to be evaporated to half the proper bulk before complete oxidation took place. The compound of ferrous chloride and nitric oxide, if no excess of any acid be present, is not decomposed in a dilute solution; hence the necessity for excessive evaporation to which we have referred. If excess of nitric acid be added, the action takes place much more readily; but ferric nitrate is produced at the same time by the decomposition of the chloride with nitric acid. We thus see that the action goes in either way—

Nitric Acid + Ferric Chloride = Ferric Nitrate + Hydrochloric Acid.

$6\,HNO_3 + Fe_2Cl_6 = 2\,Fe\,3\,NO_3 + 6\,HCl$; and also

Hydrochloric Acid + Ferric Nitrate = Ferric Chloride + Nitric Acid.

$6\,HCl + 2\,Fe\,3\,NO_3 = Fe_2Cl_6 + 6\,HNO_3$.

Second observation. The proportion of hydrochloric acid in relation to the weight of the iron and the yield differs very much. This variation may possibly be explained as follows:—If a saturated solution of iron, as in Nos. 2, 3 and 4, be mixed with the exact theoretical amount of hydrochloric acid necessary for oxidation, as in Nos. 2 and 3, on heating, not only does the ferric chloride itself suffer decomposition—losing hydrochloric acid and becoming more and more basic in its composition—but it seems more ready to volatilize along with the steam and be lost when the retaining acid is absent. This seems to be indicated by No. 4, where the addition of 16 oz. more acid to the solution before evaporation produced an increase of 1½ lb. in the yield. The fact that No. 1 gave a larger yield than No. 2, while the latter contained a larger amount of iron, also seems to favour this view.

When a strong solution of perchloride of iron is diluted with water a considerable contraction takes place, and much latent heat is given out. I have determined roughly the amount of this contraction and the rise in temperature, and have tabulated the results here. The first column indicates the number of volumes of liq. ferri perchloridi, with the specific gravity in each case. This being mixed with the number of volumes of water in column three gave the measure indicated in column four, with the indicated specific gravity. In the sixth column is the specific gravity which might have been expected had no contraction taken place. And in the last one is the rise in temperature which was noticed:—

Fe_2Cl_6	S.G.	Water.	Volume.	Exp.S.G.	Calc.S.G.	Rise in Temp.
95 vol.	1763	5	97	1747	1725	30° F.
95 „	1687	5	98	1670	1652	16° F.
95 „	1644	5	98·3	1586	1561	16° F.
95 „	1586	5	98·8	1575	1550	11° F.
95 „	1535	5	99·48	1516	1508	7° F.
95 „	1485	5	99·49	1468	1460	6° F.
25 „	1763	80	——	——	——	56° F.
100 „	1440	50	147	1315	1293	
100 „	1440	58·3	152	1297	1274	
100 „	1440	66·6	165	1272	1264	
100 „	1440	100	199·1	1225	1220	
100 „	1440	150	249·1	1180	1163	
100 „	1440	200	299·1	1150	1147	

These results must be regarded merely as rough approximations to the truth.

Solution of ferric chloride is rather interesting as regards its crystallization. If we evaporate a solution down gently, replacing any hydrochloric acid which may be lost in the operation, when it attains a degree of concentration corresponding to about sp. gr. 1500, if left standing for several hours it begins to crystallize in pale yellow nodular masses, which consist of a hydrate containing 40 per cent. of water, and having the formula $Fe_2Cl_66H_2O$. According to some experimenters another hydrate containing 25 per cent. of water, crystallizes from such a solution in rhombic plates, but I myself have only succeeded in getting the first mentioned one. There is still a third hydrate with the formula $2Fe_2Cl_65H_2O$, which crystallizes in reddish-yellow crystals from a solution of sp. gr. 1600. When exposed to moist air, this deliquesces, forming a liquid of sp. gr. 1545, by evaporation of which a solution of sp. gr. 1763 may be obtained. This latter is a super-saturated solution, and although it may remain apparently perfectly stable at ordinary temperatures, I have repeatedly found the dropping in of a crystal, or exposure to dust, or even simple agitation to determine its crystallization in a few seconds. Similar phenomena may be noticed with saturated solutions of acetate, hyposulphite or sulphate of soda, and as with these, much latent heat is given out at the moment of solidification.

Let us now turn shortly to the tincture or alcoholic solution of this salt, prepared by mixing the liquor with rectified alcohol. This preparation is very prone to decomposition, which arises from four chief causes, heat and light, presence of protochloride, deficiency of hydrochloric acid, and excess of nitric acid.

The effect of heat and light is merely to facilitate the decomposition which is liable to occur owing to the presence of one of the latter conditions, except under exceptional circumstances. Thus if the tincture be heated in a sealed tube it is decomposed very rapidly in a way we shall afterwards refer to, while if a portion be exposed to light, the ferric chloride and alcohol react on each other in a similar manner, but as the other conditions are usually present we will confine ourselves to the ordinary decomposition. This, as far as I can judge, may be divided into two kinds. First, the production of insoluble oxychlorides in the liquid, accompanied by a darkening of the colour, and the formation of ethereal compounds. Second, that in which no precipitate is thrown down, the colour becoming greener, while much protochloride and ethereal compounds are produced.

With regard to the first, a solution of ferric chloride has the property of dissolving a very large quantity of freshly precipitated ferric oxide or hydrate, even as much as ten molecules for every one of the chloride, forming liq. ferri chloroxydi, which although of variable composition, we may represent by the formula $Fe_2Cl_610Fe_2O_3$, and, indeed, the late Dr. Graham, Master of the Mint, obtained by dialysis a solution containing 98·5 per cent. of oxide to 1·5 per cent. of hydrochloric acid. This liq. ferri chloroxydi is also to some extent formed when the ordinary solution of perchloride is boiled, for then the ferric oxide set free by the chloride dissolves immediately in the undecomposed chloride, forming a solution of a dark red colour. If a tincture be made from such a liquor, a precipitate will either at once fall, or after standing for a few days, it will be deposited as a flocculent mass. This consists of the oxychlorides previously referred to, and which are insoluble in the menstruum. At the same time the colour darkens greatly, and more or less of an ethereal odour is developed.

By some it is thought that this is caused by the presence of free nitric acid, by others that it is owing to deficiency of hydrochloric acid. It certainly almost always accompanies the latter condition, but it may happen without any nitric acid at all being present.

As prepared by the B. P. 1864 way, a very dark tincture is the result, and this, owing to the fact that the nitric oxide still remains in solution in the unchanged ferrous chloride, as may be shown by adding more nitric acid, when effervescence occurs, and the liquid becomes lighter in colour. In this case a slight amount of free nitric acid is present, even though the liquor is unoxidized, but it must be in very small quantity.

To avoid the formation of the afore-mentioned precipitate, many remedies have been proposed. Thus, Mr. Wilson advocates the addition of ten per cent. of glycerine; Mr. Druce proposes to dilute the spirit with fifty per cent. of water, and Mr. Rother, as mentioned before, has brought forward a process which dispenses with the use of nitric acid altogether. He dissolves 1300 grains of iron, in 17½ ounces of hydrochloric acid, mixed with 22½ ounces of water, and having oxidized with 475 grains of chlorate of potash, he adds the spirit and filters. As thus prepared, we get a permanent tincture of a light colour, but which is much weaker than the B. P. tincture. If we, however, make a liquor by the chlorate of potash process, and from it a tincture, or directly increase the strength of Mr. Rother's preparation, the chloride produced from the chlorate, being insoluble in alcohol, crystallizes out after one or two days in beautiful crystals. Other remedies besides these I have mentioned have been suggested, but I have always found that if care be taken that the liquor is not basic, but rather contains a little free hydrochloric acid, no precipitate is thrown down during a reasonable time, although if the tincture be kept in the dark, it becomes darker in colour, while if exposed to light the opposite is the case.

We often see very dark tincture of perchloride of iron, owing to one of several causes. These are, that the liquor may have been boiled during preparation, and a deficiency of hydrochloric acid and presence of basic salts be the result; or that the tincture may have darkened from keeping, with the same results as the last in the long run; or that the liquor not being thoroughly oxidized, would retain a certain quantity of the compound of ferrous chloride and nitric oxide $4FeCl_2, 2NO$, rendering the tincture made from it very dark.

Instances are met with of the tincture being of a very light colour. This must either be owing to weakness or to its having undergone the second mode of decomposition, which I will now describe.

When the tincture is exposed to light for a few days, a powerful ethereal odour is usually developed; this takes place in the dark also, but very much more slowly. Should the hydrochloric acid be in slight excess, the liquid also becomes lighter in colour, ferrous chloride being formed. To observe these changes, I placed samples of the tincture in the dark and also in the light.

Within two days, an agreeable odour was noticed in the bottle exposed to light, and by carefully shaking the bottle, it was possible, owing to the different refractive powers of the two liquids, to notice a layer of lighter liquid lying on the surface of the tincture. This was easily shaken up and diffused through the whole mass, being readily miscible with it. During the same time, and indeed after many weeks, no similar change took place in the sample kept in the dark, and as that exposed to the light became lighter in colour, the difference between the two grew more and more marked.

Some time ago a quantity of the tincture was submitted to me, which was supposed to contain spiritus ætheris nitrosi, and it was thought that this had either been put in by mistake, or had been produced by the action of free nitric acid on the alcohol. Not being able to give a definite opinion, I tried to see if I could produce the same smell in a tincture containing no nitric acid. As the liquor from which the tincture had been prepared, was made with the B. P. quantity of nitric acid, I thought the statement might be correct, and turned my attention to tinctures made without nitric acid. Two methods of obtaining these were readily available, viz., the old Edinburgh Pharmacopœia process, using ferric oxide and hydrochloric acid, and also Mr. Rother's process. I tried both ways, and after exposing the samples obtained to light, I found the same smell as before. The production of the ethereal compounds is not then of necessity owing to nitric acid, though the presence of such would probably produce ethers. As we are aware that ferric chloride in presence of alcohol, is quickly reduced to ferrous cloride, nascent chlorine being liberated, it is highly probable that the ethereal compounds consist of all those bodies which are produced by the action of chlorine on alcohol, along with aldehyde.

I subjected a portion of the tincture to fractional distillation, and without giving any further opinion on the matter, I may state the results of an analysis which was made of the distillate by an eminent chemist, in this city. Owing to the small quantity of the liquid at his disposal, a satisfactory examination was not possible, but he found by far the greater part to consist of alcohol, while aldehyde was readily recognizable, though in small quantity. Of bodies containing chlorine, the amount was exceedingly small, so that the nature of these was not determinable. The presence of nitric or nitrous ethers could not be detected, although the sample in question was obtained from the liquor oxidized with nitric acid. As all theory must be supported by experiment, I leave the matter at this point, trusting that some one more experienced than I may investigate fully a subject so interesting from a theoretical point of view.

THE INFLUENCE OF SALICYLIC ACID AND SOME OTHER ANTISEPTICS ON FERMENTS.*

BY ED. SCHAER.

From numerous experiments it would appear that, with few exceptions, hydrocyanic acid in actual contact completely arrests or greatly diminishes the action of both cellular and non-organized ferments, while carbolic acid influences only the former class. Thus phenol does not influence diastase, while it decidedly checks alcoholic fermentation through saccharomyces and the putrefactive changes accompanying bacteria. Neither does phenol influence the catalysis of hydrogen peroxide, or the relations of ferments to ozone, while hydrocyanic acid completely destroys those properties, as in its action on extract of malt for instance.

A more concentrated form of phenol often checks such ferments, through its power of coagulating albumin, not only in the ferments themselves, but, the author supposes, in the solutions containing them, since the rapidly coagulated proteids would mechanically envelop the ferments. But even when so far diluted as not to cause coagulation, phenol exerts a marked influence on the development of cellular ferments.

The author confirms the observation of Binz, that quinine does not influence the particular fermenting powers of diastase, emulsin, and ferments of that class, and adds that they are similarly unaffected, as regards the peroxide of hydrogen reaction, by salts of quinine, which, however, decidedly influence cellular ferments.

Salicylic acid behaves in like manner towards the chief non-organized ferments, although by its power of coagulating them it often diminishes or stops the fermentation. Kolbe has shown that the addition of 1 per cent. of salicylic acid to amygdalin and emulsin, or to moistened mustard, prevented the development of the products characteristic under ordinary circumstances. Nevertheless, both glucose and cyanogen can be detected in the former case, and the volatile oil of mustard after a while in the latter. Bitter almonds freed from oil, and powdered black mustard seed, were digested with water and $\frac{1}{5}$, $\frac{1}{2}$, or 1 per cent, of salicylic acid for 24 hours. The distillate from the almonds was found to contain as much hydrocyanic acid as if no salicylic acid had been added. The quantity of salicylic acid employed diminished the amount of allyl sulphocyanate from the mustard, but $\frac{1}{10}$ per cent. did not cause appreciable diminution, although it powerfully affected yeast and other fungoid ferments.

Phenol, salicylic acid, and quinine appear to demonstrate a decided difference between soluble ferments and the so-called organized ferments, *i.e.*, some components of certain microscopic organisms, but both classes require for their action humidity and a limited range of temperature, and in some cases free oxygen, their activity being suspended by the withdrawal of these conditions.

Different results are obtained according to the *modus operandi* of the experiments on the action of synaptase in presence of salicylic acid. If water be added to powdered almonds with 1 or $\frac{1}{2}$ per cent. of dry salicylic acid, the coagulation of the emulsin takes place slowly, and the fermentation is scarcely affected. But if a saturated solution of salicylic acid be added to an equal quantity of water containing 2 per cent of amygdalin in presence of about 10 per cent. of almond emulsin, the fermentation is very much checked. But the arrest of fermentation is only apparent, for if sufficient time be allowed—12 or 24 hours—as much hydrocyanic acid will be produced as if no salicylic acid had been present.

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* *Journal of the Chemical Society*, from the *Journ. prak. Chemie* [2], xii., 123.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 12, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE BENEVOLENT FUND.

THE recent issue of a circular in reference to the Benevolent Fund for the relief of distressed chemists and druggists and their widows and orphans, has given rise to numerous communications addressed to the Secretary from various parts of the country. These communications do not indeed in all cases authorize him to put down the writers' names on the list of subscribers to the Fund, but in several instances they indicate the existence of opinions which serve in some measure to account for the very remarkable fact pointed out in the circular above mentioned, that out of a body of men, numbering little less than 14,000, for whose special benefit the Benevolent Fund exists, there are actually only 1700, or less than one-eighth of the number, who contribute in any way to the support and maintenance of this Fund. We have on previous occasions referred to this fact as being unintelligible when it is considered that the benefits of the Fund are available not only to Members and Associates of the Society, but to the whole trade. Regarded from that point of view the fact that the subscriptions to such a Fund do not represent much more than a shilling a-head as compared with the entire trade is one scarcely credible. But it is so, though we know of nothing to justify the belief that chemists and druggists are less capable than others of commiserating misfortune or of desiring to relieve it, and surely none are so far removed from the possible contingencies of distress, poverty, or sickness that all should not join together in the effort to provide for those who may have to encounter them.

There are, however, influences which stand in the way of an extension of the support accorded to the Benevolent Fund being commensurate with the extension of its benefits from Members and Associates of the Pharmaceutical Society to the entire body of chemists and druggists. We believe some good purpose may be served by endeavouring to remove these opposing influences, and that the indications afforded by the letters above mentioned may be made use of for this purpose.

One of the Secretary's correspondents on this subject says he would willingly contribute to the Benevolent Fund—but for the fact that he thinks "the simple registered chemist and druggist is overlooked in preference to the Member of the Pharmaceutical Society." He adds, also, his opinion that in the North of England the Fund would soon be doubled if this idea could be removed, and if every chemist and druggist had a right to vote whether he contributed or not. Chemists and druggists would not, he thinks, exercise this right unless they first sent a good earnest in the shape of a substantial Bank of England note.

Another says that after carefully reading over the circular soliciting subscriptions on behalf of the Pharmaceutical Benevolent Fund, he is not surprised that only 1700 out of 14,000 registered chemists and druggists are subscribers to it, and the reason he gives for this opinion is, that on looking over the Abstract of Rules he finds every Member or Associate of the Pharmaceutical Society is entitled to vote, irrespective of contributions, but that the registered chemist and druggist has no vote. The writer of this letter adds, that since people who find the funds for any purpose generally like to have a voice in the disposal of them, he thinks no further reason need be sought for the coldness manifested by chemists and druggists in regard to the support of the Benevolent Fund, and he does not anticipate any increased support will be given to the Fund by chemists and druggists as a body "until a more liberal spirit pervades the Pharmaceutical Society."

We have quoted these two letters because they are typical illustrations of the erroneous views which seem to be very generally entertained to the prejudice of the Benevolent Fund. Both agree in showing that the prevailing idea which prevents the writers from contributing, is that they are under some disadvantage as compared with Members and Associates of the Society. Nothing could well be more destitute of any foundation than such an idea, but as a very trifling misconception will sometimes operate as a bar to the attainment of very deservable objects, we think it will be worth while to expose in some greater detail than would otherwise be needful, the entire fallacy of the opinion which is here put forward as the chief reason for not subscribing to the Benevolent Fund.

To those acquainted with the affairs of the Pharmaceutical Society, it will at once be evident that the feeling of dissatisfaction expressed by the two letters we have quoted, is referable simply to the fact that the writers are not connected with the Society. If that were not the case, they would not only appreciate the principle, that people who find the funds for any purpose like to have a voice in the disposal of them; but they would equally, at least, understand that such people do not care to share their privileges in that respect, with others who do not contribute like themselves or in any other way They would then understand that since the Council of the Society has power to transfer money from the general funds of the Society to the Benevolent Fund, it has for this reason been expressly provided that every Member and Associate shall have a voice in the election of annuitants. The Council has repeatedly exercised this power, and appropriated to the Benevolent Fund considerable sums out of the money contributed to the Society by its Members and Associates in the form of subscriptions.

It is, therefore, simply as a just right to a share in the administration of the Benevolent Fund, that the Members and Associates of the Society enjoy the power of voting. It is no injustice to the chemist and druggist unconnected with the Society that he has not the same privilege; there is not the shadow of a pretext upon which it can be claimed as a right by any one having moderately clear conceptions as to *meum* and *tuum.* In fact there is not the least foundation whatever—real or sentimental—for the plea of the non-subscribing chemist and druggist that he is not upon a footing of equality with Members and Associates of the Society. Of course, he is not upon that footing; but the slightest reflection should convince him that he cannot regard that fact as a grievance he can complain of; the disability is one of his own seeking, and the only means by which he can remove it and place himself in a position of equality, in this respect, with Members and Associates of the Society is either to become one of them or to become a subscriber to the Benevolent Fund.

We have ventured to speak of this matter thus fully because it seems that the obstacle to the considerable increase of the Fund is merely a phantom of the most unsubstantial nature. We, therefore, express our thanks to the writers of the particular letters we have referred to for having furnished us with the opportunity of pointing out the erroneous nature of the conceptions by which they have been deterred from subscribing and by which they suggest that many others besides themselves are influenced.

The mistaken opinions above referred to are not the only influences which prevent chemists and druggists from subscribing to the Benevolent Fund. Inability to see straight is an affection of the mental as well as the optical perception, and there are some among the number of chemists and druggists who refuse to take delight in any of the proceedings of the Pharmaceutical Society, because they are not conducted upon the principle of a trades union. A gentleman writing from the west-end of the metropolis affords a striking, though we hope a somewhat exceptional, illustration of this state of mind. He writes in reference to the Benevolent Fund circular, "I am pleased that there are twelve hundred registered chemists who know better than subscribe their money," and then he proceeds to demonstrate the mode in which he is affected by the malady we have already mentioned by adding that if the basis of the Society was to protect the property of qualified druggists from having their business interfered with by "barbers and others" pretending to be chemists, he would not mind giving £2 or £3 a year.

Truly this is a remarkable reason to assign for refusing to subscribe to a Fund established for the relief of distressed chemists and druggists. It indicates a strange confusion of ideas and singular deficiency of logical perception to contend that the support of a Benevolent Fund must be subject to such a condition as the suppression of "barbers and others" by the Pharmaceutical Society. It is not the less remarkable too, that such demands as this and such excuses for not supporting the Benevolent Fund, are in many instances found to be urged by those whose claim to qualification consists in the fact that they were placed on the register in virtue of being in business prior to the passing of the Pharmacy Act. The protection that qualified chemists and druggists now enjoy, as compared with the state of things prevailing before 1868, is certainly due to the exertions of the Pharmaceutical Society, but its resources do not admit its entering upon the various kinds of costly litigation which some seem to think they have a right to expect for their especial benefit often upon the most vague and slender grounds.

But we are glad to be able to turn to other responses to the Benevolent Fund circular, which manifest a better spirit and a more rational desire to cooperate with the Society in promoting the common good. The representation of the fact that there are some 12,000 registered chemists and druggists who do not subscribe has, we are glad to say, so far impressed some of that number that they have announced their intention to reduce the number by becoming subscribers at once, and have offered various suggestions with the view of obtaining more general support to the Fund. We are glad to express, on behalf of the Society, our gratitude to those who have adopted this humane and rational course. One of the suggestions that have been made with this object is, we believe, deserving of special attention. It is that various members of the trade should undertake the office of canvassing their brother chemists after being authorized to do so by the Society's Local Secretary. Having regard to the influence of personal application by known persons in particular districts, and the apparent need for such a mode of making known the object and mode of administration of the Benevolent Fund, we are disposed to anticipate that by this means a very large accession to the number of subscribers might be ensured.

The steps recently taken by the Council for the purpose of extending the power of voting to subscribers of 5*s.* and 2*s.* 6*d.*, offers a favourable opportunity for carrying out the plan that has been suggested. The gentleman who offers the suggestion expresses his opinion that having regard to the objects of the Fund it is scarcely possible many if any of the 12,000 who now do not subscribe would refuse to give at least 2*s.* 6*d.* "towards a Fund from which at some future time he or his might only be too glad to receive assistance." If such a result were attained it would more than double the present income of the Fund.

Another suggestion is that a 1*s.* fund should be established as an auxiliary to that now existing, and it is likely that in this way very considerable assistance could be obtained for dealing with such casual applications for relief as are not unfrequently made and do not come altogether within the scope of the conditions under which the Benevolent Fund is now administered.

In illustration of the advantage to be gained by the system of local collections in support of the Fund we may mention the case of a Scotch chemist who though apparently disposed to subscribe, declines to do so because he does not see the names of his neighbours on the list. Whatever may be the result of the present endeavour to augment the capabilities of the Benevolent Fund it is clear that there is an ample field for efforts in this direction and we sincerely trust they may be crowned with success.

Transactions of the Pharmaceutical Society.

BENEVOLENT FUND.

SUBSCRIPTIONS RECEIVED DURING JANUARY, 1876.

	£	s.	d.
"A. B.," per Secretary	0	2	6
Abbott, Joseph, 20, Newborough Street, Scarborough	0	5	0
Abington. Herbert J., High Street, Ringstead	0	5	0
Acton, Samuel Fred., 16, Sheendale Terrace, Richmond	0	5	0
Ackerman, Hy., Chipping Sodbury	0	10	6
Ackerman, Theophilus, Redcliff Hill, Bristol	1	1	0
Allen, Thompson, 15, High Street, Boston	0	5	0
Almgill, John, Dixon Square, Yeadon	0	5	0
Archer, Joseph S., Guiseley, Leeds	0	5	0
Argue, James, Lower Marlowes, Hemel Hempstead	0	2	6
Atkinson, George, Wolverton	0	10	0
Atkinson, Stephen, Market Place, Doncaster	0	10	6
Attwood, Alfred, 147, Cannon Street, E.C.	1	1	0
Austin, James Battle, 1, Craven Terrace, Bayswater	1	1	0
Bagley, Thos. J., Wolstanton, Staffs	0	2	6
Bailey, G. W., North Walsham	0	5	0
Baker, Frank, Harnet Street, Sandwich	0	10	0
Balcomb, John, Cheltenham	0	5	0
Bamford, J. W., 37, Cronkeyshaw Road, Rochdale	0	5	0
Bancks, Alfred, Guisborough	0	10	6
Barnes, J. B., 1, Trevor Terrace, Knightsbridge, S.W.	1	1	0
Barns, Bryan, Peter Street, Derby	0	5	0
Barr, Robert, Gourock	0	2	6
Barraclough, Thos, Chapeltown Road, Sheepscar, Leeds	0	5	0
Barron, Fredk., Bush Lane, E.C.	5	5	0
Barton, H. E., Kenilworth	0	5	0
Bates. George, Heage	0	10	6
Bathgate, W. L., 23, Canning Place, Liverpool	0	10	6
Bayley, William, 3, Earle Street, Crewe	0	10	0
Beattie, Thos., Langholm	0	5	0
Bell, Thomas, Ambleside	0	10	6
Bemrose, John, Long Bennington	0	10	6
Bemrose, Wm., 36, Elgin Crescent, Notting Hill	0	2	6
Bettesworth, Henry T., Horndean	0	2	6
Billington, Fredk., 127, Wavertree Road, Liverpool	0	5	0
Bird, Augustus, Wood Lane, Shepherd's Bush	2	2	0
Bird, Matthew M., Blandford	0	5	0
Bird, W. L., 42, Castle Street East, W.	1	1	0
Bishop. M., High Street, Lynn	0	5	0
Bishop, Thos. N., Cradley Heath	0	5	0
Blackburn, Bailey, Cliffe Lodge, Baildon	1	1	0
Blacklock, J. D., 32. Old Steine, Brighton	0	5	0
Blacklock, P. W.. 32, Old Steine, Brighton	0	5	0
Blundell, John, 56, Tithebarn Street, Liverpool	0	10	0
Booth, John, Heckmondwike	1	1	0
Bourdas, Isaiah, 7, Pont Street, Belgrave Square	1	1	0
Bourdas. Isaiah, jun., 48, Belgrave Road	1	1	0
Boyce, George, Chertsey	0	5	0
Boyd, Thomas, 31, Spencer Street, Carlisle	0	5	0
Brackenbury, Elijah, Bardney	0	2	6
Bradley, Edwin S., St. John Street, Ashbourne	0	10	6
Brearey, W. A., Prospect Hill, Douglas	0	5	0
Bridgman, W. L., St. Mary Church, Torquay	0	5	0
Broad, John, Rise House, Hornsey	1	1	0
Brodie, Robert, 253, Crown Street, Glasgow	0	5	0
Broof, R., Leicester	0	10	0
Brothers, F., and Son, Ashford	1	1	0
Brown, Alfred J., 55, Trafalgar Road, Greenwich	0	10	6
Brown, A. H., Shanklin	0	10	6
Brown, Wm. Scott, 113, Market Street, Manchester	1	1	0
Brownridge, P. F., 136, Ashton Old Road, Openshaw	0	10	6
Buckle C. F., 77, Gray's Inn Road	1	1	0
Burdwood, James, 30, Frankfort Street, Plymouth	0	5	0
Burn, D. H , Arbroath	0	5	0
Bush, Thomas, Paulton, near Bristol	0	5	0
Buss, Thomas S., Ham Street, Kent	0	5	0
Butler, Charles, Walton, Liverpool	0	10	6
Butler, Samuel, Bristol	1	1	0
Cannell, Wm., Queen Square, Wolverhampton	0	10	6
Capes, J. H. C., 99, Walmgate, York	0	5	0
Capper, Edmund, 33, Gay Street, Bath	0	5	0
Casely, Thos., 102, Camden Road, N.W.	0	5	0
Casey, Edward, 10, Canal Street, Ancoats, Manchester	0	2	6
Chapman, Richard Jas., Chipping Ongar	0	10	6
Chase, Thos , jun., 14, Holborn, E.C.	1	1	0
Cheverton, Geo., The Broadway, Tunbridge Wells	1	1	0
Clift and Crow, Lee Bridge, Lewisham	1	1	0
Cockton, John, Maryport	0	5	0
Colchester, Wm. M., 2, Crown Street, Hoxton, N.	0	5	0
Colchester, W. M., jun., 6, Marquess Rd., Canonbury, N.	0	5	0
Cole, Alfred C., High Road, Lee	1	1	0
Coles, J. W., 197, Camberwell New Road, S.E.	0	10	6
Coley, S. J., 57, High Street, Stroud	0	10	6
Cook, Thomas, 52, Northgate Street, Gloucester	1	1	0
Cooper, Albert H., Bradford-on-Avon	0	5	0
Cooper, Geo. B., Brightlingsea	0	2	6
Corke, Edward, Ticehurst, Hawkhurst	0	5	0
Couchman, Thos., Wadhurst	0	10	6
Covell, Wm. M., 302, Mare Street, Hackney	0	10	6
Cowgill, Brian H., 28, Manchester Road, Burnley	0	5	0
Cranidge, J., Dirtmess Bridge, Thorne Levels	0	10	6
Craven, Fredk., Batley Carr	0	5	0
Critten, Robert P , High Street, Southwold	0	2	6
Crowther, Thos., Tickhill	0	10	6
Cubitt, Charles, 17, Market Place, Norwich	0	10	0
Cullen, R. H., 96, Westbourne Grove, Bayswater	1	1	0
Cullen. Thos., 12, St. James's Place, Paisley	0	2	6
Cupiss, Francis, The Wilderness, Diss	0	10	6
Curtis, Theophilus, 164, High Street, Notting Hill	1	1	0
Cuttle, Arthur E., Tickhill	0	2	6
C. H.	0	5	0
Dadley, Elijah, 21, Carter Gate, Nottingham	0	10	6
Dale, George, South Street, Chichester	0	10	6
Davenport, Horace, 33, Great Russell Street, W.C.	1	1	0
Davenport, J. T., 33, Great Russell Street, W.C.	2	2	0
Davies, R. M., 49, King Street, Carmarthen	0	5	0
Dawson, John, 55, High Street, Dudley	0	5	0
Dell, W. M., 10, William's Terrace, Turnham Green Road	0	5	0
Des Forges, Joseph H., 61, Lowgate, Hull	0	5	0
Dickins, John, Bridlington Quay	0	5	0
Dickins, Rowland, Aylesbury	0	5	0
Drake, William, Wyke, near Bradford	0	3	0
Drawbridge, Joseph G., 1, Upper Hill Street, Liverpool	0	10	6
Druce, Geo. C , Northampton	0	5	0
Dunston, Alfred, Timberland, Sleaford	0	10	6
Dutton, John, King Street, Rockferry	1	1	0
Dyer, Henry, Trowbridge	0	10	0
Eaton, Walter C., Pen-y-Groes	0	2	6
Edgar, F. G. C., Godstone	0	5	0
Edwards, Charles, 34, Castle Street, Shrewsbury	0	5	0
Ellis, Bartlet, 34, High Street, Banff	0	10	6
Ellwood, Michael J., Leominster	0	5	0
Entwisle, Joseph, Chapel Allerton, Leeds	0	10	6
Entwisle, J. B., 17, Shaw Street, Liverpool	1	1	0
Eve, Charles, Plough Court, Lombard Street	1	1	0
Everatt, Robert, Newbald, Yorks	0	2	6
Fairburn, Joseph, Northallerton	0	10	6
Fairman, Geo. P., Littlemill Distillery, Bowling	0	10	6
Fallowfield, J., 36, Lower Marsh, Lambeth	1	1	0
Farndale, George, Middlesboro'	0	2	0
Faulkner, Henry, 81, Commercial Road, Newport (Mon.)	0	5	0
Finch, A. H., Walter Road, Swansea	0	10	6
Fisher, Isaac. Otley	0	10	6
Fitch, Robert O., 200, Well Street, Hackney	0	10	6
Flint, John, Ranelagh Place, Liverpool	0	10	6
Foottit, Chas. M., Marlow	0	5	0
Forbes, J. W., 51, Great Moor Street, Bolton	0	10	6
Forrest, Richard, 20, Cork Street, Bond Street	1	1	0
Forrest, Richard W., Gainsborough	0	10	6
Foster, A., Market Place, Dewsbury	0	10	6
Foster, Fredk., 3, Buckingham Place, Brighton	0	10	6
Foster, James, 61, Scotch Street, Carlisle	0	5	0
Fowler, W. R., 7, Market Place, Boston	0	10	6
Fox, George, Daw Green, Dewsbury	0	10	6
Fraser, John, Fife Keith, Banffshire	6	2	6
Freeman, Fredk., Wendover	0	5	0
Froggatt, John, Eyam, Sheffield	0	2	6
Froggatt, T. W., Eyam, Sheffield	0	2	6
Furness, Thomas, 71, New Square, Chesterfield	0	2	6
Gaitskill, James, Gosforth	0	5	0
Gardener, Chas., 40, Grove Hill Road, Tunbridge Wells	0	10	6
Gates, Henry, 10, Coburg Terrace, Hull	0	5	0
Gaunt, R. D. H., 221, Union Street, Borough	1	1	0
Gibson, J. P., Hexham	0	10	6
Gladding, W. B., 75, Brook Street, Ratcliffe, E.	0	2	6
Glaisyer, Thomas, Brighton	0	10	6
Goodenough, J., Somersham	1	1	0
Goodwin, John, Lower Clapton	1	1	0
Gordon, James, Stane Shotts. Lanarkshire	0	2	6
Gorrie, Alexander, High Street, Kirkcaldy	0	5	0
Goucher, John, 43, High Street, Shrewsbury	0	10	6
Gould, Robert G., Fowey, Cornwall	0	5	0
Greasley, M. F., 13, North Street, Leeds	1	1	0
Greaves, Eccles, Mexborough	0	10	6
Greaves, G. S., 49, High Street, Mexborough	0	2	6
Green, Wm. G., Hoddesdon, Herts	0	5	0
Griffin, H. S., Bourton-on-the-Water, Gloucestershire	0	10	6
Griffin, Thos., 3, Wood Hill, Northampton	0	10	6
Grindall, Wm., 54, Charles Street, Hull	0	5	6
Grindell, John, 8, Paragon Street, Hull	0	10	0
Grisbrook, Edwd., 17, High Street, Windsor	0	5	0
Gulliver, Wm., 6, Lower Belgrave Street, S.W.	0	10	6
Hall, Edmund, 105a, Crawford Street, W.	0	5	0
Hall, Edward, 78, St. Stephen's, Norwich	0	10	6
Ham, John, Nether Stowey	1	1	0
Hamp, John, 47, Worcester Street, Wolverhampton	0	5	0
Hannah, John, Market Street, Abergele	0	5	0
Harding, Richard O., Belvedere, Bath	0	10	6
Harrington, Allen, Needham Market	0	10	6
Harvey, Edward, 6, Giltspur Street, E.C.	1	1	0
Harvey, S., Church Street, Frodsham	0	5	0
Heathcoat, Thomas, 30, Downs Park Road, West Hackney	0	10	6
Hey, David, Hebden Bridge	0	10	6
Hey, Thos. K., Hebden Bridge	0	10	6
Hick, Allan, Wath-on-Dearne	0	10	6
Hick, Matthew B., Wakefield	0	10	0
Hill, Arthur B., 101, Southwark Street, S.E.	1	1	0
Hillier, Henry, 7, Bridge Street, Bath	0	10	6

	£	s.	d.
Hindle, James, 132, Bank Top, Blackburn	0	5	0
Holme, J. C, Marple	0	5	0
Hopkin, Wm. King, 16, Cross Street, Hatton Garden	1	1	0
Hopwood, Thos. S., Richmond, Surrey	1	1	0
How, Wm., South Street, Dorchester	0	10	6
Howard, George, 15, Royal Hill, Greenwich	1	1	0
Huggins, John, Broad Street, Alresford	0	10	6
Huggins, Richard, 235, Strand, W.C.	0	10	0
Hughes, Roger, 353, Park Road, Liverpool	0	10	6
Hugill, John, 147, Cannon Street	1	1	0
Humby, L. W., Warminster	0	5	0
Hunter, Fredk. N., 39, Saddler Street, Durham	0	10	6
Hutchins, Charles, Ward Street, Neath	0	2	6
Ingall, Joseph, Ashford	1	1	0
Jackson, George, 759, Rochdale Rd., Harpurhey, Manchester	0	10	0
Jackson, Thos., 43, Great Ducie Street, Manchester	0	10	6
Jackson, Wm., 10, High Street, Crediton	1	1	0
Jarvis, John S., Lee	0	10	6
Jefferson, Thos, Church Street, Lower Edmonton	0	10	6
Jenner, Chas. U., Hailsham	0	5	0
Jessop, Jonathan, 11, Corn Market, Halifax	0	10	6
Jobson, Robt., 125, Scotswood Road, Newcastle-on-Tyne	0	10	6
Joce, James and W. D., Bideford	0	5	0
Johnson, Arthur, 1, Beech Cottages, Rotherham	0	5	0
Jones, A. M., King Street, Brynmawr	0	10	6
Jones, Henry S., 139, Fulham Road, S.W.	0	5	0
Jones, Michael, Flint	0	10	6
Jones, Morgan H., Briton Ferry	0	5	0
Jones, M., 146, High Street, Swansea	0	10	6
Jones, Thomas, 87, High Street, Putney	0	5	0
Keightley, Joseph, High Street, Tunstall	0	10	6
Kernot, Dr., 5, Elphinstone Road, Hastings	0	10	6
Keyworth, G. A., Hadleigh House, Hastings	0	10	0
King, Wm. G., Market Drayton	0	10	6
Lawrence, Benjamin, Penkridge	0	10	0
Laycock, John, High Street, Skipton	0	4	0
Leech, Robert, 34, Upper Duke Street, Hulme, Manchester	0	10	6
Lloyd, John, West Croydon	0	5	0
Macaulay, Joseph J., Donegal Pass, Belfast	0	5	0
Manning, Henry, Twyford	0	2	6
Manning, Thos. D., Yeovil	1	1	0
Marshall, J. F., Lord Street, Gainsborough	0	10	6
Millais, Thomas, 4, King Street, Jersey	1	1	0
Millidge, Thos. E., High Street, Tonbridge	0	10	6
Newzam, H. S., 40, Theberton Street, N.	0	10	6
Palmer, Fredk. W., High Street, Ramsey	0	5	0
Parsons, William, St. Mary Street, Portsmouth	0	10	6
Peel, Alfred, 87, High Street, Putney	0	5	0
Philpotts, Joseph, Blakeney	0	10	6
Plummer, George, 185, High Street, Peckham	1	1	0
Powell, Edward, 95, High Street, Winchester	1	1	0
Powell, Edward F., Winchester	0	10	6
Powell, Thomas H., 7, Poultry, E.C.	0	10	6
Power, Edward, Walton-on-Thames	0	10	0
Pratt, Richard M., Otley	0	10	6
Preston, Wm. L., Dalton-in-Furness	0	2	6
Prime, T. R., 2, Westow Hill Terrace, Upper Norwood	0	9	0
Prince, Arthur G., Longton	0	10	6
Richardson, Edward, 9, Bridge Street, Bradford	0	10	6
Ringrose, George, 123, St. George's Street East	0	10	6
Robson, Thomas, 4, Victoria Road, Brighton	0	10	6
Rutter, E. Y., 5, Bonchurch Road, Notting Hill	2	2	0
Sampson, George, Chesterfield	0	2	6
Savory and Moore, 143, New Bond Street, W.	10	10	0
Seaman, J S., Great Marlow	0	5	0
Shapley, Charles, Hagley House, Torquay	0	5	0
Shaw, Alex. H., Lower Hillgate, Stockport	1	1	0
Singer, Robert, Tarland, by Aboyne	0	2	6
Smart, John, 1, Harcourt Place, Scarborough	0	10	6
Smith, Allen, Sale	0	5	0
Smith, Samuel Allen, 3, Lower Parade, Leamington	1	1	0
Smith, Tenison, Ryde (Isle of Wight)	1	1	0
Spencer, Thomas, Wokingham	0	10	6
Squire, James, 35a, Peascod Street, Windsor	0	5	0
Stannard, F. J., 15, Broad Green, Croydon	0	5	0
Stones, William, 113, Market Street, Manchester	1	1	0
Stoneham, Philip, 45, Craven Road, W.	0	10	6
Storey, Edward H., 42, Castle Street East, W.	0	5	0
Strachan, Alex., 111, George Street, Aberdeen	0	5	0
S. T.	0	5	0
Tame, Thomas, Market Place, Trowbridge	0	2	6
Thompson, Geo. Alfred, Tunbridge	0	5	0
Trick, Wm. B., Green Lanes, Stoke Newington	0	5	0
Turner, George, Honiton	0	10	6
Vincent, Lacey A., High Street, Watton	0	5	0
Wallis, John T. W., 78, Essex Road, N.	0	5	0
Ward, Francis E., Witham	0	5	0
Wells, F. T. P., 368, Cold Harbour Lane, Brixton	1	1	0
Whaley, Edward, Kingston-on-Thames	1	1	0
White, Edward A., Mayfield, Sussex	0	5	0
White, John D., 7, Guildhall Square, Carmarthen	0	10	6
Whitelaw, James, 364, St. George's Road, Glasgow	1	1	0
Wiggins, Henry, 236, Blue Anchor Road, S.E	0	10	6
Wilcox, William, 22, Guildhall Street, Lincoln	0	10	0
Wilkinson, Thomas, 270, Regent Street, W	1	1	0
Williams, John, 16, Cross Street, Hatton Garden, E.C.	1	1	0
Wilson, C. F., 22, Liverpool Road, Stoke-on-Trent	0	5	0
Wisken, R., 35, Loughborough Road North, Brixton	0	2	6
Wood, Edward, 20, Sussex Street, Warwick Square	0	10	6
Wright, Alfred, 16, Little Alie Street, E.	0	10	6
Wright, Conrad W., Marlboro' Hill, Bristol	1	1	0
Z. V. Z.	0	10	6

DONATIONS.

	£	s.	d.
Austin, James Battle, 1, Craven Terrace, Bayswater	3	3	
Berisford, Samuel, Macclesfield	0	10	0
Blayney, Joseph J., Haslingden	0	5	0
Boyce, J. P., Windsor	5		0
Gillett, Joseph, Southport	1	1	0
Sharpe and Son, 34, High Street, Notting Hill	5	5	0

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

The last of a series of three discourses on "The Influence of Physical Laws in some of the Processes employed in Pharmacy," was given by Mr. Alexander Towerzey on the evening of Friday, January 21, in the Bristol Museum and Library; the subject selected for consideration being "The Diffusion of Liquids and Dialysis."

Mr. Towerzey commenced his discourse by explaining that the chief motive that had influenced him in acceding to the invitation of the council to occupy the post he then did as lecturer for the evening, was to show his complete sympathy with its very laudable desire to enhance the general interest in the society's work by distributing its duties as broadly as possible; and in taking a definite part in the work himself to claim a right to suggest to other members of the Association the importance and the usefulness of a more general co-operation in the labours than had hitherto been manifested.

Mr. Towerzey reminded his hearers that his lecture was supposed to be the completing one of a short series on the "Physical Laws governing some of the Processes of Pharmacy;" and explained that his intention was to place before them a certain group of phenomena whose governing principle was one of which emphatic mention had already been made by the two gentlemen who had preceded him, namely, the universal law of attraction that appeared to pervade all kinds and forms of matter, with varying degrees of force.

That this mutual intermolecular attraction existed in the *gaseous* form of matter was shown by the ease, or rather the vigour, with which gases mingled, even when great difference existed in their respective densities; and it was pointed out that this power of a gas to diffuse into another gas was found to follow a law, which would be thus expressed "The diffusion velocities of different gases are inversely as the square root of their densities, or the times of diffusion of equal volumes are directly as the square root of their densities."

Molecular attraction of similar kind existed evidently among the particles of liquids and was the force or agency at work in all the cases he was about to place before them.

The phenomena of "liquid diffusion" might be briefly stated thus:—When two liquids capable of mingling (and there were not very many that were not so capable) were carefully brought into contact, all precautions being taken to prevent mechanical agitation or other interfering influences, mutual diffusion of the one into the other takes place, but as the particles of liquids are so much less mobile than those of gases the rates of diffusion are much more slow. Moreover these rates vary with the nature of the liquids, the temperature, and, in the case of solutions, with the degree of concentration.

The lecturer then explained the different processes adopted by the late Professor Graham in the elaborate series of experiments that had resulted in the general conclusions which are now universally received, and after exhibiting some of these experiments in actual operation, drew attention to the series of results, elaborately drawn up in tables, kindly lent him by Professor Redwood.

The following were some of the conclusions arrived at:—

1. That different salts in solutions of equal strength diffuse unequally in equal times.

2. With each substance the rate of diffusion increases with the temperature.

3. That there exist classes of equi-diffusive substances which coincide with the isomorphous group.

4. That the diffusion of a salt into the solution of another salt takes place with nearly the same velocity as into pure water, but the rate of diffusion is materially affected when the liquid atmosphere already contains a portion of the diffusing salt.

It was further shown that all soluble substances might be conveniently divided into two classes :—Crystallizable substances and all others which resembled them in the fact of easy diffusibilities, to which class the term "crystalloids" might be given; and gelatinous substances and others of like kind that diffuse with great difficulty, to which the term "colloids" is applied. Lists of substances were displayed arranged in the order of their diffusibilities : hydrochloric acid and common salt appearing amongst the most diffusible and caramel and gelatine among the least diffusible of known bodies.

The consideration of colloidal substances and of the ease with which crystalloids diffuse into them naturally led to the phenomenon of dialysis, which was explained to be merely the diffusion of one liquid into another with the intervention of a septum. This septum being composed of a good colloidal material was found to interfere very little with the rate of diffusion of a crystalloid, and thus an instrument was provided for the very convenient separation of some of the ingredients of a mixed fluid from others and was often used by the chemist and by the pharmacist for this purpose.

Various forms of the dialyser were exhibited and were employed to show experimentally the separation of potassic iodide from a sarsaparilla and iodide mixture ; and of arsenious acid from a mucilaginous and coloured liquid into which half a grain of that substance had been placed ; and many purposes to which this method of investigation was applicable were indicated.

The lecturer concluded by again referring to that wonderful form of attractive force that appeared to underlie so many of the operations that pharmacists were called upon to perform.

LEEDS CHEMISTS' ASSOCIATION.

The seventh general meeting of this Association for the present session was held in the library on Tuesday evening, January 25, the President, Mr. Yewdall occupying the chair. The minutes of the previous meeting having been read and confirmed, Mr. Greasley, chemist, North Street, was elected a member.

Mr. James Abbott then read a paper on "The Extracts of the British Pharmacopœia, critically considered." In commencing, Mr. Abbott said he thought the term extract rather a loose one, and like many others frequently distorted. He asked what was the difference betwixt an expressed juice with spirit added to keep it and a liquid extract? The variations of climate and season had much to do with the quality and quantity of extract produced ; hot and dry seasons producing the best quality, whilst moist ones would probably produce larger quantities. Plants under cultivation did not yield so much of their active principles as when wild, each plant being found in nature in the soil and climate best adapted to its development. Several instances illustrative of these statements were given. The best time for collecting plants for extracts was next touched upon, and the mode of detecting spoiled colchicum corms and spurious dandelion roots pointed out. In passing, Mr. Abbott said he believed all the henbane seeds sold in the shops to be annual. The green extracts were five in number, viz., aconite, belladonna, hemlock, henbane, and lettuce. Why was the green colouring matter retained in these extracts, and rejected in the juices of the Pharmacopœia? He looked upon the practice as adding so much inert matter to the extract; and as the brightness of the colouring matter soon faded away, he could see no use in the retention. The extracts of aloes being made with water, their resinous principles were of course left behind. Cold water being used in the preparation of extract of calumba prevented the solution of the starch, but it also prevented the solution of the columbin and columbic acid, and he therefore thought a spirituous extract would be preferable. The burnt flavour often perceived in the extracts of gentian, liquorice, and taraxacum, was owing to the carbonization of the considerable quantity of gum and sugar contained in them ; hence the necessity for their being evaporated at a low temperature. Extract of logwood prepared with boiling water contained a quantity of characteristic colouring matter, hæmatoxyllin, and had a sweet taste. Extract of rhatany prepared with cold water contained a kind of tannin peculiar to that and some other drugs, but differing from the tannin found in oak bark, to which the name of rhatany tannin was applied. The extract of opium was a superior preparation of that drug ; the water dissolving out the codeine, and morphia and meconic acid, whilst the objectionable narcotine was excluded. The proof spirit extracts were rhubarb and stramonium. Extract of poppies was a watery extract with spirit added. Jalap and hops were first treated with spirit and afterwards with water ; the former containing from 12 to 13 per cent. of resin, and the latter glands filled with oil and other volatile substances, both requiring spirit for their solution. Mr. Abbott then just glanced at the rectified spirit and the ethereal extracts, but upon these time would not allow him, on that occasion, to dwell.

At the suggestion of Mr. Brown, the discussion was adjourned to a future occasion when it was hoped the subject would again be introduced, in a few further remarks on some of the last named extracts, by Mr. Abbott, to whom a cordial vote of thanks was then passed on the motion of Mr. Jefferson, seconded by Mr. Longley.

HULL CHEMISTS ASSOCIATION.

The annual supper in connection with this society was held on Thursday, January 27, at the Cross Keys Hotel, Hull, when the company was somewhat more numerous than usual. Mr. C. B. Bell (president of the year) occupied the chair, and amongst those also present were—the Sheriff of Hull (Dr. A. K. Rollit), Mr. R. Micks, Mr. Councillor Grotrian, Rev. John Henshall, Mr. Henry Gates (vice-president), Mr. Oldham (hon. sec.), Mr. Leah (Liverpool), Mr. George Myers, Mr. Anthony Smith, Mr. R. Staning, Mr. J. C. Niven, Mr. Wokes, Mr. Briggs, Mr. Escritt, junr., Mr. William Horsley, Mr. George Beall, Mr. Walton, Mr. Robert Wing. At the conclusion of the repast, the president read a letter from the Mayor (Dr. Kelburne King), who expressed regret that his many other engagements prevented his accepting the invitation to be present. After the usual loyal toasts,

The President, in proposing the "Mayor and the Corporation," expressed regret at the absence of the Mayor, but said the Association was much complimented by having as their guest the esteemed sheriff of the borough, Dr. Rollit, and associated that gentleman's name with the toast.

The Sheriff said he felt very much flattered by the association of his name with the toast of the Mayor and Corporation, though he hardly knew whether he ought to consider himself as belonging to the municipal system. Speaking as a chemist, he might say that if they were to analyse the proceedings of the Corporation they might find traces of acids and personal feeling ; but he was glad to say that the most prominent acid in the constitution of that body was *assid*uity. He did hold the honourable post of representative of the Queen, but he reminded them that he was also the legal representative of the Hull Chemists' Association.

Mr. Anthony Smith proposed the toast of the "Town and Trade of Hull," which was acknowledged by Mr. Councillor Grotrian.

The Sheriff then proposed "Prosperity to the Hull Chemists' Association. He said that although chemistry in its complete development was one of the modern sciences, still it had gained a most prominent position in its association with the industrial arts, with the administration of justice, and with general legislation. Mr. Grotrian had spoken of houses going down to prosperity, but if builders understood a little better the proper chemical composition of mortar, and would make use of the knowledge, their houses would be more likely to go down to posterity, instead of going down before they reached posterity. In agriculture, in the industrial arts, in the detection of crime, and, therefore in the preservation of life and property, a knowledge of chemistry was daily becoming of greater use and importance; and, at the present moment, the scientific development of the atomic theory of Dalton, or, more anciently, of Lucretius, was likely to create a complete revolution in the study of physiology and mental phenomena. Such being its practical and intellectual importance, he was of opinion that elementary chemistry ought to be more generally taught in our schools, and his own experience had entirely justified the requirement by the London University of a knowledge of chemistry and physiology from every candidate for its degrees, in arts no less than in science and medicine. Dr. Rollit then spoke of the advantages of the Association. and concluded by proposing the toast, and associating it with the name of the president, Mr. C. B. Bell.

The President, in responding, thanked the members of the Association for the compliment they had paid him in electing him to the honourable position he now filled. He trusted that when the presidential mantle dropped from him it would be unsullied and unstained by anything he might have done in connection with the Association. It was unnecessary for him to dilate upon the advantages of membership in such an association, which he hoped would continue to prosper and to increase in numbers. He trusted that the duties they undertook with a view to educating the young men would be attended by largely increased results; and that the young men themselves would recognize the advantages of the instruction which the society afforded them, and thus be desirous of acquiring the knowledge that was necessary prior to their passing the Minor examinations of the Pharmaceutical Society. There was one matter which had hung as a shadow over the trade of the chemist and druggist during th last few days—he referred to what had transpired at Sheffield with reference to the dispensing of physicians' prescriptions. The report which had appeared in the papers conveyed, he was sorry to find, a very unfair impression on the subject. Certain druggists had been represented as not dispensing some prescriptions accurately; but it should have been set forth that they were persons who were not accustomed to dispensing. The few cases detected by the public analyst were of chemists who carried on business in the lowest parts of the town; and it was a great shame that the whole trade should have been placed under the ban of an improper discharge of their duties, simply because these individuals, who were not accustomed to dispensing, had been placed in such an unfortunate position. He ventured to think if such a case had occurred in Hull, the public analyst would have explained that they came from the back streets, and not have suffered the trade generally to have been stigmatized for the acts of one or two individuals who were not competent to discharge their duties.

Mr. Wokes proposed "The Officers of the Society," on whose behalf Mr. Gates (vice-president) responded. He alluded in feeling terms to the late Mr. John Hudson, and expressed his sorrow that an attack of bronchitis had prevented their valued friend, Mr. Baines, from being present that evening.

Mr. Staning gave "The Medical Profession," which was responded to by Mr. Briggs.

Mr. John Thompson proposed the "Health of the Lecturers," to which Mr. J. C. Niven responded. He was sorry the Mayor was not present, as he had intended to solicit from him the same favour as had been extended to the Association by the two previous chief magistrates, who had each given a prize. These prizes were a great incentive to the students, of whom he trusted they might have a better attendance next session. The prize offered by Dr. Gibson to students who passed the best examination in physiology and botany was not awarded, as a sufficient number did not compete; but the donor had kindly allowed it to stand over for another year. He thought that in an association like that, in a large town such as Hull, an attendance of thirteen young men was not so large as they could desire or expect; but he trusted there would be a marked improvement in this respect next year.

The President next gave the healths of the "Visitors," on whose behalf Mr. R. Micks responded.

NORWICH CHEMISTS' ASSOCIATION.

The Annual Dinner of the Norwich Chemists' Association was held on Thursday, Jan. 20, at the Rampant Horse Hotel, the chair being taken by Mr. Henry Thompson. The vice-chairs were occupied by Mr. W. J. G. Butler, treasurer, and Mr. W. H. Symons, F.C.S., vice-president of the Association.

After dinner the Chairman gave the usual loyal toasts, prefacing them with some explanatory observations on his taking the chair at the request of the committee, Mr. Corder, the president of the Association, having expressed a desire that some other person and not he should do so.

Mr. D. Penrice and Dr. Waddell responded to the toast of "The Army and Navy and Reserved Forces."

Mr. F. Sutton gave "The Medical Profession," which he said was well represented on this occasion, if not in numbers in quality. In some cities and towns of the kingdom complaints were made that members of the medical profession and the chemists did not get on well together, but in this city they could make no complaint of that kind, for the medical profession in Norwich were a very gentlemanly and kind-hearted set of men to deal with; and, recognizing their position, they felt that if they were to have a well-balanced state of things they must be helpers of each other. He coupled with the toast the healths of Dr. Beverley and Dr. Waddell.

Dr. Beverley, in acknowledging the toast, concurred with the observation of Mr. Sutton as to its being to their mutual advantage for the two professions to go hand in hand. In that city he believed it to be so. Speaking personally, he had always received from those with whom he had been brought in contact the greatest kindness and civility. Those who prescribed and those who prepared and dispensed medicines must indeed have many interests in common; and in these days when they were going at railway speed, the medical profession were more and more dependent upon not only analytical but pharmaceutical chemists, especially for the constant additions made not only to their Pharmacopœia preparations but the advances lately made in anæsthetics. One reason he believed why ether was now being so greatly used in this country, so much more so than chloroform, was the superior quality of the drug prepared. When lately he was in London and went to a celebrated wholesale house and heard the enormous quantity of ether that was being sent to all parts of the country he was astonished, and the fact was attributed to the purity of the ether which it had been possible lately to supply. This was one of many instances which might be adduced.

Dr. Waddell said that it was with the greatest pleasure he was present amongst the members of this Association, in which he had taken great interest since its establishment. Such an association, except in the large cities of the country, was almost unique, for he could not call to memory any town like Norwich where one had been started. Its formation marked another step in the march of progress. It was the thin edge of the wedge; in other words, it showed that a calling which until lately had been reputed as little more than a trade was about to take its stand among the professions, inasmuch as there had lately been introduced into it a great amount of intelligence and scientific knowledge. Dr. Beverley had ably alluded to some of the great improvements which had taken place in the preparation of many drugs which physicians and surgeons were in the habit of using. But it was to chemists and druggists that physicians and surgeons had to look for the preparation of drugs, and they hoped that in future they would have to look to them entirely for their supply. The welfare of his profession lay close to his heart, and he hoped the day was not far distant when they would cease to be dispensing practitioners. Therefore, medical practitioners must hail such an association as this, not only as setting a good example to others, but as an earnest of an intention to foster and carry out those feelings of friendship which would enable them to move on smoothly in the future. As regarded the use of drugs he had no hesitation in saying plainly that up to the present they were little more than empirics, which meant little more than impostors—as men who dealt with substances without knowing what they were. Mr. Sutton well knew that the further chemical analysis proceeded the further they found it had to go. It was the same in the medical profession with regard to the action of medicine. The action of medicine up to this time had been hampered by the great evil to which Dr. Beverley had alluded—an impurity of preparation; and the great advance which had taken place in the profession rather in a therapeutical point was in a great measure due to such gentlemen as belonged to this association. He hoped that the example set by this association would not be lost and that its good effects would be realized hereafter. Around him he saw many gentlemen not destined to remain in Norwich. Connected with this association was what might be called a school, in which lectures were given on various subjects which must tend to elevate all who were called upon to enter upon active life in the calling of a chemist. As time went on and improvements continued, he hoped to see them in a more elevated position than at present.

Dr. Beverley then gave "The Pharmaceutical Society of Great Britain." It was a toast, he said, which appealed to all present who hoped to reach the same platform. To chemists and druggists the Pharmaceutical Society ought to be and was a source of very considerable interest. That society bore the same relation to chemists and druggists that the College of Surgeons did to the medical profession. Only through its portals could anyone now become a chemist and druggist. This was a great and proper advance. No one ought to have anything to do either with the preparation of drugs or with the dispensing of such elements unless proved by experience to have both a theoretical and practical acquaintance with them. As a student, he remembered Mr. Bentley, an active Professor of the Pharmaceutical Society, and teacher of the Medical School in which he was a pupil, and who imbued him (Dr. Beverley) with a considerable liking for botany. Amongst them that evening was Mr. Sutton, a member of the Council of the Society and another gentleman who acted as an examiner, namely, Mr. Corder. As citizens of Norwich they ought to be proud that Mr. Sutton was selected by the Society, to represent it at the Congress at St. Petersburg. He coupled with the toast the health of both these gentlemen.

Mr. Sutton, replying, said he thought in this part of the world they did not appear to appreciate as they ought the advantages of such a powerful society as the Pharmaceutical Society. For some years it had a struggle for existence, but in 1868 it made a stride which had placed it in a very fine position indeed; and in fact, as far as its money and interests and scientific talent of the best character were concerned, it gave place to no other scientific body in the country. Further, it published a weekly journal which was well managed and had become a source of considerable income to the Society; and then there was one thing very dear to his heart every time he came across its influence, and that was its benevolent fund. At the Council meeting every month they had applications for grants from the fund, and they gave away large sums to people in need connected with the business, and the Society had been so free in its gifts that whether a man had been a subscriber or not, or merely hung upon the skirts of the Society, it had not withheld assistance. He had, therefore, been pained by the fact that subscribers in Norwich might be counted on the fingers. It was true they had a large sum invested, something like £30,000 in Consols, and a good income, but still the claims were very large, and he should be glad to receive their names if only for 2*s.* 6*d.* subscriptions. This sum would not be missed, and its contribution to the Fund would tend to make them a more cemented body than they were now. In concluding, Mr. Sutton stated that when he was in London he saw Professor Bentley, who said, "Just tell me; have you seen my old pupil, Dr. Beverley? How is he? He was one of the best pupils I ever had in my life."

Mr. Corder also responded. He gave some excellent advice to students, reminding them that every night wasted meant two nights' hard study to make up time. If they studied not merely for the sake of passing the examinations, but from love for the thing, they would find pleasure in the study of materia medica, and in every branch of science.

Mr. Woodhouse gave "The President of the Norwich Chemists' Association," remarking that that gentleman was not only an accomplished chemist, but a most estimable man.

Mr. Corder, in acknowledging the toast, said that up to the present time the classes held had been well attended, and those who had taken part in them had given the greatest attention. He hoped this would continue to the end of the session, when many prizes offered by members of the society would be competed for. The students should remember that by studying in these classes they would not only save a great deal of time but much expense, for these examinations must be passed somehow.

Mr. J. E. H. Watson gave "The Vice-President, Mr. Symonds," who he said had been raised to his position through his ability and affability, and all the apprentices who had attended his classes could bear testimony to the benefit they had derived from his instruction.

Mr. Symonds, F.C.S., in responding, expressed the pleasure with which he had placed his services at the disposal of the Association.

Mr. Corder proposed in complimentary terms "The Health of the Chairman," and Mr. Thompson replied in one of his characteristic speeches, exhorting apprentices not to shirk study but to make themselves useful and competent men in their profession. He observed that the doctors prescribed, but upon them rested the onus of making up their prescriptions correctly, and so contributing to or retarding the recovery of patients. He also mentioned that when a student himself, during the cholera in 1832, he was presented with a silver lancet case in acknowledgment of his services.

Mr. Cubitt gave "The Vice-Chairman," and Mr. Butler, in replying, availed himself of this the first public opportunity of acknowledging a testimonial presented by the members to him as treasurer during the year.

The Chairman having proposed "The Health of Mr. Bailey," and that gentleman having responded, Mr. Gardener gave "The Secretary," in responding to which Mr. E. Hall stated that the Association needed more members, both ordinary and honorary.

The remaining toasts were "The Dinner Committee" (suitably acknowledged by Mr. T. Pitts), "The Ladies" (responded to by Mr. Rackham), and "The Press."

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The annual supper in connection with the above Association was held on Friday evening, January 28, in the rooms, Halford Street. Mr. E. H. Butler occupied the chair and Mr. Henry Cooper, the vice-chair. After supper the Chairman, in an appropriate speech, proposed the health of the Queen and Royal Family, which was received amidst much applause. The Vice-Chairman next proposed the toast of the Pharmaceutical Society, pointing out at considerable length the benefits chemists and druggists as a body derived therefrom. He gave some graphic and amusing instances that had come under his notice, of persons calling themselves chemists and druggists, whose only right to the title was furnished by a chloroform bottle, which enjoyed uninterrupted fellowship with a moptail in the pharmacist's window, or a huge bottle labelled Godfrey's Cordial, much resembling treacle foot, together with a male syringe, or a few corbyn quarts. The careless indifference shown by such persons in the sale of poisons, was also referred to, and specimens exhibited, where white precipitate and similar articles had been sold in bits of newspaper or counter bills, without any legitimate label whatever, and had been retailed without discretion, either to a child or to a person who understood the nature of the drug. This toast was received very heartily. The health of the Committee was ably proposed by Mr. Thirlby, an old committee-man. The health of the ladies was next proposed by Mr. Cadoux, and responded to by Mr. J. Young. Other toasts were proposed and addresses given by Messrs. Lloyd, Carr, Clark, Lomas, Baron, Duncalf (President), and Hammond. The meeting closed with a unanimous vote of thanks to the Chairman and Vice-Chairman.

CHEMISTS AND DRUGGISTS' ASSOCIATION OF IRELAND.

A Deputation from the North of Ireland Chemists and Druggists' Association, consisting of Messrs. Dobbyn and Harrlitt, of Belfast, waited by appointment on the Committee of the Chemists and Druggists' Association of Ireland, at the rooms of the latter, 172, Great Brunswick Street, on Wednesday, Jan. 26th.

The following members of the Committee were present:—

Mr. E. M. Hodgson, President; Mr. Tichborne, Vice-President; Mr. Wm. Hayes, Honorary Secretary; Mr. S. Oldham, Honorary Treasurer; Mr. Grindley, Mr. Holmes, Mr. O'Brien, and Mr. Simpson.

Mr. Dobbyn explained that there were one or two points in connection with the Irish Pharmacy Act, and also in reference to its working, to which they wished to call the attention of the Committee, and to ask the cooperation of the Society.

The first matter brought forward was the consideration of the 31st Clause of the Act.

Mr. Dobbyn remarked that no doubt the intention of the framers of the bill was to reserve all rights to chemists and druggists in business on their own account at the time of the passing of the Act. It was, however, the opinion of many that by that clause it was illegal for chemists and druggists to prepare such things as sheep washes and other preparations for agricultural purposes, containing poisons.

Mr. Hodgson remarked that that was the view he took of it.

Mr. Holmes said the matter had been discussed by the Council of the Pharmaceutical Society of Ireland, who agreed that the clause was badly worded, but that there was no doubt it was intended that chemists and druggists in business should carry on their business as usual.

Mr. Dobbyn said that that might be the view of the present Council, but it might not be the view of a future Council, and he should like to carry on his business in security and not be at the mercy of any one who might act as an informer.

Mr. Oldham thought it would be well to wait until some member of the trade should be prosecuted.

The Deputation, however, wished to have the point definitely settled, and suggested an interview with the Chief Secretary, to suggest adding a rider to the Act to meet the case.

The next point brought forward was a wish in the North of Ireland that there should be two grades under the Act: pharmaceutical chemists to compound prescriptions, and a class of chemists and druggists who should pass a modified examination but should not compound.

The Committee considered that that matter had been settled by the Act, and did not think it likely government would reopen it for some time.

The Deputation was afterwards entertained to luncheon by the Committee.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, February 3, 1876. Professor Abel, F.R.S., President in the chair. After the nomination and election of members, and the other ordinary business of the Society, Mr. W. Ackroyd read a paper on "Metachromism or Colour Changes," in which he discussed the phenomena presented by certain chemical compounds which changed colour on being heated. Mr. W. H. Perkin, F.R.S., then made a communication "On the Formation of Anthrapurpurin" which it appears is the product of the action of caustic alkali on anthraquinone-disulphuric acid; the supposition that alizarin is formed under these circumstances being incorrect. There were also papers "On Maltose" by Mr. C. O. Sullivan; "On a Simple Form of Gas Regulator" by Mr. T. Fletcher, and "On High Melting Points, with Special Reference to those of Metallic Salts," by Mr. T. Carnelly, B.Sc. The meeting was finally adjourned until Thursday, February 17, when Professor Frankland, will deliver a lecture "On some Points in Connection with the Analysis of Water."

Parliamentary and Law Proceedings.

ALLEGED DEATH FROM THE USE OF A PATENT MEDICINE.

On Thursday Dr. Hardwicke held an inquest at the Buffalo's Head, Marylebone Road, on the body of Catherine Hannah Painter, aged six months. The mother of the deceased said up to within the last three weeks it was a fine healthy child, then it became ill, and had, as she was told, bronchitis. The child had some medicine, but as it did not get better she was induced by a bill she had given her to go to Mr. Gardener's, a chemist, in Church Street, and ask for a bottle of "Infants' Preservative," a patent medicine manufactured by Atkinson and Barker, of Stockport, near Manchester. On the paper with the bottle it stated she was to give two teaspoonfuls at a time. She gave the child altogether this medicine five times, but as it got worse she took it to Dr. Danford Thomas, in St. Mary's Terrace, who considered the infant had been poisoned. The child died the same afternoon.

Dr. D. Thomas said the child was evidently under the influence of some narcotic. Its eyes were fixed, and the pupils strongly contracted to a point, and he was unable to arouse it. Being sure that some opiate had been administered, the mother gave him the bottle and the bills produced which contained printed matter professing to be testimonials in favour of the wonderful cures of the mixture. He handed the bottle with its contents to Professor Anderson to analyse. He considered the death had resulted from congestion of the lungs, accelerated by the narcotic detected in this patent medicine. Dr. Thomas complained of the protection afforded to vendors of quack medicines. Had he or any practitioner administered such medicine they would have been held responsible. Yet under a patent and a government stamp the vendor escaped.

A gentleman present stated that Messrs. Atkinson and Barker, of Stockport, had been sending letters to the registrars all over the kingdom, offering them a commission to place bills recommending the "Infants' Preservative" into the hands of all informants on occasion of birth registration.

Professor Anderson said there was about one fluid ounce of the medicine in the bottle, and it contained opium; but he was unable to weigh it.

The jury returned a verdict "That the deceased died from congestion of the lungs, accelerated by narcotic poisoning, the said narcotic being contained in a bottle of Atkinson and Barker's "Infants' Preservative," administered to it."—*Standard.*

POISONING BY PARAFFIN.

At the Stamford Assizes, January 22nd, Jane Yates, 32, married, was indicted for attempting to commit suicide by taking paraffin. A medical gentlemen deposed that he found the prisoner lying on the floor in an unconscious state. The room smelt very strongly of paraffin, as did also her breath. With the stomach pump, he washed out her stomach, and what came away smelt strongly of paraffin. He had no doubt that paraffin was in the stomach. She gradually came to herself, and was then perfectly sane. He asked her how much paraffin she had taken, and she replied "About a quarter of a pint—all she had in the house, and if there had been more she would have taken it." She said she was unhappy. She told him, "The next time he was sent for it would be no use to bring that thing, as she would take enough that he would find her dead when he came. She would not have that thing poked down her throat again" (alluding to the tube of the stomach pump). He had never heard of a case of poisoning by paraffin. He should imagine that in a weak delicate person, two ounces would be enough to destroy life. He thought that if the pump had not been applied, the case would have terminated fatally, judging from the cold, flabby state she was in. He thought the paraffin was taken about half-an-hour before—perhaps less.

The prisoner at first denied having taken any paraffin, but afterwards acknowledged that she had taked some to frighten her husband.

The jury returned a verdict of guilty, and the prisoner, who had been in goal a fortnight, was ordered to be discharged upon her husband entering into recognizances in the sum of £25 that she should come up and receive judgment when called upon.—*Stamford Mercury.*

POISONING BY CARBOLIC ACID.

On Thursday, January 27th, Mr. Bedford held an inquest at the Strand Union Board Room, Bow Street, on the body of Mr. John Ilkins Murray, aged 56, a solicitor, who had been found dead in bed, at the Opera Coffee House, Exeter Street, Strand. Behind a fire-screen was found a bottle with the neck broken off, labelled "Poison.—Carbolic acid, for disinfecting purposes." The bottle was three-parts full of acid. The broken part of the neck of the bottle was discovered on the floor. A glass containing a small quantity of carbolic acid was also found on a washstand. The *post-mortem* examination showed that death had been caused by the effects of carbolic acid, the inside of the mouth, and the tongue, and the stomach being charred white by the corrosive action of the poison.

Mrs. Murray, the widow, said for some time past the deceased had complained of pains in the head, but he never expressed the slighest intention of committing suicide.

The jury returned a verdict of "Suicide in a state of unsound mind."—*Echo.*

POISONING BY LAUDANUM.

On Friday, Jan. 28, Mr. Bedford, the coroner for Westminster, held an inquiry at St. Martin's Vestry Hall, upon the body of Edward Smith. The deceased, who had for many years carried on a confectionary business in Moore Street, Covent Garden, had been unwell a long time, but there was no appearance of his doing himself any injury. On the previous Friday, he got up as usual and went out for about ten minutes. Soon after his return he was seen to stagger about, and Dr. Mills was sent for. It was then discovered that he was suffering from the effects of poison. Deceased was removed to the Charing Cross Hospital, where he died the same afternoon.

Mr. J. B. Jones, an assistant to Mr. Pippin, chemist, of Compton Street, deposed to deceased coming to his shop for laudanum, said to be for the purpose of rubbing his gums for the toothache. In three days he bought one ounce of poison, and when warned, said he knew the nature of the article. The medical evidence showed that death was the result of poisoning. Verdict, "Suicide whilst of unsound mind."

POISONING BY OXALIC ACID.

Mr. Coroner Molesworth has held an inquest in Oldham touching the death of Mary M'Haffie, aged 48. The deceased, who had been accustomed to take an effervescent beverage to relieve her of flatulency, said she would have some "fizzing" drink. She went to the cupboard, took down what she supposed to be a packet of tartaric acid, mixed it with water in a cup at the slopstone, and drank the mixture in the presence of her husband. She afterwards became ill, and, although the doctor was promptly in attendance, she died about an hour afterwards. It was ascertained that she had used a packet of oxalic acid, kept for removing stains from linen. The verdict was that the deceased died from a dose of oxalic acid, taken by mistake for tartartic acid, intended to be taken as an effervescent draught.—*Manchester Courier.*

SINGULAR CASE OF POISONING.

An extraordinary case of vegetable poisoning has been investigated by Mr. Dunstan, coroner, at the Parkside Asylum, Macclesfield. Emma Linnell, who had been a patient in the asylum since last June, became suddenly ill, and died apparently in an epileptic fit. A *post-mortem* examination was held, and about a teaspoonful of green fluid was found in the stomach, with some holly seed. There were also some yew leaves, which had been in the stomach only a short time, and fragments of either laurel or holly leaves. A verdict in accordance with the evidence was returned, Dr. Deas saying this was the first case of the sort in his experience. The patient was not suicidal.—*Echo.*

THE LATE POISONING IN DUNDEE INFIRMARY.

The deposition of William Grant, Aberdeen, who is in ill health, and unable to proceed to Dundee for examination, has been taken in the case at the instance of the Crown against Thomas James Jarman, Dundee, in connection with the alleged poisoning of a patient in Dundee Infirmary through the reckless administration of some deleterious drug. Grant preceded Jarman as apothecary at the Infirmary in Dundee.—*Dundee Courier.*

SUPPOSED POISONING BY PUTRID PEAS.

A most extraordinary case of wholesale poisoning has just occurred in Salford. It appears that a woman keeping a small shop, has been in the habit of selling boiled peas, and it would seem that she did a fair amount of business. Within a few days a number of people living in the locality were suddenly taken ill after partaking of peas purchased from Brain's shop. In some cases whole families after eating but a small quantity of the peas were suddenly prostrated and exhibited symptoms of irritant poisoning. Altogether more than a dozen people came under medical treatment, suffering from symptoms of poison. Fortunately none of the people who have been attacked were in a dangerous condition, and many of them soon recovered. It having been supposed that some poisonous substance had been mixed with the peas to make them a fresh green colour, a sample of the peas was sent to Dr. Carter Bell, the public analyst, for examination. Dr. Bell has presented a report to the effect that he could not find any trace of arsenic, copper, lead, or any other metallic poison, and that he was inclined to think that the peas consumed by the sufferers must have been sold in a decomposed condition, the sample which he received being very bad. It is stated that the police will prosecute the retailer of the peas for selling unwholesome food.—*Manchester Courier.*

SUICIDE OF A CHEMIST.

On Thursday morning, February 3, Mr. W. H. Phillips, deputy coroner, held an inquest at the Cross Hotel, Kingswinford, on the body of Frederick Hooker 40, late chemist and druggist, of Kingswinford, who had been found dead on the previous Tuesday.

William Henry Hughes said, as the deceased seemed much affected by the death of his wife on the previous Sunday, he went into the house and stayed with him on Monday night until about two o'clock on Tuesday morning. Witness did not consider deceased to have been then in a sound state of mind. Deceased remarked to him that he did not know what to do with himself. He said he had lost two fortunes in money, and another in his wife, and had a good mind to destroy himself. When witness left him he seemed in a very queer state of mind, and as if he did not know what he was doing. Witness saw a light in deceased's room after he left him. There was no one else in the house but deceased.

George Evason, postmaster, Kingswinford, said that on Sunday deceased came to him and asked him to write a letter to his father-in-law, informing him of the death of his wife. Witness did so, as deceased trembled and shook so much that he could not do it himself. His wife had been ill for about six weeks previous to her death. Deceased was very much distressed. Witness went and stayed with the deceased on Sunday. While witness was with him deceased said there was nothing for him to live for, and he did not know what he should do with himself. Witness offered him a bed in his own house, but deceased declined. On Tuesday witness went with him to the churchyard to select a grave for his wife, and he appeared very strange in his conduct. During the week deceased did not take his meals properly, and for the two days following his wife's death he had hardly any solid food.

Dr. Thomson said previous to her death deceased's wife had been his patient. In his visits to her he had noticed that deceased had a continual tremor about him, and appeared very absent in mind. This he attributed to his drinking habits. In examining the body he had found no external marks or injuries at all likely to cause death. On Wednesday he made a *post-mortem* examination of the body. He found on removing the scalp that the blood-vessels of the head were congested and those of the brain full of dark venous blood. The brain itself was that of a healthy man. The right side of the heart was distended with dark blood. The substance of the heart and valves was perfectly healthy. The lungs were gorged with blood, and filled with frothy matter. The liver was very much enlarged, and was that of a man who was in the habit of drinking frequently. He removed the stomach for particular examination. In it he discovered a very strong odour of prussic acid. He had no doubt in his own mind that the stomach had contained a quantity of prussic acid, and that this was the cause of death. In examining the drugs of the deceased he found two bottles containing prussic acid, such as would be likely to be kept by the deceased for the ordinary requirements of his business. In the measuring glass found near the body of the deceased, he could detect nothing; whatever had been in it had entirely evaporated. Prussic acid evaporated very quickly.

The jury were unanimously of opinion that deceased died from the effects of poison administered by himself whilst in a state of temporary insanity, and a verdict was accordingly recorded to that effect.

Review.

ROYLE'S MANUAL OF MATERIA MEDICA AND THERAPEUTICS. Sixth edition. Edited by JOHN HARLEY, M.D., Lond., etc. Churchill and Sons, London.

It is now seven years since the last edition of this well known manual was published, and during that time great progress has been made in the various sciences connected with medicine. This has been especially the case with materia medica and therapeutics. The recent appearance of 'Pharmacographia,' which must always rank as a classical work of reference, has rendered a revision of all other existing works on materia medica a matter of necessity. The present edition of Royle's Manual has been almost entirely re-written, and yet contains only eleven pages more than the last, although the type is somewhat larger. This is due to the fact that the editor has wisely appropriated a large space, which in previous editions was occupied by details to be found in most elementary works on botany, to an account of the actions of medicines, in which account he embodies the results of his own valuable investigations. "All materials and compounds of accredited utility and advantage" have been introduced and examined. The text is furnished with twenty-six new figures, which are chiefly in illustration of chemical manufactures and pharmaceutical processes, and are such as might be found in most elementary works on chemistry and pharmacy.

The organic materia medica is arranged according to the plan adopted by the late Dr. Pereira, viz., beginning with the algæ, and ending with the higher orders of plants, an arrangement which has the disadvantage of not being generally followed, either in works on botany or materia medica, and is likely, therefore, to confuse those who are studying the two subjects simultaneously.

In the earlier chapters of the work the remarks on pharmaceutical operations and on crystallography have been extended and some notes on the preservation of drugs have been added; these are of a very practical nature and are written in a very lucid style. When, however, the editor extends his observations into the region of medical and pharmaceutical ethics, subjects which were not touched upon in the last edition, his remarks are not so happy, the subject being naturally viewed from the medical standpoint. Few of our readers will probably agree with the following quotation, "Whenever it is practicable the prescriber should be his own dispenser;" and there are probably still fewer who have not found how difficult it is to "communicate at once with the prescriber if there be any actual error in the prescription, and clear up all ambiguity before he delivers the medicine to the patient," especially when the initials of the physician are scarcely readable, and it is impossible to obtain his name or address, as is not unfrequently the case. Another new feature in this edition is that eight or nine pages have been devoted to the composition of various mineral waters.

In the inorganic materia medica, the chemical notation used in the Pharmacopœia has been followed throughout. All the remedies in the Appendix to the Pharmacopœia have been added, and many which, although not official, are in frequent use, such as croton chloral hydrate, iodoform, salicylic acid, trimethylamine, and bichloride of methylene, have been noticed.

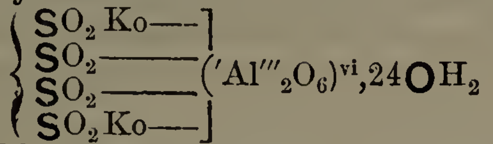
In the organic materia medica, extensive use has been made of the researches of Hanbury and of various papers published in the *Pharmaceutical Journal*, and the work has been rendered as far as possible *au courant* with the present state of our information, and were it not that this portion has been somewhat carelessly or hastily done, this manual would still hold its own in the foremost rank of manuals on materia medica.

In many instances there are inadvertent misstatements or misquotations and ambiguously worded sentences which cannot fail to puzzle the careful reader. Since the work is the only one at present which contains a large amount of recent information concerning nearly all the new medicines, and will probably be largely used as a handbook, we think it our duty to point out to our readers some of the mistakes we have noticed, more especially since they are not noticed in the errata at the commencement of the book. Thus, on p. 577, it is implied that oil of anise from *Illicium anisatum* concretes at 50°; *Rheum officinale*, Baillon, is said to agree specifically with the *Rheum palmatum*, var. *tanguticum*, of Maximowicz; Chinese ginseng is said to be produced by *Panax quinquefolium*; *Artemisia maritima*, var. *A. pauciflora*, Weber, mentioned by Hanbury as being identical with *A. maritima*, var. *A. Stechmanniana*, of Besser, is misquoted as a second variety; under jaborandi the description is so worded that it is impossible to say how much of the engraving belongs to the true plant, how much to Nees and Martius' figure of *P. parviflorus*, and how much to Vahl's figures of the genus; and so far as can be judged from the figures, a leaf of the true plant of jaborandi, which has compound leaves, appears to have been laid over a flowering twig of Nees and Martius' *P. parviflorus*, a simple leaved species belonging to another section of the genus, while the characters of the species *P. pennatifolius* appear to have been made up partly from Lemaire's description, who had not seen the fruit, and partly from a fruit obtained from the jaborandi of commerce. While following Hanbury in identifying the napelline of Wiggers with pseudaconitia, no mention has been made of Hubschman's napelline, an alkaloid insoluble in ether and benzol, while pseudaconitia is termed a variety of aconitine, a conclusion scarcely warranted by the researches of Dr. Wright in the paper quoted (*Pharmaceutical Journal*, September, 1875, p. 90). The clear descriptions of the different varieties of *Pareira brava*, by Hanbury, are here so mixed up that it is almost impossible to determine how much of the text belongs to *Chondrodendron tomentosum*, and how much to *Cissampelos*, *Pareira*, the writer apparently not understanding that *Cissampelos Pareira*, yields a root not corresponding to the characters attributed to Pareira root in the Pharmacopœia. The same want of clearness is evident in the statements with regard to the solubility of podophyllin in ether. Similarly confused statements occur under the adulterations of myrrh, in which African and Indian bdellium, two distinct drugs, are attributed to the same plant. For some of the more important adulterations of, or substitutions for saffron, pareira brava, cochineal, chiretta, and matico, and for an account of well-known commercial varieties of Persian opium, fennel fruits, aniseed, linseed, liquorice, tragacanth, sarsaparilla, and myrrh, the reader must still consult other works on the subject.

From the above remarks it will be seen that while this manual is scarcely sufficient to give the pharmaceutical reader a perfect knowledge of the subject, yet there is no other manual at present published which enumerates and gives the therapeutical action, etc., of so many new remedies. The notes upon the action of drugs, emanating from so high an authority as Dr. Harley, will render the work especially valuable to students of medicine.

A Set of Chemical Labels for the Laboratory. Birmingham: P. Harris and Co. 1876.

This is a little book of about two hundred labels, including the names, many of them in duplicate, of most of the reagents found on the shelves of an ordinary chemical laboratory. The labels are gummed at the back, and in all that concerns size, shape, and type, are very satisfactory. But in respect to the nomenclature and notation adopted we must say that we think there are many who would prefer a more humble designation for an old friend on a label than "Aluminic Dipotassic Tetrasulphate," accompanied by the formula—



$$\left\{\begin{array}{l} SO_2\,Ko\text{---} \\ SO_2\text{———} \\ SO_2\text{———} \\ SO_2\,Ko\text{---} \end{array}\right]({}'Al'''_2O_6)^{vi},24OH_2$$

So_2Cao would be equally unfamiliar to most persons, and $CO\,Cao''$ is, we presume, a mistake. Lastly, little could be said in favour of "Nestler's Solution."

BOOKS, PAMPHLETS, ETC., RECEIVED.

Analyse Chimique de quelques Drogues Actives et leurs Préparations Pharmaceutiques. By Dr. G. Dragendorff. Translated into French by Dr. J. Morel. Ghent: F. Clemm. From the Translator.

Jahresbericht über die Fortschritte der Pharmacognosie, Pharmacie und Toxicologie, bisher herausgegeben von Dr. A. Wiggers und Dr. A. Husemann, fortgesetzt von Dr. G. Dragendorff. 9 Jahrgang 1874. Gottingen: Vandenhoek und Ruprecht. 1875. From the Publishers.

Annuaire de la Pharmacie française et étrangère: Résumé de Chimie, Pharmacie, Histoire naturelle, Matière médicale, Toxicologie, Hygiène, Thérapeutique. Rédigé par le Dr. C. Méhu. Annee 1875. Paris: Au Moniteur Scientifique-Quesneville. 1876. From the Author.

Notes and Queries.

[496] BOW'S LINIMENT.—Could any reader oblige me with the form for Bow's Liniment? I believe it once appeared in the Journal many years ago and the preparation is I think still retailed in small quantities in the north.—*B. L.*

Obituary.

Notice has been received of the death of the following:—

On the 21st of December, 1875, Mr. Hugh Williams, Chemist and Druggist, of Trefdraeth, Anglesey. Aged 53 years.

On the 7th of January, 1876, Mr. Joseph Butter, Pharmaceutical Chemist, of Market Place, Kingston-on-Thames. Aged 28 years. Mr. Butter had been a Member of the Pharmaceutical Society since 1873.

On the 26th of January, 1876, Mr. William Harold, Pharmaceutical Chemist, of Battle, Sussex. Aged 70 years. Mr. Harold had been a Member of the Pharmaceutical Society since 1842.

On the 31st January, 1876, Mr. John Dyke Slade, Chemist and Druggist, of Llantrisaint, Glamorganshire. Aged 76 years.

On the 3rd of February, 1876, Mr. Robert Thomson Dun, Chemist and Druggist, of Argyle Street, Glasgow. Aged 31 years.

The following journals have been received:—The 'British Medical Journal,' Feb. 5; the 'Medical Times and Gazette,' Feb. 5; the 'Lancet,' Feb. 5; the 'London Medical Record,' Feb 5; 'Medical Press and Circular,' Feb. 5; 'Nature,' Feb. 5; 'Chemical News,' Feb. 5; 'Gardeners' Chronicle,' Feb. 5; the 'Grocer,' Feb. 5; 'Journal of the Society of Arts,' Feb. 5; 'Grocery News; Feb. 5; 'Produce Markets Review,' Feb. 5; 'Practical Magazine,' for February; 'Educational Times,' for February; 'British Journal of Dental Science,' for February; 'Journal of Applied Science,' for February; American Journal of Pharmacy,' for February; 'Moniteur Scientifique,' for February; 'Pharmaceutische Zeitung,' for Feb. 2 and 5; 'Sanitary Record,' Feb. 5.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

EXAMINATION FEES.

EXPLANATORY.

Sir,—It occurs to me that our students and assistants who read the account of alterations made yesterday by the Council, as to the non-returning of any portion of the fees, may take unnecessary alarm at the change. As the Journal of Saturday will probably report, I opposed this particular change, but I think as things are, a single word will show to our future candidates that they are very little worse than at present as to the cost of either of the three examinations of the Society. All who pass on the first examination remain on exactly the same footing as at present. Those rejected on their first examination for the Preliminary will remain at the close of their second examination exactly as now, viz., they will have paid £3 3*s.* for their two examinations. The rejected Minor and Major candidates who come up a second time, will each have to pay for their two examinations £1 1*s.* more than at present, viz., £5 5*s.* and £7 7*s.* respectively, instead of £4 4*s.* and £6 6*s.* as at present.

It would have greatly pleased me had the Council ventured to accept my own proposals—reducing the fees to rejected candidates—but even as things now stand, the change is not nearly so serious a one as it appears on a first look.

DANIEL FRAZER.

Glasgow, February 3, 1876.

UNREGISTERED CHEMISTS AND DRUGGISTS IN GLASGOW.

Sir,—You correspondent "J. G." thinks that I keep strangely silent and dark upon the question of the keeping of open shop in our business by unlicensed men in Glasgow, and that I have failed "to illuminate the wonderful darkness of the Council regarding the state of matters" in this respect here.

I am assured that no member of Council will endorse this opinion of "J. G.", as I fear I have come to be looked upon by my colleagues on the Council as all but an absolute bore in regard to the frequency with which I have, in season and out of season, brought this very question before them, and that in all manner of forms.

As my last speech in reference to the questions was not, from its great length, published in our Journal, if "J. G." will kindly send me his address, or will call on me first, I will be very happy to supply him with a printed copy of my speech in support of the famous "Glasgow Memorial," delivered in Council on the 5th of May, last year, and where at page 6 and elsewhere he will find that I had the "courage" to express my opinion in favour of a motion involving this very question, with other points connected with it, that failed to get any other hand held up in its support than my own, and I can assure "J. G." from some experience, that to do so does need not a little courage.

DANIEL FRAZER.

Glasgow, 7th Feb. 1876.

THE RECTIFICATION OF THE REGISTER.

Sir,—In your leader on the above subject in a recent Journal, you remark in regard to the Pharmaceutical Society taking the position of public prosecutor, that "the function, however, is imposed upon the Pharmaceutical Society, and the performance of it is a duty which the Society owes no less to the public at large than to properly registered members of the trade, whose interests it is also bound to protect." It would be well for members on this side of the border if the Society would extend its protection to Scotland, at least as far as Glasgow, for in that city alone 20 per cent. of the chemists and druggists in business are not registered, and unfortunately the numbers are rapidly increasing from want of any check being applied to their illegal practices. Within the last six weeks to my own knowledge two unregistered men have opened shops.

I enclose a circular from one of these worthies to show you how ingeniously he leads the public to believe that he is proprietor of the Medical Hall without his directly stating that such is the case. The mode of getting into business adopted by some of the fraternity is equally as ingenious; the first thing is to find a speculative landlord who is willing to fit up the shop on condition of being promised a higher rent than its real value; the next to find a friend connected with the wholesale trade who provides the drugs, etc., on six or twelve months' credit, then advertise for a medical man to consult in a chemist's shop, and when they have secured that individual, the Medical Hall is now complete and the opening duly announced to the public. Having no cash and as little conscience, they drag out a miserable existence by underselling their neighbours, keeping open at untimely hours to catch stray customers, and other disreputable practices.

As an instance of the way these men cut down prices, the following prescription—

℞. Quiniæ Sulph. . . . . ʒss.
Acid. Sulph. Dil. . . . . ʒj.
Aq. . . . . ad ℥ij.
Sig. A teaspoonful three times a day—

was taken to a respectable member of the Pharmaceutical Society in the West End to be dispensed, and the customer was charged 1*s.* 8*d.* for medicine and bottle; the same prescription was sent to one of the unregistered Medical Halls to be renewed and was there charged 1*s.* Of course the lady was under the impression that she had been imposed upon in the first instance.

As some of these men have held situations in respectable establishments the public believe that they are as well qualified as their neighbours. If the present downward course is allowed to continue, the trade of a chemist and druggist will come to be low indeed. Should the Pharmaceutical Society or the local association take no action in the matter I would suggest that the registered chemists and druggists in the West of Scotland form a defence association to protect their own interests.

SANDY.

Glasgow, 1st February, 1876.

ANOTHER GRIEVANCE.

Sir,—None of your numerous correspondents on the Relations between Doctors and Pharmacists have mentioned a grievance under which I occasionally suffer, and which is perhaps not peculiar to this latitude.

It is this: a doctor attending a patient, and thinking it desirable to have a second opinion, calls in a surgeon. The joint prescription instead of being sent to the usual dispenser, is carried off by the surgeon and by him deposited with a druggist, his own particular pharmaceutical drudge, with whom he has an arrangement on the "penny an ounce" system. The customer is therefore lost, at least *pro tem.*, to the family chemist, and the patient, it may readily be believed, is none the better off for an arrangement, that might, without undue severity, be called mean and contemptible.

GAMMA.

TABLESPOONFULS, ETC.

Sir,—I recently had my attention forcibly directed to a coming difficulty with regard to the customary directions for patients to take their medicines by tablespoonfuls.

A physician prescribing a pretty full dose of Fowler's Solution appended his usual instructions "℥ss t. d." I wrote the label "A tablespoonful thrice a day," and proceeded to caution the patient to use a graduated glass, tablespoons being so variable, when I was met with the reply, "The doctor told me a dessertspoonful" The apparent error having been cleared away by an explanation that the dessertspoonful as verbally ordered by the doctor would no doubt correspond pretty closely with his written instructions of ℥ss, and with the old tablespoonful which is still retained as the customary measure for medicine, I was still left in doubt as to what should be done next time the instructions were ℥ss t. d., so took an early opportunity of asking the doctor, and was informed that whenever he wrote ℥ss I might translate it a "dessert-tablespoonful." I thus go over a fraction of the difficulty only to discover how much more must necessarily develop out of the discrepancy between what modern spoons will hold and what is usually intended to be understood by the term spoonful.

We shall be having some physicians writing ℥ss and expecting us to direct a tablespoonful, others expecting us to translate the same symbol as a dessertspoonful. We shall have some writing a "tablespoonful" when they intend the patient to take half ounce, and others writing a "dessertspoonful" with the same intention. And we shall have —as indeed we now have—patients taking one ounce as a tablespoonful and others only taking half that quantity, and the same confusion will reign throughout the whole question of tablespoonfuls, dessertspoonfuls, and teaspoonfuls, for all the modern spoons are just about double the capacity of those which were in use forty or fifty years ago, and which pretty well corresponded with the measures ℥ss, ʒij, and ʒi, respectively.

I draw attention to the matter now in the hope that by its discussion the inconvenience may be diminished and ultimately the confusion reduced to order, though I admit I do not at present see how that is to be accomplished.

It is not difficult to suggest remedies, but it is impossible to insure the universal adoption of any change, and a change will only be a remedy if generally or almost universally adopted. We cannot bring back the custom of using small spoons, nor can we expect the use of graduated measures to become universal.

If we say "half an ounce thrice a-day," there will be for long to come a worse state of confusion than before, from our patients not knowing what is half an ounce. And if we attempt the adoption of graduated bottles, the divisions on the bottles or on paper slips are not much better than spoonfuls. And if all in the trade adopted some good mode of indicating half an ounce, when that quantity was required, there would still remain the difficulty of knowing what the physician intended, and the danger arising out of a discordance between the custom of the surgery and the pharmacy.

While I admit on principle it is not desirable to encourage the continuance of any measures which are essentially variable, as spoons, glasses, and cups must necessarily be, I do not see my way to suggest anything better than a compromise.

Where the doctor writes "tablespoon" or "cochl. mag.," I do not see that we can do otherwise than write tablespoon on the label. But when ℥ss is prescribed we might with propriety write "half an ounce (a small tablespoonful)." In this way the public would gradually learn that only the small tablespoons correspond appropriately with the half ounce; and they might be further instructed as to the dangerous variability of spoons as measures, by the general use of a note which I have for some time past printed on my prescription envelopes to the effect that "In all cases where medicines are directed to be taken by spoonfuls it is desirable to use a graduated glass, ordinary spoons being very variable."

And if we could command the attention of the medical profession to the matter, they might further promote accuracy by using the expression large tablespoonful to mean an ounce, or small tablespoonful to mean half an ounce.

I trust the matter will be considered worthy of the attention of some other correspondents who will give us the benefit of their experience in such matters.

BARNARD PROCTOR.

Grey Street, Newcastle,
Jan. 27, 1876.

HUCKSTERS' MEDICINES.

Sir,—I enclose you a cutting from the *Staffordshire Advertiser* of the 22nd ult., which tells its own tale, and conveys its own lesson. Every sensible person must agree with the concluding sentence of the verdict in this case; but what is to be said in reprobation of the chemists who supply these things? In the potteries it is a usual thing for people like Mrs. Charlton to sell in the lowest hucksters' shops not only most of the ordinary drugs in daily use, put up in halfpennyworths and pennyworths—but also a large number of compound preparations, which they obtain from certain well-known parties whose names appear on the Register of Pharmaceutical Chemists or Chemists and Druggists.

Child's Cordial, Infant's Mixture, Mother's Friend, Soothing Syrup, Carminative, Cough, and Diarrhœa Mixtures, powders of all kinds and colours, pink, white, and brown, pills in large variety, tinctures, cerates, ointments, etc., etc., are sold regularly. Sometimes the maker supplies labels, but generally not; when the dealer is unable to read, as is often the case, the only plan is to trust to smell and colour, the only way Mrs. Charlton found out she had "made a mistake" and poisoned a child. Ought these things so to be?

F. C.

THE ABUSE OF SUGAR.

Sir,—The death from syrup of chloroform (and morphia), an account of which appears in the *Pharmaceutical Journal* of to-day, ought, I think to check the tendency to make dangerous drugs sweet and palatable.

For notable—I may say lamentable—examples I would instance the common-going Godfrey's cordial and syrup of poppies.

Those who are disposed to believe that nothing whatever is external to the domain of Providence will admit that colocynth, opium, nux vomica and products of the same are divinely guarded by their now disagreeable bitterness. Ought we, then, to break down this fence—or defence rather — in endeavouring after palatable, and therefore treacherous preparations of dangerous drugs?

A SWEDENBORGIAN.

York, January 29, 1876.

CHEMISTRY: ITS RELATION TO MODERN THOUGHT.

Sir,—On the occasion of your publishing Professor Tyndall's famous Belfast address, a bigoted and intolerant letter appeared in the Journal condemning alike the address and your action. That letter evoked such a burst of generous indignation that it might have been expected to prove for many years to come an efficient warning to any one who might otherwise be disposed to evince through the aid of your columns similar uncharitableness. But, alas! eighteen months have hardly run their course when all lovers of fair-play and earnest truth-seekers must be scandalized by the appearance in the Journal of another letter equally as intolerant and bigoted—and I may add offensive—as the one to which I have alluded, and which merits equally the condemnation of all right-feeling and fair-dealing men. This time the exhibition of intolerance and bigotry proceeds not from the "orthodox" side, where I fear some are inclined too exclusively to expect it, but from the opposing side, or as the writer would doubtless say, the "liberal" side, and yet anything more illiberal could hardly be. "'Tis passing strange" that men cannot observe the same amount of respect for the opinions of others, that they unmistakably expect to be observed for their own. The writer of the letter on which I am at present venturing to animadvert, speaks of John Stuart Mill, as "a man whose freedom from dogmatism is acknowledged by his opponents." Would that his eulogizer would but emulate him in this respect. A more temperate paper than Mr. Baildon's assuredly was never penned, and as your correspondent, Mr. Feaver, says, it is evidently "the work of a gentleman and a scholar."

Mr. Baildon may rest assured that he has the universal sympathy of your readers and his professional brethren, in the ungenerous and uncalled-for attack made on him.

I, for one, desire heartily, though humbly, to record my sense of the judiciousness and catholicity of spirit displayed in reprinting such an address as Professor Tyndall's, and in publishing such a paper as Mr. Baildon's. That the editorial department of the *Pharmaceutical Journal* may long be conducted with the same perfect freedom from sectarian bias is the earnest hope of

ROB. CHIPPERFIELD.

Southampton, January 31, 1876.

CHEMISTRY IN RELATION TO MODERN THOUGHT.

Sir,—I am glad that Mr. Feaver has replied to Mr. Langham's attack on Mr. Baildon's paper, and I cannot help thinking that Mr. Langham himself, on reflection, will regret the use of such unmerited and uncharitable expressions as "worthless stuff," etc. We are not all gifted with the same practical turn of mind that seems to animate Mr. Langham. For my part I am much obliged to Mr. Baildon and to the North British Branch for the coutribution, and I only wish other B.A.'s would occasionally assist us by reading kindred papers at our local gatherings. It is not my intention to enter into an unprofitable controversy, but simply to bear testimony that all are not of Mr. Langham's opinion.

M. P. S.

THE HANBURY GOLD MEDAL.

Sir,—I venture to express the opinion that the system of offering rewards and prizes which has largely characterized the educational efforts of recent times has been an unqualified good, and that it has produced most healthy and beneficial results. Though in principle a student works *con amore*, and should require no further stimulus than the love of his subject, yet it cannot be doubted that practically honours and medals, scholarships or fellowships, and other prizes have proved a valuable stimulus to many, and made all the difference to some between mediocrity and excellence. I am aware that as a rule the influences decrease with years, and that manhood holds cheap many a coveted prize of youth; nevertheless, it is not altogether so, and the knowledge of the existence of an honourable prize, which may be yours, will at least not detract from the devotion and energy with which you pursue your course.

I have been led thus to think and write by observing in the last number of the Journal a proposal to establish a "Hanbury Gold Medal," and in addition to what Professor Dragendorff has so forcibly though so briefly urged, I cannot but think the stimulus that would be furnished by the existence of such a prize would induce many students to break fresh ground and devote themselves more frequently than is now the case to original research. As the proposal, which I think originated with yourself, has been so generously seconded by so able and influential an authority as Professor Dragendorff, I thought I might venture as a junior to offer my very humble tribute of support.

A LABORATORY STUDENT.

February 1, 1876.

PSEUDO QUININE.

Sir,—I have read without surprise the communication of Messrs. Howard. Until quite recently the whole of the Eastern market has been glutted with spurious drugs and chemicals, emanating chiefly from German firms. During my residence in Shanghae, I, at the request of the Commissioner of Maritime Customs, made an examination of two samples of so-called quinine, and found them to be composed entirely of muriate and sulphate of cinchonine; the bottles and labels were fac-similes of those sent out by the well-known firm of M. Pelletier, and were ordered for a Chinese firm by a Shanghae merchant. The Customs have determined in future to seize and examine suspected importations, as genuine quinine is held in high estimation by them as a specific for malarial diseases.

T. H. BATEMAN.

Blandford House, Peckham,
January 31, 1876.

A. S.—The berry sent is from a Solanaceous plant, but not the *Physalis Alkekengi*.

C. Hawthorne.—(1) Apply to the publishers Messrs. Churchill, New Burlington Street. (2) Apply to the Secretary for a copy of the pamphlet, "Hints to Students."

"*Catholicus.*"—The extract from the *Tablet* kindly forwarded by you does not appear to contain anything in respect to the subject of the paragraph in last week's Journal which makes it necessary "in the interests of accuracy" to refer to it again.

"*Inquirer.*"—Your question is not sufficiently definite for publication.

J. Spearing.—In reply to your inquiry as to the reason why the preparation you mention can be sold without a patent medicine stamp we cannot do more than refer you to the Inland Revenue authorities, whose principles of action in these matters are not easily understood.

J. Pumphrey.—We are obliged to you for your communication and have made a note of the information contained in it, which we shall take a suitable opportunity to make use of.

F. W. Underdown,—There is no doubt that under the Juries Act (25 and 26 Vict. c. 107) all "registered pharmaceutical chemists actually in practice are absolutely freed and exempt from serving upon any juries or inquests whatever," and that this exemption is not affected by an Act passed several years before. But it is necessary that pharmaceutical chemists should examine the lists exhibited at church doors, etc., in September, and if they find their names improperly included they should claim to have them expunged on the day of appeal.

W. H. Priestley.—*Matricaria chamomilla*, so far as can be judged from the flower-heads alone.

"*Registered Apprentice.*"—(1) Any good modern arithmetic book; Colenso's for instance. (2) The grammar is published by Groombridge, Paternoster Row.

G. E. B.—See the article on the Administration of Phosphorus, by Dr. Méhu, before, page 2.

J. Geldard.—See a formula in the *Pharmaceutical Journal*, for Jan. 16, 1875, p. 579.

"*Nil.*"—Apply to the Secretary at 17, Bloomsbury Square, giving your name and address.

"*Simplex.*"—Candidates for the Bell Scholarship must be Registered Students of the Society under twenty-two years of age.

"*Gadus.*"—The information could probably be obtained from Dr. De Jongh's agents.

"*A Student.*"—(1) You will find an answer to this question in any work on chemistry. (2) Because the formula used appears most in accordance with known facts.

"*Pessary.*"—(1) We are surprised at being asked to answer such a question. Certainly you have no right to advertise a wholesale house as agent without asking and receiving permission. (2) This question we cannot undertake to answer. (3) The decision lies with the authorities at Somerset House.

T. Dadford.—The paragraph has been received with thanks; but the statement contained in it is so remarkable as it stands that we are unable to publish it without making further inquiries.

P. W.—(1) Carbolic acid is miscible with strong acetic acid in all proportions. (2) The label has clearly been drawn up with full appreciation of the provisions of the Patent Medicine Stamp Act. We are not prepared to say whether the attempt to keep outside the meshes of the Act is a successful one, but must refer you for a decision to the Inland Revenue authorities.

J. A. Card.—Third edition.

"*Glycerine.*"—We do not know, but it is only very slightly soluble in it when cold.

J. Hardcastle.—Oss, according to the Pharmacopœia is ten ounces.

"*Chemicus*" (who should have sent his name and address).—Several papers on pill coating have appeared in this Journal within the last two years.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ*. A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Hesse (Stuttgart), Mr. S. Taylor, Mr. Bell, Professor Dymock (Bombay), Dr. Vallardi (Naples), Mr. J. A. Carr, B. L.

NOTE ON MYRRH AND ITS ALLIED GUM RESINS.

BY W. DYMOCK.

The gum resins I include under this head are, true African myrrh, Arabian myrrh, common African bdellium, scented African bdellium, Indian bdellium, and opaque bdellium. These drugs are brought to Bombay from Africa, Arabia, and different parts of India, for selection and dispatch to suitable markets in Europe, China, and other countries.

The merchants who deal in myrrh and the gums which come from the north-east of Africa and southern Arabia have their chief houses in Bombay, and employ partners or agents at Aden and Makulla; the Aden agents also attend the great annual fair at Berbera on the opposite coast, and exchange English and Indian goods for myrrh, bdellium and other African produce. The bags or bales which contain the myrrh, when opened in Bombay, are found to be made up of 1st, a large proportion of roundish masses of fine myrrh; 2nd, a considerable proportion of small semi-transparent pieces of myrrh of irregular shape; 3rd, numerous pieces of dark coloured myrrh, mixed with bark and other refuse; 4th, a small proportion of an opaque gum resin (*Bdellium opaque* of Guibourt?); occasionally pieces of resin (juniper?) are also met with. In Bombay the contents of the package are sorted; the best myrrh goes to Europe, the darker pieces form a second quality, and the refuse is exported to China, where it is probably used as incense. True myrrh is known in the local market, as kărăm. The opaque bdellium is called meena hărma, and is used for the extraction of the Guinea worm; it is of a yellowish white colour, resembling ammoniacum, with hardly any odour, and a bitter taste.

From Berbera also comes bdellium. In the bales of this drug two distinct kinds are met with, viz., ordinary bdellium and a perfumed kind in small quantities. The latter occurs in irregularly shaped pieces, more or less flat, some of them having fragments of thick bark adherent, but not the birch like bark which adheres to common bdellium. The colour of the gum is dark reddish brown; but opaque yellowish white streaks are frequently met with in the semi-transparent reddish mass which forms the bulk of the drug. The odour, on fresh fracture, is powerful and pleasant, not unlike a lemon lollipop. The Arabic name is hăbăk hādee; I know of no Indian name. It seems to be considered a kind of bysabole (or bdellium).

From Makulla and Aden another kind of myrrh is received, the Arabian myrrh of the 'Pharmacographia.' The trade name of this drug in Bombay is meetiga; it is mostly sold in India as true myrrh, for which it might easily be mistaken by any one not specially acquainted with drugs. I am assured by the dealers that no true myrrh is ever received from Arabia.

Indian bdellium, as far as I have been able to ascertain, comes chiefly from the Deccan. In general form and appearance it somewhat resembles the African drug, the pieces often having portions of papery bark attached to them; but the colour is different, being greenish, and the odour though similar, is more faint. Its value is one third less than that of African bdellium.

VASELINE.

BY JOHN MOSS,

Fellow of the Chemical Societies of London and Berlin.

In order to test the accuracy of the conclusion arrived at in the paper on this body, printed at pp. 623,* viz, that vaseline is a mixture of paraffins, an ultimate organic analysis was made by burning 0·134 gramme of vaseline with lead chromate. The carbonic acid gas and water obtained respectively corresponded to 0·1124 gramme carbon and 0·0183 gramme hydrogen, the two together forming 97·54 per cent. of the whole.

On drying at 120° C. the vaseline lost 0·5 per cent. of water, and on ignition it left 0·05 per cent. of ash.

The composition of vaseline is therefore—

Hydrocarbons (*paraffins?*) . . .	97·54
Moisture	·5
Ash	·05
	98·09

Under the microscope vaseline is seen to contain numerous minute needle-shaped crystals; the number of these increases as the temperature is lower, and there is no reason to suppose that on an ordinary cold winter's day the mass would not be wholly crystalline. One ounce of vaseline was boiled with successive portions of absolute alcohol until traces only were dissolved. The alcoholic solutions united gave 66 grains of an almost colourless residue, which melted at 29·5° C. Vaseline itself melts at 37° C.; this part of it, therefore, is less likely to be crystalline than the bulk, yet crystals could be easily discovered in it with the aid of the microscope, and, by dropping ether on the back of the slide, the temperature was so reduced that crystals filled the field. The part not dissolved by alcohol (85 per cent. of the whole) having a much higher melting point than the above was also found to be mainly crystalline, and this without cooling. Vaseline was examined as to its crystalline or amorphous condition, because of statements by the manufacturer and others that it will not crystallize. The importance thus attached to absence of crystalline character may be due to the fear of irritation by the edges of the crystals when in contact with a sensitive surface, but it is in apparent forgetfulness of the fact that solid vegetable and animal fats generally have the character which it has been shown that vaseline possesses. The possession of this character constitutes another, though not very important, feature in which vaseline resembles the paraffins. Vaseline, then, consists almost entirely of *hydrocarbons*; it is not at all affected by most chemical bodies, and only slowly by the more powerful among them; by distillation under pressure it is resolved into bodies having lower melting points; it is obtained from the residue of the distillation of American petroleum; and is of a crystalline character. All these characters pertain to paraffins, and the justness of the above conclusion is consequently emphasized by the result of the combustion, and by the microscopical examination.

It has been suggested, presumably as a name by which it may be prescribed, that vaseline should be styled *Gelatum Petroleum.* Independent of the defective Latinity of the term, there are several reasons why it should not be adopted. If it be intended to indicate "frozen or congealed petroleum," it is intended to indicate what is not the fact; if it imply "petroleum jelly," it can only do so on the principle *bellum quia minime bellum*, for vaseline has none of the characteristic properties of a jelly. Further, the word "petroleum" is undesirable, because of its familiarity to the public, and the same objection applies to paraffin in its Latinized form. Vaseline (or *Vaselinum*) would seem to be excluded by the extent to which it has been popularly employed, and I therefore venture to suggest that, for the purpose of prescribing, vaseline be denoted by the term *Saxoleum inspissatum purificatum*. The title is long, but it has the advantages that it indicates the origin of vaseline, the *process* (of thickening) by which it is obtained, and the *condition* (pure) to which it is brought. The last word of the name suggested may (and probably will) be omitted.

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* Erratum.—Page 623, line 28, *dele* "uncorrected for temperature and pressure but sufficiently accurate for most pharmaceutical purposes."

300, *High Holborn.*

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 603.)

The micro-polariscopical examination of starch is a simple matter; but there are several little points to be attended to, in neglect of which erroneous observations are likely to be made. The first point is that the starch shall be carefully mounted in some highly refracting medium which is capable of interpenetrating the granule and rendering it not only transparent, but bringing its refractive index somewhat into accordance with its own index, thereby getting rid of interference phenomena on the margin of the starch granule.* Perhaps the most useful medium in which to examine starch by the polariscope is either a benzol solution of dammar, an essential oil such as anise, or Canada balsam; water is the least useful, and in many cases, notably that of wheat, the granule is so feebly bi-refractive when immersed in it that the older microscopists quite failed to detect any polarization phenomena. Another point is to secure that the illuminating apparatus is accurately centred, and that the object is well illuminated. When any higher power than an inch objective is used the achromatic condenser must be employed, the Nicol of course being *below* the condenser, and whenever accurate observation is intended, the analyser must be above the eye-piece. For observations on starches, no selenite being employed, a really good tourmaline or herapathite is preferable to a Nicol, and, whenever possible, should be employed. The third and last point to be attended to is to use a sufficiently high power and to take care that the whole of the lenses used are themselves quite neutral to the polarized beam. For such starches as tous-les-mois an inch objective will suffice; for arrowroot, wheat and maize, a half inch is better; whilst for rice and other like minute starches a fifth at least should be used. The angular aperture of the higher powers should be moderate, not being too small, so as to possess small light-gathering power, nor so large as to suffer seriously in definition and be too sensitive as to focal adjustment.

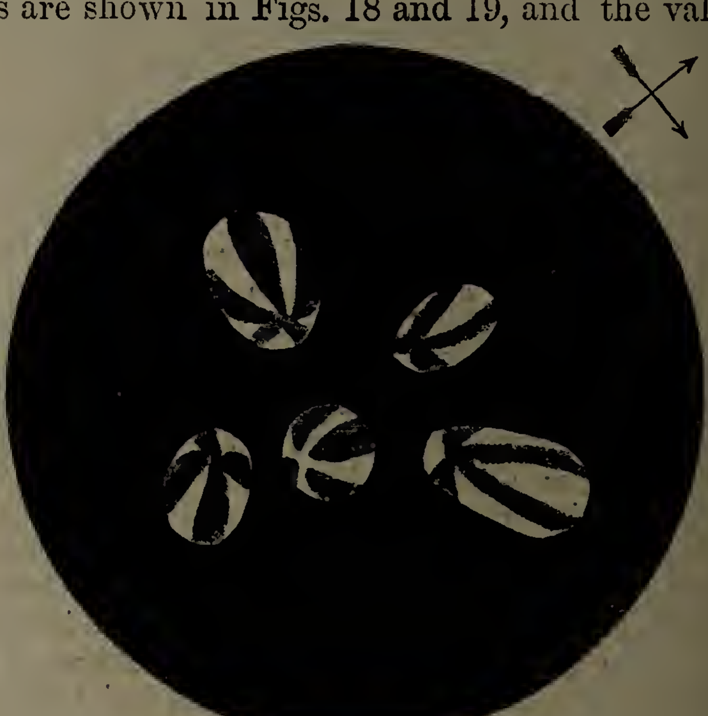

Fig. 18.—Tous-les-mois: prisms crossed.

The polarization phenomena of starches are far more numerous and much more interesting than many microscopists appear to know, and by no means comprised in those described in our text-books, and shown at nearly all microscopical *soirées*. The generally known phenomena, of course, are, the black cross seen when the prisms are crossed, and varying in position in different starches (not necessarily or only in starches from different plants*), the reversal of the phenomenon when the corresponding diagonals of the prisms are parallel, and certain chromatic phenomena visible when selenite or mica films of different thicknesses are interposed between the starch and the polarizer. These phenomena are extremely interesting as well as beautiful, and our almost immediate study of them will not unlikely make our heads ache, but they are by no means the only ones, nor, perhaps, from the scientific point of view, the most interesting. If we take a little tous-les-mois and mount it with Canada balsam between two circles of thin glass, we can place it in a selenite carrier and examine the granules in all positions. Rotating the starch in a plane around the mechanical axis of the optical arrangement, we shall notice that whilst the arms of the cross retain their lines of direction, these being determined by the diagonals of the prisms, or rather by the planes of polarization and analysation respectively, the cross changes more or less in shape (in wheat and other *round* starches this is not so), and we shall find that this holds good if we interposed a selenite (which must not rotate) between the polarizer and the starch. The chief forms of the cross are shown in Figs. 18 and 19, and the value of the experiment lies in that it shows that the cross is, upon the whole, fixed in position so long as the direction of the planes of polarization and analysation remain fixed, but that the granule does exert a certain coercive force upon its lines of direction. The planes of polarization are shown by arrows in the figures. If we now interpose either a red and green, or yellow and blue selenite, we shall notice that the starch will be brilliantly coloured and that all the granules are not similarly coloured; we shall also observe that the opposing quadrants only of each granule are similarly coloured, that there are two pairs of colours, each of which shades down to the arm of the "cross" that divides it from the neighbouring opposing and complementary colour. If we use the complicated selenite stage arrangements we shall observe many other chromatic phenomena, many of which are very interesting, but taking us too much aside to be considered here. Substituting now for the colour-giving selenite what is known as a quarter wave mica film, that is, one which has the property of converting plane polarization into circular polarization (for yellow light perfectly, for white light approximately, as usually made) we observe the phenomena shown in Figs. 20 and 21. The phenomena, it will be noticed, as the quarter wave is rotated, all else remaining fixed, the mica being introduced with its neutral axis in the plane of polarization, in which position it is inactive, are the gradual obliteration of the cross and the substitution of two brush-like arms, as shown in Fig. 21, each occupying the opposing quadrant between the arms of the vanishing cross. When the axis of the selenite has attained an azimuth of 45° in regard to the plane of polarization these brushes are at their maximum distinctness, from which they gradually fade away, or, more correctly, pass into the reappearing cross as the rotation of the mica is continued, until the azimuth of the mica is 90°. When the cross reappears, continuing the rotation of the mica, the cross again fades and the brushes reappear, but in opposite quadrants to the last, as in Fig. 22, and again fade into the cross until the starting point of the mica is reached. It will be noticed also that we start with a dark field, the prisms being crossed and the mica inactive, but that the field becomes lighter as the mica is rotated until 45° is reached when it is quite bright, and then is gradually darkened until the mica is at 90°, from which point the process of lightening and darkening is repeated as the rotation of the mica is continued. These phenomena were, it will be remembered, referred to in my Pharmaceutical Conference paper on Starches Microscopically, etc., Considered, but not so the following, which are, however, merely the complement of the foregoing. Retaining the whole of the arrangements required by the experiment just described in such order that we have a well-defined brush in each starch granule, we interpose between the starch and the objective a second quarter wave plate, with its axis at right angles to the last, and therefore negativing its action (reducing, as we shall see later, its circular polarization to plane polarization in a plane 90°, from that of primitive polarization). We have now a *dark* field in place of the bright field, but this is not all: the previously well-defined cross has now entirely disappeared, and the starch granules stand out with startling distinctness on a dead black ground. They are quite bright, except that slight duskiness—a trace, as it were, of the vanished

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* The precise action of these media is not yet understood; I have long had the subject before me, and hope to publish some of my observations shortly.

* The diagnostic value of the cross is limited, but the discussion of the question, and that of some technical points of the subject, will appear in the sequel.

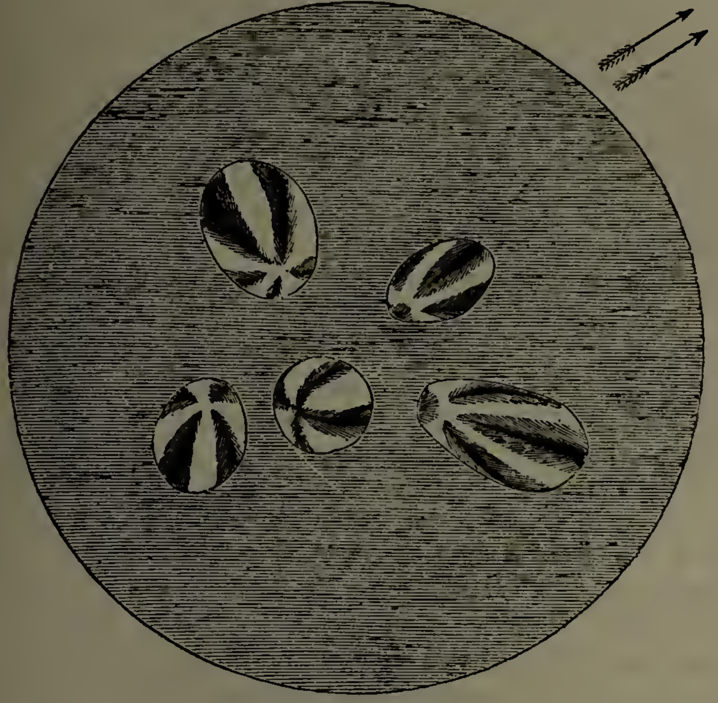

Fig. 19.—Tous-les-mois : prisms not crossed.

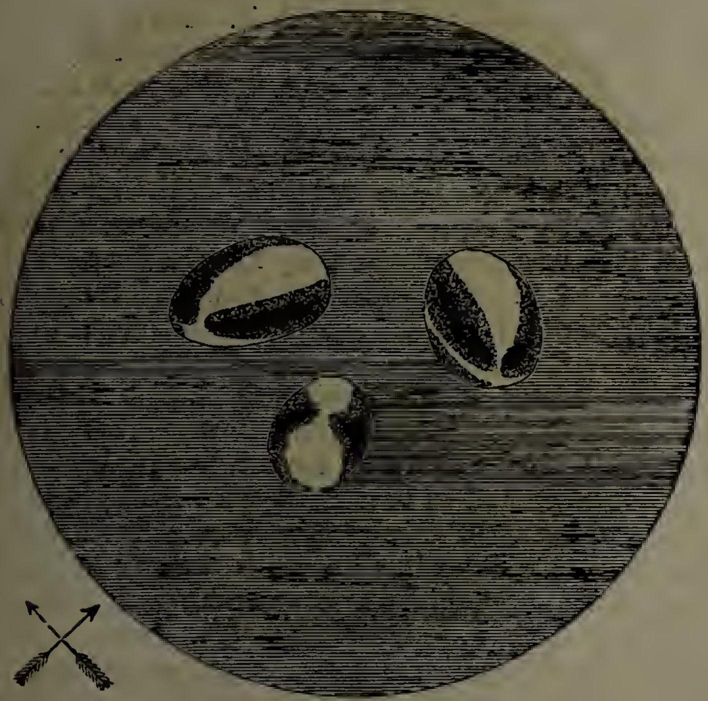

Fig. 20.—Tous-les-mois : over ¼ wave mica.

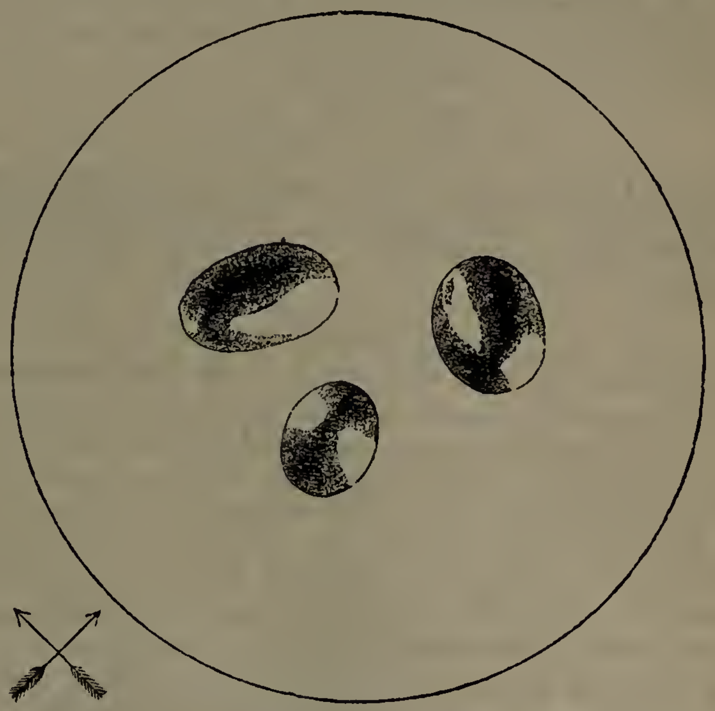

Fig. 21.—Tous-les-mois : mica reversed.

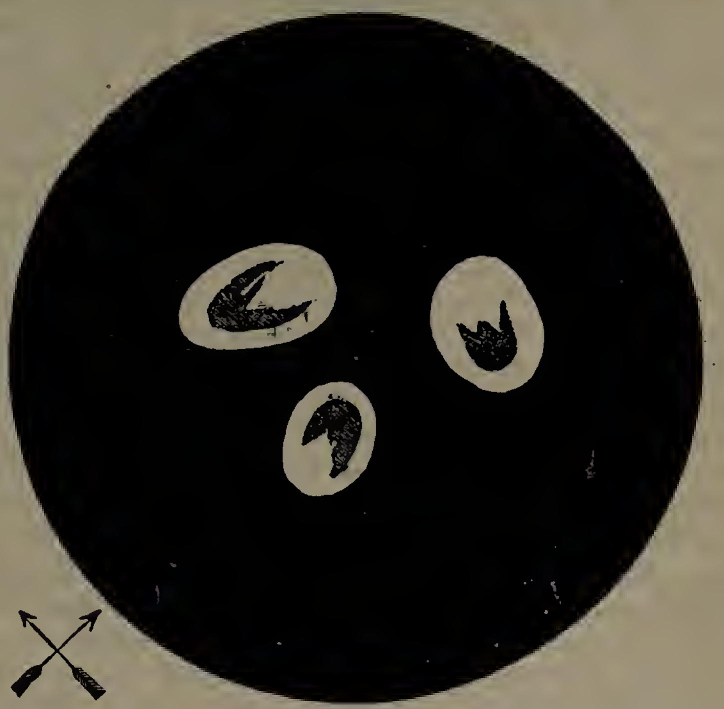

Fig. 22.—Tous-les-mois : two mica films, one above, one below.

brushes and crosses—exists at the hilum, which is extremely well seen, whilst the concentric lines are perhaps more sharply defined than they are by any other method of examination.

(*To be continued.*)

OBSERVATIONS ON THE OPTICAL DEPORTMENT OF THE ATMOSPHERE IN REFERENCE TO THE PHENOMENA OF PUTREFACTION AND INFECTION.*

BY JOHN TYNDALL, F.R.S.

Professor of Natural Philosophy in the Royal Institution.

1. Introduction.—The author alluded, in an introduction, to an inquiry on the decomposition of vapours, and the formation of actinic clouds, by light, whereby he was led to experiments on the floating matter of the air. He refers to the experiments of Schwann, Schroeder and Dusch, Schroeder himself, to those of the illustrious French chemist Pasteur, to the reasoning of Lister and its experimental demonstration regarding the filtering power of the lungs; from all of which he concluded, six years ago, that the power of developing life by the air and its power of scattering light would be found to go hand in hand. He thought that the simple expedient of examining by means of a beam of light, while the eye was kept sensitive by darkness, the character of the medium in which their experiments were conducted, could not fail to be useful to workers in this field. But the method had not been much turned to account, and this year he thought it worth while to devote some time to the more complete demonstration of its utility.

He also wished to free his mind, and if possible the minds of others, from the uncertainty and confusion which now beset the doctrine of "spontaneous generation." Pasteur has pronounced it "a chimera," and expressed the undoubting conviction that, this being so, it is possible to remove parasitic diseases from the earth. To the medical profession, therefore, and through them to humanity at large, this question is one of the last importance. But the state of medical opinion regarding it is not satisfactory. In a recent number of the *British Medical Journal*, and in answer to the question, "In what way is contagium generated and communicated?" Messrs. Braidwood and Vacher reply that, notwithstanding "an almost incalculable amount of patient labour, the actual results obtained, especially as regards the manner of generation of contagium, have been most disappointing. Observers are even yet at variance whether these minute particles, whose discovery we have just noticed, and other disease germs, are always produced from like bodies previously existing, or whether they do not, under certain favourable conditions spring into existence *de novo*.

With a view to the possible diminution of the uncertainty thus described, he submitted without further preface to the Royal Society, and especially to those who study the etiology of disease, a description of the mode of procedure followed in this inquiry, and of the results to which it had led.

A number of chambers or cases were constructed, each with a glass front, its top, bottom, back, and sides being of wood. At the back is a little door, which opens and closes on hinges, while into the sides are inserted two panes of glass, facing each other. The top is perforated in the middle by a hole two inches in diameter, closed airtight by a sheet of india-rubber. This sheet is pierced in the middle by a pin, and through the pin-hole is passed the shank of a long pipette ending above in a small funnel. A circular tin collar, two inches in diameter, and one inch and a half high, surrounds the pipette, the space between both being packed with cotton wool moistened by glycerine. Thus, the pipette, in moving up and down, is not only firmly clasped by the india-rubber, but it also passes through a stuffing-box of sticky cotton wool. The width of the aperture closed by the india-rubber secures the free lateral play of the lower end of the pipette. Into two other smaller apertures in the top of the case are inserted, air-tight, the open ends of two narrow tubes, intended to connect the interior space with the atmosphere. The tubes are bent several times up and down, so as to intercept and retain the particles carried by such feeble currents as changes of temperature might cause to set in between the outer and the inner air.

The bottom of the box is pierced sometimes with a single row, sometimes with two rows of holes, in which are fixed, air-tight, large test-tubes, intended to contain the liquid to be exposed to the action of the moteless air.

On the 10th of September, the first case of this description was closed. The passage of a concentrated beam across it through its two side windows then showed the air within it to be laden with floating matter. On the 13th it was again examined. Before the beam entered, and after it quitted the case, its track was vivid in the air, but within the case it vanished. Three days of quiet sufficed to cause all the floating matter to be deposited on the sides and bottom, where it was retained by a coating of glycerine, with which the interior surface of the case had been purposely varnished. The test-tubes were then filled through the pipette, boiled for five minutes in a bath of brine or oil, and abandoned to the action of the moteless air.

During ebullition, aqueous vapour rose from the liquid into the chamber, where it was for the most part condensed, the uncondensed portion escaping at a low temperature, through the bent tubes at the top. Before the brine was removed, little stoppers of cotton wool were inserted in the bent tubes, lest the entrance of the air into the cooling chamber should at first be forcible enough to carry motes along with it. As soon, however, as the ambient temperature was assumed by the air within the case, the cotton wool stoppers were removed.

We have here the oxygen, nitrogen, carbonic acid, ammonia, aqueous vapour, and all the other gaseous matters which mingle more or less with the air of a great city. We have them, moreover, "untortured" by calcination, and unchanged even by filtration or manipulation of any kind. The question now before us is, Can air thus retaining all its gaseous mixtures, but self-cleansed from mechanically suspended matter, produce putrefaction? To this question, both the animal and vegetable worlds return a decided negative. Among vegetables, experiments have been made with hay, turnips, coffee, hops, repeated in various ways with both acid and alkaline infusions. Among animal substances are to be mentioned many experiments with urine; while beef mutton, hare, rabbit, kidney, liver, fowl, pheasant, grouse, haddock, sole, salmon, cod, turbot, mullet, herring, whiting, eel, oyster, have been all subjected to experiment.

The result is, that infusions of these substances exposed to the common air of the Royal Institution laboratory, maintained at a temperature of from 60° to 70° F., all fell into putrefaction in the course of from two to four days. No matter where the infusions were placed, they were infallibly smitten in the end. The number of the tubes containing the infusions was multiplied till it reached six hundred, but not one of them escaped infection.

In no single instance, on the other hand, did the air which had been proved moteless by the searching beam show itself to present the least power of producing bacterial life or the associated phenomena of putrefaction. The power of developing such life in atmospheric air and the power of scattering light are thus proved to be indissolubly united.

The sole condition necessary to cause these long dormant infusions to swarm with active life is the access of the floating matter of the air. After they have remained for four months as pellucid as distilled water, the opening of the back door of the protecting case, and the consequent admission of the mote-laden air, suffice in three days to render the infusion putrid and full of life.

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* Abstract of part of a paper read before the Royal Society, January 13th, 1876.

That such life arises from mechanically suspended particles is thus reduced to ocular demonstration. Let us inquire a little more closely into the character of the particles which produce the life. Pour eau de Cologne into water, a white precipitate renders the liquid milky. Or, imitating Brücke, dissolve clean gum mastic in alcohol, and drop it into water, the mastic is precipitated and milkiness produced. If the solution be very strong, the mastic separates in curds; but, by gradually diluting the alcoholic solution, we finally reach a point where the milkiness disappears, the liquid assuming by reflected light a bright cerulean hue. It is, in point of fact, the colour of the sky, and is due to a similar cause; namely, the scattering of light by particles, small in comparison to the size of the waves of light.

When this liquid is examined by the highest microscopic power, it seems as uniform as distilled water. The mastic particles, though innumerable, entirely elude the microscope. At right angles to a luminous beam passing among the particles, they discharge perfectly polarized light. The optical deportment of the floating matter of the air proves it to be composed in part of particles of this excessively minute character. When the track of a parallel beam in dusty air is looked at horizontally through a Nicol's prism, in a direction perpendicular to the beam, the longer diagonal of the prism being vertical, a considerable portion of the light from the finer matter is extinguished. The coarser motes, on the other hand, flash out with greater force, because of the increased darkness of the space around them. It is among the finest ultra-microscopic particles that, the author shows, the matter potential as regards the development of bacterial life is to be sought.

But though they are beyond the reach of the microscope, the existence of these particles, foreign to the atmosphere but floating in it, is as certain as if they could be felt between the fingers, or seen by the naked eye. Suppose them to augment in magnitude until they come, not only within range of the microscope, but within range of the unaided senses. Let it be assumed that our knowledge of them under these circumstances remains as defective as it is now—that we do not know whether they are germs, particles of dead organic dust, or particles of mineral matter. Suppose a vessel (say a flower-pot) to be at hand filled with nutritious earth, with which we mix our unknown particles; and that in forty-eight hours subsequently buds, and blades of well defined cresses and grasses, appear above the soil. Suppose the experiment, when repeated over and over again, to yield the same unvarying result. What would be our conclusion? Should we regard those living plants as the products of dead dust, of mineral particles; or should we regard them as the offspring of living seeds? The reply is unavoidable. We should undoubtedly consider the experiment with the flower-pot as clearing up our pre-existing ignorance; we should regard the fact of their producing cresses and grasses as proof positive that the particles sown in the earth of the pot were the seeds of the plants which have grown from them. It would be simply monstrous to conclude that they had been "spontaneously generated."

This reasoning applies word for word to the development of bacteria from that floating matter which the electric beam reveals in the air, and in the absence of which no bacterial life has been generated. There seems no flaw in this reasoning; and it is so simple as to render it unlikely that the notion of bacterial life developed from dead dust can ever gain currency among the members of a great scientific profession.

A novel mode of experiment has been here pursued, and it may be urged that the conditions laid down by other investigators in this field, which have led to different results, have not been strictly adhered to. To secure accuracy in relation to these differences, the latest words of a writer on this question, who has materially influenced medical thought both in this country and in America, are quoted. "We know," he says, "that boiled turnip or hay-infusions exposed to ordinary air, exposed to filtered air, to calcined air, or shut off altogether from contact with air, are more or less prone to swarm with bacteria and vibriones in the course of from two to six days." Who the "we" are who possess the knowledge is not stated. The author is certainly not among the number, though he has sought anxiously for knowledge of the kind. He thus tests the statements in succession.

And first, with regard to filtered air. A group of twelve large test-tubes were passed air-tight through a slab of wood coated with cement, in which, while hot, a heated "propagating glass," resembling a large bell-jar, was imbedded. The air within the jar was pumped out several times, air filtered through a plug of cotton wool being permitted to supply its place. The test-tubes contained infusions of hay, turnip, beef, and mutton, three of each, twelve in all. They are as clear and cloudless at the present moment as they were upon the day of their introduction; while twelve similar tubes, prepared at the same time, in precisely the same way, and exposed to ordinary air, are clogged with mycelium, mould and bacteria.

With regard to the calcined air, a similar propagating glass was caused to cover twelve other tubes filled with the same infusion. The "glass" was exhausted and carefully filled with air, which had passed through a red-hot platinum tube, containing a roll of red-hot platinum gauze. Tested by the searching beam, the calcined air was found quite free from floating matter. Not a speck has invaded the limpidity of the infusions exposed to it, while the contents of twelve similar tubes, placed outside, have fallen into rottenness.

The experiments with calcined air took another form. Six years ago, it was found that, to render the laboratory air free from floating matter, it was only necessary to permit a platinum wire heated to whiteness to act upon it for a sufficient time. Shades containing pear juice, damson juice, hay and turnip juice, and water of yeast, were freed from their floating matter in this way. The infusions were subsequently boiled, and permitted to remain in contact with the calcined air. They are quite clear to the present hour; while the same infusions, exposed to common air became mouldy and rotten long ago.

It has been affirmed by other workers on this question, that turnip and hay infusions, rendered slightly alkaline, are particularly prone to exhibit the phenomena of spontaneous generation. This was not found in the present investigation to be the case. Many such infusions have been prepared, and they have continued for months without sensible alteration.

Finally, with regard to infusions wholly withdrawn from air, a group of test-tubes containing different infusions was boiled under a bell jar filled with filtered air, and from which subsequently the air was removed as far as possible by a good air pump. They are now as pellucid as they were at the time of their preparation more than two months ago, while the contents of a group of corresponding tubes exposed to the laboratory air have all fallen into rottenness.

There is another form of experiment on which great weight has been laid; that of hermetically sealed tubes. On the 6th of last April, a discussion on the "Germ Theory of Disease," was opened before the Pathological Society of London. The meeting was attended by many distinguished medical men, some of whom were profoundly influenced by the arguments, and none of whom disputed the facts brought forward against the theory on that occasion. The following important summary of these was given by Dr. Bastian. "With the view of settling these questions, therefore, we may carefully prepare an infusion from some animal tissue, be it muscle, kidney, or liver; we may place it in a flask whose neck is drawn out and narrowed in the blowpipe flame; we may boil the fluid, seal the vessel during ebullition, and, keeping it in a warm place, may await the result, as I have often done. After a variable time, the previously heated fluid within the hermetically sealed flask swarms more or less plentifully with bacteria and allied organisms."

Previously to reading this statement, the author had operated upon sixteen tubes of hay and turnip infusions, and upon twenty-one tubes of beef, mackerel, eel, oyster, oatmeal, malt, and potato, hermetically sealed while boiling, not by the blow-pipe, but by the far more handy spirit-lamp flame. In no case was any appearance whatever of bacteria or allied organisms observed. The perusal of the discussion just referred to caused the author to turn again to muscle, liver, and kidney, with the view of varying and multiplying the evidence. Fowl, pheasant, snipe, partridge, plover, wild-duck, beef, mutton, heart, tongue, lungs, brains, sweetbread, tripe, the crystalline lens, vitreous humour, herring, haddock, mullet, cod-fish, sole, were all embraced in the experiments. There was neither mistake nor ambiguity about the result. One hundred and thirty-nine of the flasks operated on were exhibited, and not one of this cloud of witnesses offered the least countenance to the assertion that the liquid within flasks boiled and hermetically sealed swarm subsequently more or less plentifully with bacteria and allied organisms.

The evidence furnished by this mass of experiments that Dr. Bastian must have permitted errors either of preparation or observation to invade his work is, it is submitted, very strong. But to err is human; and in an inquiry so difficult and fraught with such momentous issues, it is not error, but the persistence in error for dialectic ends by any of us, that is to be deprecated. The author shows by illustrations the risks of errors run by himself. On October 21st he opened the back door of a case containing six test-tubes filled with an infusion of turnip, which had remained perfectly clear for three weeks, while three days sufficed to crowd six similar tubes exposed to mote-laden air with bacteria. With a small pipette he took specimens from the pellucid tubes, and placed them under the microscope. One of them yielded a field of bacterial life monstrous in its copiousness. For a long time he tried vainly to detect any source of error, and was prepared to abandon the unvarying inference from all the other experiments, and to accept the result as a clear exception to what had previously appeared to be a general law. The cause of his perplexity was, however, finally traced to the tiniest speck of an infusion containing bacteria which had clung by capillary attraction to the point of one of his pipettes.

Again, three tubes containing infusion of turnip, hay, and mutton, were boiled on November 2nd under a bell-jar containing air so carefully filtered that the most searching examination by a concentrated beam failed to reveal a particle of floating matter. At the present time, every one of these tubes is thick with mycelium, and covered with mould. Here, surely, we have a case of spontaneous generation. Let us look to its history.

After the air has been expelled from a boiling liquid, it is difficult to continue the ebullition without "bumping." The liquid remains still for intervals, and then rises with sudden energy. It did so in the case now under consideration; and one of the tubes boiled over, the liquid overspreading the resinous surface in which the bell-jar was embedded. For three weeks the infusions had remained perfectly clear. At the end of this time, with a view of renewing the air of the bell-jar, it was exhausted and refilled by fresh air which had passed through a plug of cotton-wool. As the air entered, attention was attracted by two small spots of penicillium resting on the liquid which had boiled over. It was at once remarked that the experiment was a dangerous one, as the entering air would probably detach some of the spores of the penicillium, and diffuse them in the bell-jar. This was, therefore, filled very slowly, so as to render the disturbance a minimum. Next day, however, a tuft of mycelium was observed at the bottom of one of the three tubes; namely, that containing the hay-infusion. It has by this time grown so as to fill a large portion of the tube. For nearly a month longer, the two tubes containing the turnip and mutton infusions maintained their transparency unimpaired. Late in December, the mutton infusion, which was in dangerous proximity to the outer mould, showed a tuft upon its surface. The beef-infusion continued bright and clear for nearly a fortnight longer. The recent cold weather caused me to add a third gas-stove to the two which had previously warmed the room in which the experiments are conducted. The warmth of this stove played upon one side of the bell-jar, causing currents; and, on the day after the lighting of the stove, the beef-infusion gave birth to a tuft of mycelium. In this case, the small spots of penicillium might have readily escaped attention; and had they done so, we should have had here three cases of "spontaneous generation" far more striking than many that have been adduced.

(*To be continued.*)

BUTYL-CHLORAL.*

In a recent article in the *Deutsche Medicinische Wochenschrift*, Dr. Oscar Liebreich states that Messrs. Krämer and Pinner, in the course of their researches on the substance commonly called croton-chloral, have ascertained that it contains two more atoms of hydrogen than was supposed, and that it is in fact butyl-chloral. When soda or another alkali is mixed with it, it undergoes decomposition, chloride of sodium, formiate of soda, and bichlorallylene being produced.

The physiological action of butyl-chloral is, Dr. Liebreich has ascertained from a large number of experiments, very constant. In rabbits, anæsthesia is always found to commence at the head, a state of hypnotism having been already produced. The animals, while sitting quietly, let the head drop; and anæsthesia of this part now appears, while reflex action can be excited in the limbs; from the head, the anæsthesia spreads over the body, and reflex action is not caused by irritation. The respiration and pulse become slow; and, with a fatal dose, the respiration ceases before the pulse. The *post mortem* appearances differ from those of poisoning by chloral. In that in the latter paralysis of the heart is found, both ventricles being full of blood; while in death from butyl-chloral the left ventricle is contracted and nearly empty, the right cavities and the lungs being charged with blood. With this difference in the *post mortem* appearance corresponds the difference in the mode of death; in chloral-narcosis, general anæsthesia is rapidly produced; *i.e.*, the action of a large dose passes quickly from the cerebrum to the medulla oblongata, and the heart's action ceases while the respiratory movements continue.

In chloral poisoning, Dr. Liebreich says that artificial respiration is useless; the heart's action can only be restored by the action of strychnia on the cardiac ganglia. With butyl-chloral, on the other hand, the heart's action can be re-excited by artificial respiration. This may be seen in an animal whose thorax has been opened during the narcosis.

Chloral, then, causes death by interfering with the cardiac ganglia; butyl-chloral, by its action on the respiratory centre. And just as the ganglion cells of the heart are stimulated by strychnia, so continued artificial respiration overcomes the narcosis of the medulla oblongata.

Dr. Liebreich points out, as a fact of practical importance, that the duration of the stages in the narcosis produced by butyl-chloral is about two-thirds less than in that produced by chloral.

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* From the *British Medical Journal*, February 12.

In man as in animals, anæsthesia commences at the head, while reflex action can still be excited on the limbs. Some experiments on a child, detailed by Dr. Liebreich, show that even in the waking state there is anæsthesia of the cornea while the nasal mucous membrane is still irritable. With a dose of chloral sufficient to produce anæsthesia of the eye, there would also be general anæsthesia of the whole body.

Doses of butyl-chloral sufficient merely to produce anæsthesia of the head do not essentially affect the pulse and respiration. In insane adults, Dr. Liebreich has found doses up to 5 grammes to produce sleep and anæsthesia of the head, with maintenance of the muscular tonus and of reflex action in the trunk, so that the patients remained sitting while the head was perfectly anæsthetic.

Though as yet unable to adduce any practical experience on the subject, Dr. Liebreich believes that butyl-chloral may be very useful as an anæsthetic in operations on the head, especially when, as is sometimes the case, it is impossible to give anæsthetics by inhalation.

The practical value of butyl-chloral, Dr. Liebreich says, lies in its property of diminishing sensibility before producing narcosis. He entertained the hope at first that it would be useful in tic-doloureux; but in the cases in which he has given it, he has, he says, certainly observed relief of the pain, but not an arrest or cure of the malady. The action of butyl-chloral is of less duration than that of morphia; a comparison of the general effects of the two remedies indicates that butyl-chloral should be preferred to morphia or combined with it. Dr. Liebreich observed the action of butyl-chloral in a most marked manner in two cases of tic, in which the tenderness was so great that the patients could not bear to touch the painful parts of the face or to bring a handkerchief near their noses. A gramme of butyl-chloral produced complete relief, lasting generally for two hours, each time that the dose was repeated.

Regarding the mode of administration of butyl-chloral, Dr. Liebreich says that he tried an alcoholic solution; but he has found that, after long standing, some change takes place which greatly impairs the action of the butyl-chloral. He now orders it in the following form: butyl-chloral hydrate, 5 to 10 parts; glycerine, 20 parts; distilled water, 130 parts. The mixture requires to be shaken before being used. The dose is half an ounce, followed in five minutes by a second, and in ten minutes by a third. It is well to begin with a small dose, so as to avoid producing hypnotism—that is, where the anæsthetic effect alone is desired. To produce sleep, one, two, or three grammes (15 to 45 grains), according to the patient's constitution, are to be given at bedtime.

Butyl-chloral gives relief in painful affections of the teeth; but of course a radical cure can only be effected by attacking the cause of the disease. It should, whenever possible, be taken after meals, and be followed by a copious draught of water.

Whether any advantage is to be derived from combining butyl-chloral with ordinary chloral or with alkaloids, must be decided by further experiments.

THE ANCIENT STANDARD WEIGHTS OF BABYLON, ASSYRIA, ETC., NOW IN THE BRITISH MUSEUM.*

In his work on Asiatic coins, weights and measures, up to the period of Alexander the Great (*Das Munz-Mass-und-Gewichtswesen in Vorderasien bis auf Alexander dem Grossen. Berlin*, 1866), Dr. Brandis refers to the ancient Babylonian and Assyrian system of weight, from which he considers the Greek system of weight to have been derived. Not only do the terms Mina and Stater point to this origin, the one being an Aramaic word (*mna* or *manah*), signifying "part," and the other a translation of the Semitic word shekel, signifying weight, having a similar meaning, but also the peculiar sexagesimal subdivisions of the Greek talent, in their various modifications, are from Babylonian sources.

The system of ancient Assyrian and Babylonian weight has become known to us through the discoveries by Mr. Layard of the ancient standard weights in the ruins of Nineveh and Babylon, the weight of which in pounds troy, from weighings at the Royal Mint, are given in his work.* These ancient weights are now deposited in the British Museum. There are two series of standard weights: the first of these consists of a set of sixteen bronze weights in the form of a crouching lion reposing on a pedestal, and bearing inscriptions in cuneiform character, Assyrian or Babylonian, together with Phœnician inscriptions. On the side of the pedestal there are marks of the number of units in each weight, thus, | | | | | | A segment of a ring was originally fixed on the back on most of these weights, and served as a handle. These weights are of elegant and artistic form.

The standard weights of the second series, also bearing cuneiform inscriptions, are in the form of a duck with its head turned round flat upon its back. These standard weights are made of marble or stone, and there are also some of hardened clay.

From these ancient standard weights, of undoubted authenticity and certain date, we learn not only the actual values of the Babylonian and Assyrian units of weight, the mina and the shekel, but their relative value, and the scale of weight adopted.

As some doubt has existed as to the actual weight of these ancient standards, different values having been assigned to them and the weight being marked upon many of them in lbs., ozs., etc., sometimes troy and sometimes avoirdupois, the Warden of the Standards thought it desirable, after consultation with Professor Miller, and as a matter of general interest, that they should be accurately compared with standard metric weights in a balance of precision, so as to determine their actual weight. Dr. Birch, in whose immediate charge these Assyrian antiquities are placed, courteously afforded every facility for the weighings, which were made at the British Museum by an officer of the Standards Department in November 1873. The opportunity was taken of obtaining the exact values of several other ancient Asiastic and Egyptian weights in Dr. Birch's custody. From the results of the weighings of the sixteen Babylonian and Assyrian standard lion weights, the values being stated both in metric grammes and in equivalent imperial grains in the official report, it would appear that they comprise two different systems, and that three of the sixteen belong to a lighter system of weight, the unit of which was one half of the unit of the heavier system.

The ancient Babylonian shekel was $\frac{1}{60}$th of the mina, and the mina $\frac{1}{60}$th of the talent.

Dr. Brandis calls attention also to a very large ancient lion weight of bronze, in perfect preservation and similar in form to the Babylonian lion weights, which was found by Botta in the ruins of Khorsabad, and is now in the Louvre. This bronze lion bears no inscription, but it weighs 60·400 kilograms (932,119 grains), and has therefore been considered to be a Babylonian talent, containing 60 of the heavier mina of 1006·66 grammes, or 15,535 grains.

Another large ancient bronze lion weight, similar to those found at Nineveh, but of inferior workmanship, is described in the *Revue Archéologique* for Jan. 1862, pp. 30—39. It was found at Abydos in the Troad. Its length is stated to be 34 or 35 centimetres (13½ inches), height 20 centimetres (7¾ inches), and weight 25,657 grammes (395,900 grains). It has been thought to be a Euboic talent, equal to ⅚ths of the lighter Babylonian talent, or to 50 of the lighter Babylonian mina. On the back of the lion is a mark resembling the Phœnician letter signifying "100." On one side of the base it bears a Phœnician inscription which has been deciphered as signifying "approved" (or "found correct,") on the part of the keepers of silver.' This bronze lion weight has an iron handle, and a supplementary layer of metal under the base.

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* From the Ninth Report of the Warden of the Standards.

* 'Discoveries in the Ruins of Nineveh and Babylon,' by A. H. Layard. Pp. 600. London, 1853.

The series of ancient Babylonian standard duck weights appear to belong to the system of the lighter mina weights.

From the evidence of this series of Assyrian and Babylonian standard weights in the form of lions and ducks, Dr. Brandis considers the heavier Babylonian talent to have weighed 1010 grammes, and the lighter talent 505 grammes. He refers to a perfectly well preserved plate of gold found in the ruins of the palace of Khorsabad, which weighs exactly 167 grammes, or $\frac{10}{60}$ths of the heavier mina, and $\frac{20}{60}$ of the lighter. Such minas would be equal to 1002 and 501 grammes respectively. The value thus assigned is a little more than that assigned by Queipo, viz. 993·4 and 496·7 grammes, being the mean of the more reliable weights, and more particularly as this last valuation very nearly approaches the weight of the Olympic mina of 489 grammes anciently used in Asia Minor. This mina was the 60th part of the Olympic talent, or the oldest commercial talent of Phœnicia.

In his 'History of Jewish Coinage,' and with reference to these ancient standards of weight, Mr. Madden adopts the views of his colleague, Mr. R. L. Poole, who, under the article "Weight" in Dr. Smith's 'Dictionary of the Bible,' prefers to take as the standard the maximum weight of the lion minas, that is to say, 15,984 English grains (or 1035 grammes) for the heavier mina, and 7992 grains (or 517·5 grammes) for the lighter mina.

The heavy and light minas were both divided into sixtieths or shekels, the heavier Babylonian shekel being thus, according to Mr. Poole, 266·4 grains, or 17·25 grammes, and the lighter shekel 133·2 grains, or 8·625 grammes. In like manner, Brandis makes the weights of the two shekels 16·83 and 8·41 grammes, and Queipo 16·56 and 8·28 grammes.

Mr. Poole adopts the opinion of Dr. Hincks that the lighter shekel was divided into thirtieths, and $\frac{1}{30}$th of 133·2 being equal to 4·4 grains, that this lesser unit, equal to a little more than four of our grains, is the key to the standard weight of the lesser duck weights.

But with the evidence now before us of the difference of the weight of the mina as a unit, and of its derived units, the talent and shekel, at different periods extending from 2000 to 625 B.C., the hypothesis of assigning an uniform specific weight to these units, and that derived from the maximum weight here found, appears inadmissible. It is probable that from time to time the standard weight of the mina varied during this extended period, just as we have found the weight of the English pound to have varied during a far shorter period, from the time of the Plantagenets to that of Queen Elizabeth. The more important of these variations in the pound weight, of which we have certain evidence, have been as follows:—

Saxon monetary lb. . . . = 5400 troy grains.
Merchants' lb. (Henry III.) . = 6750 "
Ancient Scotch lb. . . . . . = 7600 "
Troy lb. . . . . = 5760 "
Avoirdupois lb. . . . . . . = 7000 "

We may, therefore, assume from the evidence of these undoubtedly genuine ancient Babylonian standard weights that the weight of the Babylonian heavier mina varied from about 1040 to 960 grammes, or from 16,000 to 15,000 English grains, and the lighter mina from about 520 to 460 grammes, or from 8000 to 7000 English grains. It has been from this lighter mina that later units of weight, the Greek monetary mina and the modern pound, are supposed to have been derived.

As regards the standard of Egyptian weight, attention may be more particularly directed to a 5 kat standard weight, found amongst the ruins at Thebes, and now in the British Museum; its normal weight may taken to be 700 imperial grains. An account of it was first given by M. Chavas, in the *Revue Archéologique*, Paris, 1861. The ancient Egyptians are known to have had two units of weight, the larger of which, the *men* or *ten*, contained ten kat. The weight of these units is found to have been—

Men or ten . = 1400 grains or 90·717 grammes.
Kat . . . . = 140 " 9·071 "

Mr. Poole shows that the weight of the Ptolemaic copper coins was based upon such units.

Amongst the inscriptions at Karnac, recording the tributes imposed upon conquered nations by Thothmes III. (who reigned about 1445 B.C., according to Sir G. Wilkinson), two Pharaonic weights are frequently mentioned as having been used for gold, silver, and other metals, and for precious stones. Their names have been deciphered as *ten* and *kat*. Thus a large piece of lapis lazuli is mentioned as weighing "20 outen 9 kat." The largest unit of weight mentioned is the ten, some articles being stated to weigh 3000 ten.

The exact relation of the kat to the ten has been determined from a papyrus formerly in Mr. Harris's possession, and now in the British Museum, containing annals of Rameses III. (B.C. 1270), and showing the decimal ratio of 10 kat to the ten. The passage has been deciphered as follows:—

Good gold	217	ten	5	kat.
Earth gold, from land of Keb-ti or Coptos	61	"	3	"
Gold of Kush	290	"	8½	"
Total	569	"	6½	"

Dr. Brandis shows that the earliest money current in Mesopotamia consisted of small gold bars weighing about 16·8 and 8·4 grammes (260 and 130 grains), and silver bars of 11·2 and 5·6 grammes (172 and 86 grains); that is to say, pieces of gold and silver, of which the normal unit of weight was $\frac{1}{60}$ th and $\frac{1}{90}$ th of the mina. Their value was based on a determinate fineness, the legally established ratio of the value of gold and silver being then ten to one. In still earlier periods, payments were made in Assyria in silver of specified weight. Thus, in his recent work, 'Assyrian Discoveries in 1873-4,' Mr. Geo. Smith refers to his decipherings of cuneiform characters on an ancient Assyrian tablet of the reign of Esarhaddon, 671 B.C., relating to a deed of sale of 500 *sekul* or acres of land for four manahs of silver; to a sale of a female slave destined to the king's harem for one half manah of silver; and again to a sale of a cultivated field of barley for 11 shekels of silver.

It is generally considered that money was first *coined* in Asia Minor when subject to the Kings of Lydia, and at a period not earlier than the seventh or eighth century B.C. Herodotus expressly states that the Lydians were the first nation to introduce the use of gold and silver coin, and that they coined money before the Greeks. On the other hand, some numismatists maintain from the authority of the Parian marble that Pheidon, King of Argos, first coined silver money at Ægina. The date of Pheidon's reign is assigned by some authorities between 783 and 730 B.C., although Herodotus and Strabo date it about the 50th Olympiad, or according to the Newton chronology, 576 B.C. But Herodotus says that Pheidon only regulated the weights and measures of the Peloponnesians.

The earliest coins of the cities of Asia Minor, before the time of Crœsus, were of the alloyed metal known as electrum, or gold mixed with about 30 per cent. of silver, more or less. Dr. Brandis mentions two of these coins as now existing, weighing respectively 13·955 and 14·18 grammes, or about 216 grains. The earliest gold and silver Lydian coins are believed to be those of Crœsus, and to have been struck at Sardis. According to Rawlinson, Crœsus took Sardis 554 B.C. These gold staters have nearly the same weight as the somewhat later gold Darics—viz.: about 8 grammes or 124 grains. These Persian Darics are said to have been first coined by Darius Hystaspes, whose reign Rawlinson places 521 B.C. The earliest coins of Ægina were silver drachmas and didrachmas (equivalent to shekels), of which numerous specimens now exist. The mean weight of the earliest Æginetan drachmas is shown by Queipo (Vol. I. p. 425) to be 5·8 grammes, or 90 grains, and that of the didrachma 12·052 grammes, or 184 grains. Drachma in Greek signifies "handful."

At this early period there were two principal systems of weight established in Greece. The Attic monetary mina, according to Quiepo, was equal to 425 grammes, or 6558 imperial grains, and was equal to the 100th part of the Egyptian monetary talent. It was divided into 50 didrachmas of 85 grammes each, corresponding with the light Babylonian shekel, and into 100 drachmas. The Greek commercial mina, supposed to be of Phœnician or Egyptian origin, was equal to 587·213 grammes, or 9060 grains. It was the mina of the market in Egypt, and was the 50th part of the Olympic talent of 29,360 grammes (64·650 lbs. avoirdupois), considered to have been derived from the weight of water contained in the cube of the Olympic foot. This ancient measure of an Egyptian foot was ⅔ of the natural cubit of 6 palms, and was very nearly the same length as the modern English foot, being equal to 1·012 English foot. The weight of the Æginetan drachmas and didrachmas corresponds with the 100th and 50th parts of this commercial mina.

In the English translation of Dr. H. Schliemann's interesting work, 'Troy and its Remains,' lately published by Mr. Murray, London, 1875, there are two lists of supposed Trojan weights dug up at various depths, with their values in metric grammes. The first series is of terra cotta cylinders, balls, pyramids, etc. The second series is of round stones. The greater part of these were found in what is believed to have been the remains of ancient Troy, destroyed about 1200 B.C. The terra cotta specimens there found vary from 26 grammes to 748 grammes, and the stone balls from 100 grammes up to a maximum of 4260 grammes. But the weights vary so much, that no principal unit of weight can be deduced from them. Nor indeed is there any sufficient evidence of their having been used as weights, or any inscription upon them to warrant such a supposition.

Another system of weight in Egypt was based on the weight of water contained in the cube of Alexandrian or Phileterian foot, which was ⅔ of the royal cubit of 7 palms. This weight constituted the Egyptian monetary talent, and was afterwards known as the Alexandrian great talent. Its weight was 42,480 grammes, or 113·814 lbs. troy (655,556 grains). The mina of this system was $\frac{1}{50}$th of the talent, and equal to 849·6 grammes, or 13,110 imperial grains, and it was divided into 60 shekels, each of 14·16 grammes, or 218·5 grains.

There remains only to notice the Hebrew or Jewish system of weight, originally adopted from the Egyptian, with which the Babylonian system was afterwards mixed up. The earliest scale of Hebrew weight in the time of Moses is well known from the Mosaic writings, although there is a difference of opinion as to the absolute weight of the units. The *Kikkar*, or talent of silver, mentioned in Exodus xxxviii. 25, contained 50 mina and 3000 shekels, and is considered by Queipo to have been of the weight of the monetary talent. These shekels were called "Holy," or shekels of the sanctuary. The shekel, the 60th part of the mina, was divided into 20 gerahs, see Exodus xxx. 13, and Numb. iii. 47. "And the shekel shall be 20 gerahs, 20 shekels, 25 shekels, and 15 shekels shall be your manah," Ezek. xlv. 12. Madden (p. 281) agrees very nearly with this opinion of the value of the Hebrew silver talent, which he takes to have been about 660,000 grains. He bases this valuation on the known weight of the earliest coined shekel. He shows that the average weight of the heavier specimens of the earliest Jewish shekels coined in the time of the Maccabees was about 220 grains. At the same time, from the statement of Josephus that the Hebrew talent of gold contained 100 minas, he considers that the gold talent of the Jews was exactly double the silver talent. No further reference to the latter modifications of the system of Jewish weight is here needed.

EXPERIMENTS ON THE ARREST OF FERMENTATION BY SALICYLIC AND OTHER AROMATIC ACIDS.*

BY E. VON MEYER AND H. KOLBE.

Quantitative experiments were undertaken to ascertain the effect of the addition of salicylic acid to solutions of sugar and yeast, as regards its power of arresting fermentation. Neubauer's experiments pointed to a direct proportion between the quantity of salicylic acid present and the yeast destroyed; the authors show that this is true within certain limits only.

The experiments are tabulated in this abstract in nine series. The salicylic acid, dissolved in warm water, was added to the solution of sugar, which, unless otherwise stated, consisted of a 12 per cent. solution of glucose.

(1.) To determine the quantity of salicylic acid which is just sufficient to check the action of a given amount of yeast, and thus to fix the limit at which fermentation would begin when overstepped.

Experiment.	Result.
1 lit. sugar solution. ·25 grm. salicylic acid. 3 grms. yeast.	Weak fermentation.
⅓ lit. sugar solution. ·25 grm. salicylic acid. 1 grm yeast.	No fermentation.
⅓ lit. sugar solution, 6 per cent. ·25 grm. salicylic acid. 1 grm. yeast.	No fermentation.
1 lit. sugar solution. ·4 grm. salicylic acid. 5 grms. yeast.	Weak, but distinct fermentation.
1 lit. sugar solution. ·5 grm. salicylic acid. 15 grms. yeast.	Feeble fermentation.
To the last were added— ·5 grm. salicylic acid, and 15 grms. yeast.	The fermentation became active.
1 lit. sugar solution. ·6 grm. salicylic acid. 25 grms of yeast.	No fermentation.
To the last were added— ·6 grm. salicylic acid. 35 grms. yeast.	Moderately strong fermentation.
1 lit. sugar solution. ·75 grm. salicylic acid. 50 grms yeast.	Turbidity, but no evolution of gas.
To the last were added— ·75 grm. salicylic acid. 60 grms. yeast.	Evident fermentation.

The last experiment was repeated with a 6 per cent. solution, with the same result.

Representing the quantities of salicylic acid and limits of yeast, rendered inactive by co-ordinates, a curve is obtained, which rises gaadually up to ·4 gram, but steeply from that point to ·75 gram.

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* *Journal of the Chemical Society*; from the J. pr. Chem. [2], xii., 133—151.

(2.) The next series shows that the quantity of yeast rendered inactive by salicylic acid varies with the dilution of the fermenting substance, and is in inverse ratio to the quantity of the fermenting liquid, while the amount of sugar contained in it has no influence within certain limits.

Experiment.	Result.
2 lit. sugar solution, 6 per cent. ·5 grm. salicylic acid. 15 grms. yeast.	Distinct fermentation.
4 lit. sugar solution, 6 per cent. ·5 grm. salicylic acid. 5 grms. yeast.	Active fermentation after a short time.
1 lit. sugar solution, 12 p.c. 1 grm. salicylic acid. 30 grms. yeast.	Absolutely no fermentation.
4 lit. sugar solution, 12 p.c. 1 grm. salicylic acid. 30 grms. yeast.	Strong fermentation.
4 lit. sugar solution, 3 per cent. 1 grm. salicylic acid. 30 grms. yeast.	Active fermentation.
4 lit. sugar solution, 3 per cent. 1 grm. salicylic acid. 10 grms. yeast.	Evident fermentation.

(3.) In Neubauer's experiments a larger quantity of salicylic acid was required to check the fermenting power of yeast after it had been acting for some time than before it had commenced; but those experiments were performed with beer-must, in which the yeast rapidly multiplies. The following experiments show that where there is no considerable increase of the yeast (as when pure sugar is employed), the same quantity of salicylic acid that would be required at the commencement suffices to check fermentation after it has proceeded for some time. One gram of yeast was added to 1 litre of sugar-solution, and after fermentation had been set up, the addition of ·25 gram of salicylic acid completely arrested it. Similarly were 15 and 50 grams of yeast in 1 litre of sugar-solution checked by ·5 and ·65 gram of salicylic acid respectively.

(4.) The next experiments go to prove that after being checked by contact with salicylic acid, yeast cannot resume functional activity. The yeast in each case was washed till perfectly free from salicylic acid. It was then added to a fresh solution of sugar, but in neither case did it set up fermentation.

(1.)	(2.)
1 lit. sugar solution.	1 lit. sugar solution.
1 grm. salicylic acid.	·5 grm. salicylic acid.
30 grms. yeast.	10 grms. yeast.

(5.) To ascertain whether in arresting fermentation the salicylic acid suffers any chemical change, the next series of experiments were undertaken. The plan adopted was to add the salicylic acid to the fermentable mixture, containing yeast below or in excess of the limit, and then to separate what salicylic acid remained unaltered. The method employed to separate the salicylic acid after it had been added was to neutralize the warm filtered solution with chalk, evaporate, add hydrochloric acid, and then to shake up repeatedly with ether. The ethereal extract left a brown mass on evaporating, and this was extracted with chloroform. The residue from the evaporation of the chloroform solution was suspended in water, and treated with carbonate of lead. The lead salt was decomposed with sulphuretted hydrogen, the warmed solution treated with chalk, and the salicylic acid liberated from the lime salt by sufficient hydrochloric acid and ether. It was dried at 50°—60°,

Experiment.	Observation.
1 lit. solution, 3 per cent. 1 grm. salicylic acid. 30 grms. yeast.	After fermentation, 89·1 p. c. of the salicylic acid was recovered.
4 lit. sugar solution. 1 grm. salicylic acid. 40 grms. yeast.	87 per cent. of the salicylic acid recovered.
4 lit. sugar solution, 3 per cent. 1·5 grm. salicylic acid. 60 grms. yeast.	90 per cent. of the salicylic acid recovered.

(6.) The small loss is readily accounted for in the process of extraction. As confirmation of the inference from these results, the yeast was added in small successive quantities. To 1 litre of sugar-solution and ·5 gram salicylic acid there were added at intervals of four and five hours three times 5 grams, and twice 10 grams of yeast, that is to say 20 grams more than the salicylic could check if all added at once. The fluid was turbid with yeast, but there was no fermentation. In a similar experiment 140 grams of yeast did not cause fermentation in presence of 1 gram of salicylic acid.

(7.) A series of parallel experiments was made in the case of emulsin and amygdalin. It is evident that salicylic acid does influence this fermentation, from the fact that the greater the amount added the larger is the quantity of emulsin rendered inactive; but the action of salicylic acid is not nearly so powerful on emulsin as on yeast. The amygdalin was dissolved in the solution of salicylic acid, to which was then added a weighed quantity of sweet almonds, from which the oil had been removed by ether. After twenty-four hours in a closed vessel, the mixture was distilled, and the hydrocyanic acid estimated as silver salt. For example:—

Experiment.	Observation.
2·5 grms. pure amygdalin. 100 grms. water. 5 grms powdered almonds.	Yielded ·135 grm. hydrocyanic acid.
2·5 grms. pure amygdalin. 1 grm. salicylic acid. 12 grms. sweet almonds.	·0377 HCy, *i.e.*, 75 per cent. of the amygdalin was unaltered.
As above, but with only 5 grms. sweet almonds.	97·6 per cent. of the amygdalin remained undecomposed.

(8.) The next experiments demonstrated that an aqueous solution of salicylic acid coagulated emulsin, as well as albumin of hen's eggs; and further, that coagulated emulsin is without action on amygdalin; hence, when mixed with the salicylic acid, previous to meeting the amygdalin, the effect of emulsin is very greatly lessened.

(9.) Comparative experiments were also made with other aromatic acids. Cresotic acid gave the same results as salicylic acid. Benzoic acid acted similarly, but in a lesser degree, being one-fifth as powerful as salicylic acid. Chlorosalicylic acid exerted an action on yeast intermediate between the action of salicylic acid and that of benzoic acid. Paraoxybenzoic acid does not influence fermentation, but chlorodracylic acid, obtained from it by the action of phosphorus pentachloride, has a decided antifermentative action.

Gallic, pyrogallic, phthalic, and isophthalic acids are without effect.

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"SPONTANEOUS GENERATION."

OUR readers will doubtless remember that some years since a series of very interesting experiments made by Professor TYNDALL led him to the conclusion that the power of scattering light and the power of developing life which ordinary atmospheric air possesses, would both eventually be found to have an intimate connection with the existence of minute floating bodies which could be separated from air by filtration and other means. Oppressed with the uncertainty and confusion which now prevails in regard to the doctrine of "spontaneous generation," maintained by some and pronounced by PASTEUR to be a "chimera," as well as by the unsatisfactory state of medical opinion concerning the subject, Professor TYNDALL has thought it worth while to devote some time to the more complete demonstration of the utility in this respect of his method of examining the character of the medium in which experiments were conducted with the object of deciding the question whether the minute bodies whose existence in ordinary air he had demonstrated, are always produced from like bodies, previously existing, or whether they do not, under certain favourable conditions spring into existence *de novo*.

Observers are still at variance on this point, and with a view to the possible diminution of the prevailing uncertainty Professor TYNDALL has instituted a series of experiments, the results of which he recently laid before the Royal Society. By means of an apparatus described in the abstract of his paper he was enabled to expose a number of tubes containing organic infusions to air which had been deprived of the floating particles, the presence of which produced the scattering effect upon a beam of transmitted light. The infusions were boiled so as to destroy any bacteria or germs existing in them, and the experiments set going in order to decide the question whether air retaining all its gaseous ingredients, but cleansed from mechanically suspended bodies, can produce putrefaction. The infusions used in these experiments were prepared from a great variety of vegetable and animal materials, and the result obtained was that while the infusions exposed to the common air of the Royal Institution laboratory and maintained at a temperature of from 60° to 70° F. all fell into putrefaction within a few days, those on the other hand which were in contact only with air which had been proved "moteless" by the searching beam of light did not in any single instance manifest the least production of bacterial life or the associated phenomena of putrefaction.

From these results it was inferred by Professor TYNDALL that the power of developing such life and the power of scattering light was proved to be indissolubly united in atmospheric air. The sole condition necessary, as he maintains on this ground, to cause these infusions to swarm with active life is the access of the floating bodies in the air. It is among the finest ultra-microscopical particles that Professor TYNDALL maintains that the matter potential as regards the development of bacterial life is to be sought.

There is another form of experiment on which great stress has been laid, that of hermetically sealed tubes, in regard to which Dr. BASTIAN stated at the discussion on the 'Germ Theory of Disease' at the Pathological Society that when hermetically sealed flasks containing previously boiled infusions are kept in a warm place, they swarm more or less plentifully after a variable time with bacteria and allied organisms.

Professor TYNDALL was induced by the perusal of this discussion to experiment again on this subject, with the view of varying and multiplying the evidence. The most various materials were used in preparing the infusions; one hundred and thirty nine flasks containing them were operated upon, and here again the result was that out of the one hundred and thirty-nine liquids operated with, not one of this cloud of witnesses offered the least countenance to the assertion that boiled liquids within flasks hermetically sealed swarm subsequently, more or less, with bacteria and allied organisms.

Referring to Dr. BASTIAN's representation of the existing state of knowledge on this subject in 'Evolution and the Origin of Life,' where he says "We now know" that boiled infusions exposed to air, filtered or calcined, or shut off all altogether from contact with air, are more or less proved to swarm with bacteria and vibriones in a few days, Professor TYNDALL throws discredit on the statement by asking who are the "we" that possess this knowledge, and then proceeding to describe experiments of the kind in which he obtained negative results.

Dr. BASTIAN, in commenting upon Professor TYNDALL's paper, remarks that it is incumbent upon others to weigh his views and conclusions upon their own merits, and not to be merely influenced by his great reputation and the authoritative mode in which they were uttered.

He first objects to Professor TYNDALL's experiments as not being conducted with due regard to the conditions prescribed by him in regard to the temperature at which the infusions were to be maintained. And he urges that instead of keeping them at a temperature of 60° to 70° F., as Professor Tyndall did, a temperature of 80° to 95° is requisite, and that this is of immense importance, he having recently found that some infusions which remain sterile within hermetically sealed vessels at 90° F., or higher, not unfrequently may be made to putrefy if exposed for a few days to the still higher temperature of 115° F. He then goes on to say that looking to the very striking manner in which Professor Tyndall has deviated from the requisite experimental conditions in regard to temperature, it is impossible to have full confidence that he has prepared the infusions in the manner prescribed. As regards the hundred and thirty-nine instances in which Professor Tyndall failed to obtain the results indicated by him as being obtainable, Dr. Bastian says, that if so grave a question were not concerned, all this would be truly laughable, and, as it seems to him, far more like burlesque than the sober pursuit of science.

In a letter which appeared in the *Times*, Professor Tyndall briefly denied the applicability of the objections made to his conclusions by Dr. Bastian on the ground that in the matter of temperature there had been a departure from the experimental conditions necessary to success. The Professor contended that the difference in temperature was insufficient to account for the negative results of his experiments, and declared "Dr. Bastian's temperature hypothesis" would not answer.

In support of this view, he urged that many of the infusions prepared with the most scrupulous adherence to Dr. Bastian's prescription were exposed for weeks to temperatures varying from 80° to 90°, and nevertheless they remained perfectly sterile throughout, though a temperature 20° lower rapidly developed putrefaction in the presence of atmospheric air. He does not, however, deny that such a difference of temperature as Dr. Bastian objected to did exist, and there seems to be reason to regret that this was the case. Though Professor Tyndall declares that the subject was taken up by him with a full consciousness of its gravity and of the fact that upon its right solution depends the practice of the physician, and therefore, the lives of men, and that, knowing this, he spared neither care nor toil in examining the facts and doctrines which Dr. Bastian has of late years so successfully spread abroad, still the maximum point of the range of temperature in his experiments, as stated in the letter to the *Times*, was less than that directed by Dr. Bastian on the 'Beginnings of Life.' Whatever may be the actual value of this difference, it is unfortunate that it should have existed, especially since Dr. Bastian has insisted upon the importance of a temperature even so high as 115°.

Professor Tyndall, however, meets this difficulty by referring to another part of the 'Beginnings of Life,' where Dr. Bastian says that the temperature which actually sufficed for his "generations mostly ranged between 75° and 86° Fahrenheit, though it occasionally has been even higher than this." The absence of any reference to this passage by Dr. Bastian in his letter to the *Times* is characterized by Professor Tyndall as "suppression," and the reference to "recent" observations that some infusions remain sterile at 90° or higher, but may be made to putrefy if exposed for a few days to the still higher temperature of 115° F., is declared to be a needless exacerbation of the difference between Dr. Bastian and himself.

The forms of expression here introduced tend to remove the discussion from the field of science to that of ethics, and a still graver impulse in this direction is furnished by the succeeding passages, in which Professor Tyndall takes exception to the "morality" with which Dr. Bastian treats one of the gravest practical questions that ever came before the high court of Science. He refers, for illustration to Dr. Bastian's mention of Schwann as one of those constituting the "we," with whom Professor Tyndall admitted being unacquainted, and proceeds to summarize the paper in question with the result of showing very clearly that the conclusion deduced by Schwann from his experiments was unfavourable to spontaneous generation, inasmuch as he states it in these terms:—

"(1) A boiled organic substance, or a boiled liquid, previously capable of fermentation, does not ferment when placed sufficiently long in contact with calcined atmospheric air.

"(2) For putrefaction, as for fermentation, or more generally for processes in which new animals and plants appear, the introduction of either unboiled organic matter, or uncalcined atmospheric air, is necessary."

There can be no question that this is strictly accurate, and that it is so, is rendered still more evident by the circumstance that in a note Schwann mentioned experiments that gave a different result, and where liquids fed with calcined air sometimes fermented, but did so only to point out the mode of operating as the source of this anomaly which he thought "easily explicable," because "a little unboiled organic substance could readily enter the flasks."

Professor Tyndall points to this result as that on which Dr. Bastian founds his claim to quote Schwann, and he naturally, from this point of view expresses his astonishment; he then points to the remark with which he prefaces his list of investigators constituting the "we" referred to by him, viz. "what explanations these investigators severally gave of the facts they record, need not now detain us since it is the facts themselves which Professor Tyndall ignores and in fact denies," and he describes this as being put forward by Dr. Bastian in justification of this proceeding, adding that it is a cause of real grief to him to find English science the matrice of a birth like this.

But surely it is, to say the least, scarcely fair to Dr. Bastian to deny him the benefit of the position which he evidently seems in the passage above quoted to take deliberately. He does not rely upon the explanations of the investigators he refers to, but in fact disputes their accuracy and takes the facts they record as material for interpretation by the light of his own observations. To overlook this point seems to indicate a tendency to the position of the advocate, a position inconsistent with the championship of those "momentous interests" which Professor TYNDALL believes to be imperilled by Dr. BASTIAN'S error.

As the matter now stands little seems to have been gained in the elucidation of the obscure and difficult subject investigated with such opposite results by Dr. BASTIAN and Professor TYNDALL. The former declares that certain liquids exposed to air, whether filtered or calcined or shut off altogether from contact with air, are more or less prone to swarm with bacteria and vibriones in the course of a few days; that he has established the fact by his own experiment and that the experiments of others have confirmed his results. He holds that bacteria and their germs are decidedly killed by five minutes' boiling in organic infusions, and he produces Dr. BURDON SANDERSON'S criticism of his experiments as bearing testimony to the accuracy of his statement of fact, although Dr. SANDERSON is not willing to accept such fact as proof of "spontaneous generation." Professor TYNDALL, also adopting the opinion that boiling destroys the germs and bacteria brings forward one hundred and thirty-nine instances in which no such result as the development of bacteria and vibriones has been obtained, and upon this basis he asserts that in those instances where Dr. BASTIAN and others observed development of bacteria and vibriones, their germs were introduced into the liquids. Dr. BASTIAN replies that the Professor's negative results apply only to imperfectly conducted experiments and consequently the issue between them is still, whether certain boiled organic infusions can or cannot be made to putrefy in contact with pure air.

THE PROTECTOR AND THE ALCHEMIST.

HISTORY has associated OLIVER CROMWELL'S name with the author of one notable purge,—Colonel PRIDE,—but has not hitherto connected it with the discoverer of another,—the *sel mirabile* of GLAUBER. It has been reserved for a firm of Victorian auctioneers to suggest that the great Protector sometimes relieved the tedium of war and statecraft by the study of alchemy. We learn from the *City Press* that Messrs. PUTTICK and SIMPSON have discovered a volume of GLAUBER'S 'Alchemy,' containing, in CROMWELL'S own handwriting, the following commentary on the author, who was not only a believer in the "universal medicine," but also in the "philosopher's stone":—"Id sayde GLAUBER is an arrant knave. I doo bethinke me he speaketh off wonders which cannotte bee accomplished, nevertheless itt ijs lawfull toe the endeavour." The same book is said to contain a pen and ink drawing of a "Plan of Battell," signed "O. CROMWELL," showing the relative positions of the Parliament and Royalist armies, appended to which are the following Davidian lines:—

"O may ye Lord helpe me in mine pious undertakinge
Bie ye most highe. I will cuett you off roote and branche.'

Whatever may be thought of the sagacity and piety of the great Englishman, one cannot but agree with CARLYLE as to his "eager ungrammatical manner." But Board schools and spelling bees were unknown in the seventeenth century.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

February 16th, 1876.

Present—Messrs. Allchin, Barnes, Benger, Bottle, Carteighe, Corder, Gale, Linford, Martindale, Moss, Schweitzer, Taylor, and Umney.

Dr. Greenhow was present on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Three* failed. The following *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Thompson, Charles	Bedworth.
Walton, Edward Bridges	London.
Williams, Richard	St. Clears.
Wills, Geo. Sampson Valentine	Hay.

MINOR EXAMINATION.

Fourteen candidates were examined. *Seven* failed. The following *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Armistead, Hugh Baldwin	Liverpool.
Maggs, Frederick Richard	Yeovil.
Pain, Arthur	Bury St. Edmunds.
Smith, Edward Michell	Weymouth.
Stevens, James	Strood.
Stoddart, Wm. Walter Boycott	Bristol.
Williams, Joseph Phillips	Neath.

PRELIMINARY EXAMINATION.

The under-mentioned certificates were received in lieu of the Society's examination:—

Certificates of the University of Cambridge.

Atherton, John Henry	Wigan.
Cherry, Edmund F.	St. John's Wood.
Cox, Arthur Wellesley	Yeovil.
Timms, William Henry	Worcester.

Certificate of the University of Durham.

Weaver, James	Richmond.

Certificate of the University of Oxford.

Gordelier, Frank Heward	Sittingbourne.

February 17th, 1876.

Present—Messrs. Allchin, Barnes, Benger, Bottle, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Taylor, and Umney.

MINOR EXAMINATION.

Twelve candidates were examined. *Seven* failed. The following *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Adams, Herbert Richard	Shepherd's Bush.
Bishop, Edward James	Leicester.
Griffiths, Benjamin	Cardiff.
Hartridge, James Hills	Woodbridge.
Senier, Harold	Finsbury Park.

MODIFIED EXAMINATION.

Seven candidates were examined. *Four* failed. The following *three* passed, and were declared qualified to be registered as Chemists and Druggists:—

Battman, Thomas	London.
Davies, John	Lampeter.
Melvin, James	Chepstow.

PRELIMINARY EXAMINATION.

The undermentioned certificate was received in lieu of the Society's examination:—

Certificate of the University of Cambridge.

Wood, Robert .... Loughborough.

Erratum.—No. 293, p. 631, col. i., line 4 from top, for "Jenkins, Thomas, Swansea," read "Jenkins, Thomas, London."

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The seventh general meeting was held at the Royal Institution, January 20, 1876. The President, Mr. A. H. Mason, F.C.S., in the chair. Messrs. James Crean and W. S. Howarth were elected members.

Several inquiries were found in the question box, which were replied to by the members present. The evening was devoted to miscellaneous communications.

Mr. Thomas Garside, F.C.S., stated that while analysing some samples of kaolin, he noticed that when ignited in contact with chloride of magnesium the aluminum became soluble in water. He asked for an explanation of the phenomenon; his opinion was that it was probably due to an interchange of acids, resulting in the formation of chloride of aluminum and silicate of magnesium.

Mr. James T. Armstrong, F.C.S., and Mr. A. E. Tanner spoke of the new product recently introduced into this country from America, called vaseline; they thought it would probably be found useful as a substitute for lard, as a basis for ointments. It was a solid substance, without smell, unalterable in air, tasteless, not acted upon by acids or alkalies, and supposed to be obtained in the purification of petroleum.

There was a discussion on a subject of sanitary importance to Liverpool, to which Mr. Armstrong called attention; viz., the fact that the authorities were permitting town refuse to be thrown upon building land, and the houses built upon this refuse were most unhealthy. Messrs. Sanderson and Parkes had strongly condemned the practice in their official report, and still it was persisted in. The President, Messrs. Davies, Garside, and Tanner took part in the discussion.

The eighth general meeting was held the Royal Institution, February 3, 1876. The President, Mr. A. H. Mason, F.C.S., in the chair. Mr. E. H. Morton, F.C.S., was elected member. The President exhibited a specimen of pure crystallized glycerine, from Messrs. Dunn and Co., of Stratford, a portion of a bulk of 40 lbs. The crystallization had been induced by exposure to the cold of the early part of January, combined with the agitation of a journey by rail. Its specific gravity at its melting point, 60° F., was found by Dr. Von Hamel Ross to be 1·261.

Mr. S. W. Lee exhibited the following specimens of salts of vanadium:—Sulphate of vanadium, chloride of vanadium, oxalate of vanadium, chloride of sodium and vanadium, pure vanadate of soda, divanadate of soda, divanadate of potash, divanadate of ammonium, divanadate of lead, orthovanadate of potash, orthovanadate of ammonium, phosphovanadate of potash. These were kindly lent by Messrs. Johnson, Matthey and Co., of London. It was stated that vanadium has latterly been a subject of active research, and, from recent experiments, will probably soon become an important commercial article. A vote of thanks was unanimously passed to Messrs. Johnson and Matthey for their kindness in lending the specimens.

The President then called upon Mr. E. W. Parnell, F.C.S., to read his paper on "Electricity applied to Analytical Chemistry." The paper contained an account of the manner in which electricity has been applied for the determination of copper, nickel, and cobalt in the Government mining establishment at Mansfeld, Eislehen. A lively discussion followed the reading of the paper, in which the President, Messrs. Davies, Garside, Williams, and others took part. A cordial vote of thanks to Mr. Parnell for his very instructive and interesting paper brought the meeting to a close.

LEEDS CHEMISTS' ASSOCIATION.

The eighth general meeting of this Association for the present session was held in the Science Lecture Room of the Leeds Mechanics Institute, on Tuesday evening, February 8th. In the absence of the president, the chair was occupied by Mr. F. Reynolds, and Mr. George Ward proceeded to deliver his fourth lecture on "Practical Pharmacy."

"The determination of the boiling point of liquids" having been left over from the last occasion was first taken up this evening. The lecturer said it might be described "as that point when the elastic force of the vapour in the liquid is equal to the pressure of the surrounding atmosphere." It was, under fixed conditions a constant point; but varying with the amount of pressure and temperature brought to bear upon it; also, to a limited extent with the nature of the vessel in which the liquid was contained; it is affected as well by the presence of matter soluble or otherwise. As an instance of the latter, the practice of using pieces of platinum or of broken glass in distilling oil of vitriol was given. The mode of taking the boiling point with the thermometer by suspending it in a flask containing the boiling liquid just above its surface, and the lowering of the boiling point by removal of pressure when a liquid was placed under the receiver of an air pump, were here shown. In different liquids the boiling point varied greatly, and was hence frequently used as a test of their purity, as in the case of ether, benzol, etc.

Evaporation.—The lecturer said this was a subject following very naturally the former one. Water and every other liquid give off vapour at all temperatures, the amount given off by any liquid depending upon its boiling point. Dalton's theory "that the tension of all vapours was alike if taken at the same number of degrees below their own boiling point," was not *absolutely correct*, but very good, except for short distances above or below their boiling points. Dry air as stated in a former lecture had an increased capacity for moisture. There was a limit to evaporation, mercury giving off vapour at ordinary temperatures, but not when cooled to a very low temperature; whilst oil of vitriol did not give off any vapour at ordinary temperatures. Evaporation took place in solids; as for instance, camphor, and even ice was subject to this process. The influences affecting evaporation were, extent of surface, amount of pressure, and kind of atmosphere exerting the pressure on that surface. The latter influence was most effectually dealt with by the *vacuum pan*, in which evaporation went on at a much lower temperature than in vessels exposed to the pressure of the atmosphere, and hence its great value in the preparation of extracts. The different modes of preparing extracts were, the old way of using a naked flame, very unsafe, a certain amount of chairing being almost sure to take place, and in these days might be well considered inadmissible; by the water bath, a decided improvement upon the former method, but subject to this detraction that the temperature of the article operated upon could not be raised to the boiling point; the oil bath was a very good appliance if it could be kept cleanly; but undoubtedly the proper apparatus for evaporating extracts in, especially when prepared in large quantities, was the jacketed steam pan, which when fitted with an escape valve was almost as perfect as could be desired. It was very important to finish the evaporation of extracts at a low temperature.

Distillation.—This was again very closely allied to the last subject, and a process much used by pharmacists both in direct preparation of medicinal substances, and in the recovery of spirit, etc., used in the manipulation of other preparations. The lecturer here showed and described Liebig's Condenser, Woulfe's Bottles, and the Worm; the atter being chiefly used when large quantities were to be operated upon. Professor Williamson's beautiful continous process for distilling ether was then described, in which a stream of spirit of wine just sufficiently large is allowed to run into the retort, acted upon at once by the sulphuric acid already contained therein, and passes over at the condensing end as ether and water.

Sublimation differed from distillation, in that in one case a liquid was the body operated on, and in the other a solid. The main thing to be considered in this process was the mode of condensation of the product. A sample of compact calomel was shown, in which the condensation had taken place in *confined* space, whereas had the product been condensed in a larger area, with more atmospheric air, or in the presence of steam as was suggested by Mr. Josh Jewel, of Messrs. Howard's, some years ago, the calomel would have been in the finely divided state in which it is usually met with.

In conclusion the lecturer gave several other instances of the process of sublimation of articles in the British Pharmacopœia.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION AND SCHOOL OF PHARMACY.

The fourth ordinary monthly meeting of the session took place at 37, Blackfriars Street on Wednesday evening, February 9th. The President (Mr. W. S. Brown) in the chair. Mr. Louis Siebold who had been advertised to lecture was prevented by illness from being present.

Messrs. Brumwell, J. B. Bond, L. P. Chapman, William Porter, and Clegg were elected associates.

The Secretary (Mr. Benger) then announced that the Council of the Pharmaceutical Society had made a grant of £25 in aid of the expenses of the Manchester School.

The Chairman having alluded in the course of his remarks to the liberal grant of £50 made last session and the apparently beneficial effect it had produced, said it had been a great gratification to him to report such a result when making this second application for aid in the Pharmaceutical Council. He had met with the utmost appreciation of local effort, and he could not refrain from telling them, that whenever he or their friend Mr. Benger paid official visits to London they always heard the Manchester Association spoken of in the kindest manner by every member of the Council, and especially by the President, Mr. T. H. Hills, who seemed to feel a warm interest in their doings. He (the chairman) hoped the Association would always remember they had a name and character to maintain, and continue to assist the executive in further developing and extending the work of the Society.

Mr. George Westmacot then moved—"That the Council of the Manchester Chemists and Druggists' Association and School of Pharmacy desire to express their cordial thanks to the Council of the Pharmaceutical Society for the liberal grant of £25 to be applied in aid of the expenses of the school."

The resolution was seconded by Mr. Barton and carried with acclamation.

A long and interesting conversation on a variety of trade subjects concluded a very excellent meeting.

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

The third regular meeting of the session was held December 21st, 1875, Dr. W. H. Pile in the chair.

Professor Maisch presented to the library, on behalf of Mr. J. C. Rumph, a catalogue and price list of Materia Medica, "Catalogus et Valor Materiæ Medicæ, seu medicamentorum simplicium et compositorum in officinis Molhusinis prostantium," printed in 1715. Besides much curious information, it contains the oaths as administered to apothecaries and physicians in the beginning of last century.

Professor Remington called attention to the suggestion that had been made by Mr. W. C. Bakes, of making a collection of pharmaceutical books and apparatus possessing historical interest.

Professor Remington read the following paper on—

ALOIN.

BY CHARLES L. MITCHELL, PH.G.

The subject of aloin having lately been again brought to the notice of the pharmaceutical world by the experiments of Dr. Tilden, it occurred to the writer to undertake some experiments on aloin, in order to ascertain if a good article could not be prepared by some reliable process, not too difficult for general adoption.

The grades of aloin, as found in the market, have occasioned much distrust of its value as a medicine, on account of the unreliability and uncertainty attending their use, very often being almost inert. Aloin, when of a good character, is a very safe and efficient cathartic and purgative, acting freely in doses of from 1 to 3 grs. It affords a convenient and efficacious method of obtaining the remedial effects of aloes in a concentrated form.

In making these experiments the process of Dr. Tilden (*Pharm. Journ.*, Nov. 5, 1870) was followed. "One pound of good Barbadoes aloes was broken up and dissolved with heat in 1 gal. water, acidulated with f℥ss sulphuric acid, and after perfect solution, was set aside for twenty-four hours to cool. The supernatant, clear liquid was poured off from the resin (which is comparatively inert), and evaporated by a gentle heat to about 2 pints, and then set aside for several days. On examining the liquid at the expiration of that time, a heavy crystalline deposit of a yellow colour was found on the bottom and sides of the vessel. This was collected on a filter, washed with a little ice-cold water to remove colouring matter, well drained and dried. This aloin is rather impure. It can be rendered quite pure by dissolving it in warm water, decolorizing with animal charcoal, and again evaporating and crystallizing.

Aloin, thus obtained, is of a yellow colour, crystalline, and of an extremely bitter, aloetic taste. It is slightly soluble in cold water, very soluble in hot water, and soluble in alcohol. The yield was about 600 grains.

Some of this aloin was made up into pills, and it purged actively in doses of 2 grs.

The liquid from which the crystalline deposit had been separated was evaporated to extract consistence, yielding about 10 ounces of a very good article of extractum aloes.

The main point to be considered in the preparation of a reliable article of aloin, is the selection of a good grade of aloes. Barbadoes aloes is generally the best, on account of the aloin obtained from it being much more easily separated and more active, than that obtained from the other varieties of aloes. Natal aloes, lately quite prevalent in the market, also affords an extremely handsome "looking" article of aloin, but unfortunately it, as well as the aloes itself, is very weak in its action; 15 and 20 grs. of the aloin having been taken with the result of only a slight purgative action.

The writer also examined an article of aloin prepared from a grade of aloes called Curaçoa, but this was also quite weak in its action.

The best means of detecting the nataloin is by its reaction with strong sulphuric acid, and the vapour of nitric acid, as proposed by Histed. Add a few grains of the suspected aloin to several drops of strong sulphuric acid, and then pass a glass rod, moistened with strong nitric acid, gently just over its surface. The presence of nataloin will be indicated by the blue colour which immediately results. Barbaloin can be detected by its reaction with strong nitric acid, giving a red colour.

Professor Maisch asked for further information concerning the extract described as being made from the mother liquid after the separation of the crystals of aloin.

Professor Remington said it had the appearance of a good extract. Some members, however, thought that it should not be used for the extract of aloes, as officinal in some European pharmacopœias.

Mr. I. J. Grahame believed the results claimed for the administration of aloin, as a substitute for aloes, had not been realized. He said the therapeutic effects of the various aloins were different; the drug was sold at a high price, and required to be given in comparatively large doses. On the other hand, aloes is used more frequently as a laxative than as a cathartic, and with a good article, the dose was not large.

Mr. Wm. McIntyre read a paper on—

WAFER CAPSULES AS A MEANS OF ADMINISTRATION OF MEDICINES.

BY WILLIAN MC INTYRE, PH.G.

Recently attention has been specially directed to wafer envelopes or capsules as a means of administering medicines, and there have appeared in the market wafer discs and presses to enable druggists to dispense them. The want of information as to their production and the expense attending upon the press has proved a barrier to their general introduction.

The plan consists in having two small concave wafer discs to fit each other in such manner that when joined a perfectly sealed envelope or capsule is formed, thus rendering feasible the administration of such medicines as are free from moisture, in a tasteless and odourless manner, also allowing the presentation in one envelope of two substances, separated by a middle leaf of wafer paper, with the intention that they unite in the stomach, and form a salt in a nascent state.

It is possible to secure all these advantages by means of apparatus and wafer discs that can be prepared by any one at a very trifling outlay.

To prepare the capsules, the mode of proceeding is as follows: Procure wafers in sheets such as are used by fancy cake bakers. Cut them into circular pieces by means of an hollow punch. One of these is slightly moistened by placing it between wet muslin cloths, removed and inserted between two tin plates which have been prepared of the desired shape of the finished disc; after pressing together the plates, the wafer will have received the desired impression and is ready to receive whatever suitable combination the physician may desire to prescribe.

I have, however, found wafer sheets which could not be moistened and worked to advantage in this way; but these can be managed without this treatment, if the tin plates are heated, the flat wafer inserted, and pressure applied as before.

These latter have a highly polished surface and can be manufactured with greater rapidity than the former.

The use of the press is to seal the wafers. This is accomplished by properly moistening the internal surface of the rim of one wafer, upon which has previously been placed the medicine, and covering this with another, and submitting to pressure. This moistening is done by an apparatus formed by taking two hollow metallic cylinders, differing in diameter, enclosing one within the other and filling the intervening space with round lampwick or flannel cloth, which is allowed to slightly project. This is moistened by applying it to a piece of flannel which has been previously wetted; or one of the discs may be pressed upon a moistened cloth until the rim is in such condition that when applied to the filled disc it will adhere.

Mr. E. M. Boring has devised a press which answers all requirements, and is yet so simple in its construction that any one can, in a short time, with comparatively no expense, make one. It consists of two pieces of 1½ inch hardwood board, 2 inches wide and 9 inches long, joined at one end with a good hinge. The pressing surfaces consist of concave pieces of brass or metal, having a rim corresponding to the various sizes of wafer discs sunk to a proper level and fastened into the body of the press. For these buttons for stair-rods answer every purpose.

The medicated capsule is now ready for the patient, who will be thus enabled to take such bitter substances as quinia, aloes, etc., without perceiving the least taste whatever, and requiring very little effort to swallow, all that is requisite being to dip the wafer for a moment in cold water, place it upon the tongue, and swallow with a very small drink of water.

Professor Maisch said wafers in sheets had long been in use in Europe for this purpose. The introduction of the wafer capsules, by Limousin, had at first materially increased this mode of medication; but it appeared that their use there was already on the decline, and he believed their apparent advantages would not supplant the American methods now in use.

Professor Remington had used the capsules to a great extent, found them to answer a good purpose and claimed for them rapidity of action.

Professor Maisch suggested that a solution would act with still greater rapidity.

Mr. Charles Bullock did not believe that a greater amount of action could be claimed by the choice of one form of administration over another. The effect of a pill was equal to that of a powder; it might require a little more time but would frequently cause the medicine to be retained when the stomach would reject the same medicines if given in some other form.

Mr. J. B. McElroy had used the French wafers, and considered them very neat.

Mr. E. C. Jones claimed the use of a press as unnecessary, having seen the rim of two turned wood boxes used as a substitute.

Professor Remington said that two empty morphia bottles had been used by some in place of a press.

Professor Maisch exhibited a series of botanical models, made by Robert Brendel, of Berlin, Germany, which have been recently imported, to be used for the illustration of the lectures on botany and materia medica. These models are faithful representations of the flowers and other parts of plants belonging to different natural orders, magnified to such an extent that the different parts can be readily seen at some distance; they are painted in the natural colours of the organs which they represent, and many of them can be taken apart so as to exhibit their internal structure. Amongst the models shown were those of *Aconitum Napellus*, *Viola tricolor*, *Conium maculatum*, *Hypericum perforatum*, *Maruta cotula*, *Digitalis purpurea*, *Colchicum autumnale*, *Atropa belladonna*, the flowers of the potato, strawberry, apple, cherry and others, the entire series comprising sixty-five numbers, of which twenty-five consist of from two to four distinct models.

Mr. E. M. Boring directed the attention of the meeting to the following prescription:—

℞	Quiniæ Sulphatis	gr.xvi
	Tinct. Ferri Chloridi	fʒiss
	Acidi Phosphorici Diluti . . .	fʒi
	Syrupi	f℥iss
	Aquæ, q.s. ad.	f℥iv

A white precipitate being formed, the ingredients were mixed in various ways, and the quinia dissolved in the necessary quantity of dilute muriatic acid, with the effect merely of delaying the appearance of the precipitate. The phosphoric acid used had been made of phosphorus, and the precipitate, having been found to be ferric phosphate, several other samples of dilute phosphoric acid were procured and tested with solution of ferric chloride containing no free acid, by adding three drops of the former and two drops of the iron solution to one drachm of water, when precipitates would occur. Upon reversing the proportions, using two drops of acid and three of iron, two of the samples gave precipitates, one became opalescent and two remained clear. One of the latter had been made by Professor Markoe's process. On mixing the acid with an equal quantity of tincture of iron, diluting this with water, as directed in the prescription, one-half the quantity of the quinia was added, and the solution remained perfectly clear, while the whole quantity of quinia ordered almost immediately caused the appearance of a precipitate. The inference drawn from his experience was, that testing with neutral chloride of iron some definite proportion should be given, because if carried to very dilute solution the resulting phosphate of iron would not remain in solution. This was not so readily observed in using the tincture of chloride of iron, which contains free hydrochloric acid.

Mr. I. J. Grahame had met with the difficulty as early as 1868. He had been able to prepare an acid from the glacial acid that would mix clear with tincture of chloride of iron by prolonging the time of heating. The details of the U. S. Pharmacopœia he regarded as not specific enough n this case.

Dr. Pile said all the glacial phosphoric acid that had lately been examined was found to contain phosphate of sodium, and no means of getting rid of this contamination had been presented.

Mr. R. V. Mattison thought that with a knowledge of this adulteration, it would not be proper to prepare the medicinal acid from it. There was some difficulty in getting rid of the nitric acid, and too high a heat would generate pyrophosphoric acid.

Professor Remington suggested, that if an acid which would not at first mix clear with the tincture, were allowed to stand some time, a change would take place; and said that an acid could not be made from the glacial acid that would answer for this purpose unless free nitric acid was purposely left in it.

Professor Maisch did not agree in this statement. Like Professor Graham, he had observed glacial phosphoric acid containing sodium compound to be completely converted into orthophosphoric acid; it was an old method, practised in analytical laboratories, to convert pyrophosphates into orthophosphates, by boiling them with nitric acid. He had pointed out, three years ago, to a number of persons, the cause of the difficulty with the dilute phosphoric acid made from glacial acid.

Dr. Pile had tested the acid prepared by Professor Markoe's process for ammonia, by saturating with caustic soda, but did not perceive any odour of ammonia. A sample of an acid, prepared by the same process by A. P. Brown, was tested by Professor Maisch, and found to contain some ammonia.

QUEKETT MICROSCOPICAL CLUB.

Friday, Feb. 25th., at eight o'clock:—Papers "On an Improved Freezing Microtone," by R. Packenham Williams; "On a New Stage Arrangement for the Examination of Objects by Reflected or Transmitted Light," by Nathaniel E. Green.

Parliamentary and Law Proceedings.

Fatal Mistake by a Dispenser.

On Tuesday last Mr. Humphreys held an inquest at the York Minster Tavern, Stepney, on the body of Mr. John McMorine, aged 31, of Philpot Street, Stepney, who died on the previous Wednesday from the effects of poison.

James Ray, 61, Philpot Street, draper, a friend of the deceased, deposed that he was with him at the time of his death. Deceased said to witness that he had been poisoned, and had taken a dose of medicine which would take him home.

Dr. Allwyn Llewellyn said he had attended deceased, who suffered from disease of the lungs. Witness's assistant prescribed for the deceased on Tuesday last, deceased having requested to have another bottle of the mixture which the assistant had previously prescribed. The mixture was sent, and the order was entered in the day book (produced), as usual, and the dispenser made up the mixture, and initialled the prescription in the book, making a reference to another folio of the book containing the prescription. That prescription was in the handwriting of the dispenser. Nothing in the prescription would be at all prejudicial to health.

David Scott, assistant to the last witness, having given similar evidence,

Thomas Davis, the dispenser, after being duly cautioned by the coroner, said that he was a registered member of the Pharmaceutical Society. The folio in the day-book of 1st February was in his handwriting, taken from the dictation of the last witness. Witness also initialled the prescription on the 8th February, and referred to the original entry before making the last one up.

Evidence was then given that the deceased had died from the effect of aconite. Mr. Charles Tidy, B.M., Professor of Medical Jurisprudence and Lecturer on Chemistry at the London Hospital, said that he had examined the contents of a bottle purporting to contain a portion of the medicine in question. It contained ammonia, camphor, and six-tenths of a grain of aconite (*sic*). Supposing deceased took a sixth part of the mixture he would have taken one-tenth of a grain of aconite. Witness had received some aconite liniment, and found that six drachms of that liniment contained six-tenths of a grain of aconite. The tenth of a grain of aconite would be sufficient to cause the death of a strong man.

Mr. Davis, recalled, said that he could give no exact account how the aconite got into the bottle, but he believed that he must have made the mistake as the aconite was kept in the same cupboard with one of the drugs contained in the prescription. From an examination of the bottles in that cupboard he had no doubt that he had committed a fatal error. By Mr. Agar—Had been a dispenser for twenty-eight years, and had had sole charge of Dr. Llewellyn's surgery for eight years. By the Jury—He went for the drug he required mechanically, and probably did not look at the bottles so minutely as he should have done, hence the error.

The jury returned a verdict of "Death by misadventure," and appended thereto a rider severely censuring Mr. Davis for not having taken greater care.—*Daily News.*

[⁂ It will be noted that in this report, Mr. Davis is made to say that he is a registered member of the Pharmaceutical Society. Mr. Davis is, however, in no way connected with the Pharmaceutical Society; although his name appears on the Register of Chemists and Druggists, from the fact of his having been in business before the passing of the Pharmacy Act, 1868. It would be interesting to learn from some of our medical contemporaries whether, apart from the sad result in this case, the prescribing by a registered chemist and druggist, which they consider to be so culpable when done over his own counter, is less wrong when done in the surgery, and on behalf of a medical practitioner.—Ed. Ph. Journ.]

Poisoning by Morphia.

An inquest has been held by Dr. Hardwicke, in Camden Town, on the body of George Locke, aged 52. The deceased had been suffering from a nervous affection and sleeplessness, and had been in the habit of taking morphia to procure sleep. On Thursday evening he went to bed in good health and spirits, and at five o'clock in the morning he got out of bed and took a dose of the drug, and having done so said, "Oh dear me, I have taken too much of the stuff." He returned to bed, but soon began to make a strange noise, and it was found impossible to arouse him to a state of sensibility. He never spoke again. Dr. Ainsworth, of Camden Road, came with a stomach pump, which could not, however, be used. An antidote was administered without effect. Deceased died about two o'clock on Friday afternoon. Dr. Ainsworth stated that the cause of death was the overdose of morphia. The jury returned a verdict of "Death from misadventure."

Poisoning by Aconite.

The *Echo* reports that on Tuesday last Dr. Turner, of Northampton, committed suicide by taking a dose of aconite. He had recently resigned the post of medical officer to the Friendly Societies' Institute, and had fallen into intemperate habits. He had been in the habit of taking opium and other anodynes to induce sleep.

Adulteration of Mustard.—The Labelling of Packages.

On Friday, the 11th inst., at the Greenwich Police Court, two summonses were entered against grocers for selling mustard adulterated. In the first case the inspector appointed under the Act deposed to purchasing a quarter of a pound of mustard, which was served to him by the daughter of the shopkeeper from a can bearing a printed label on the front, in large letters, "Best London Mustard." He was charged for it at the rate of 1*s.* per lb., the price of genuine mustard being double that amount. When the inspector remarked that he hoped the mustard was pure, as he had purchased it for the purpose of analysis, the daughter said it was a low-priced mustard. She called her mother, who now produced the can from which the mustard had been taken, and on the sides of which were printed labels to the effect that the article sold as mustard was mustard seed and with an admixture of other condiments, to produce greater flavour and pungency. An analysis was made by the district analyst, who certified that the mustard in question contained 18 per cent. of starch from wheat and 6 per cent. of turmeric and rye, which would increase the weight of mustard, but would not be injurious to health.

Mr. Spencer, the solicitor to the district board, pointed out that by the 8th section of the Adulteration of Food Act, the vendor of any article which had any admixture was required to place on the article sold a label, either printed or legibly written, denoting such admixture, otherwise he would be liable to a penalty.

Mr. Balguy, in disposing of this case, said it was difficult to understand what was meant by the words in the clause cited, and in suggesting that the summonses should be withdrawn, which was agreed to, he recommended that dealers should place labels on the packages sold.

In the second case, a like purchase of mustard had been made, the price charged being 2*s.* per lb., and the dealer declined to retain a portion on hearing it was to be analysed, stating it was Sadler's mustard, supplied to him by respectable firms, who were agents to the manufacturer, and that he was sure it was pure, the covering at the top and bottom of each cask having branded the words "genuine" and "pure." The result of the analysis showed that there was an admixture of 18 per cent. of starch from wheat and 18 per cent. of turmeric and rye, not injurious to health.

The defendant, in answer to the magistrate, said he relied on the purity of the article, and had not had any warranty from the persons of whom he had purchased.

Mr. Balguy imposed a nominal penalty of 2s. 6d. and 2*s.* costs, advising that dealers should obtain warranties as to the purity of the articles retailed.—*Times.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

The Microscopic Examination of Crude Drugs and other Vegetable Products. By Mark W. Harrington, M.A. Ann Arbor: J. Moore, 1876. From the Author.

Obituary.

Notice has been received of the death of the following: On the 25th January, 1876, Mr. Frederick Hooker, chemist and druggist, of Kingswinford. Aged 40 years.

Notes and Queries.

[496]. BOW'S LINIMENT.—

℞	Opii,	
	Camph. . . . . āā	ʒiiss
	Sapo. Cast.	℥i ʒii
	Ol. Lavand.	ʒii
	Spt. Vin. Rect.	℥xvii
	Liq. Ammon. Fort.	ʒiij

M. ft. Liniment.—F. S.

[496]. BOW'S LINIMENT.—The form for above much used in the north is as follows:—

℞	Opium	℥2½
	Soap	℥1¼
	Comp. Camphor Liniment	℥20

Digest for 14 days, press and filter.—Drug Traveller.

[496]. BOW'S LINIMENT.—I have for many years made a Liniment similar to Dr. Bow's as follows:—

Lint. Camp. Co.
Lint. Saponis.
Tinct. Opii.

M. partes æquales.—W. R. S.

[496]. BOW'S LINIMENT.—Below is the form for this preparation:—

℞	Opium	℥j
	Lin. Camph. Co.	℥viii

M. ft. Liniment. Digest 7 days.—H. C. Baildon.

[497]. BRONZE POWDER.—Drug Traveller asks for a form for a bronze powder that will mix with oily or fatty substances without turning green through their action on it by oxidation or otherwise on exposure.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Proposed Hanbury Medal.

Sir,—The proposition to establish a gold medal for original research in materia medica and pharmacy in honour of our departed friend and colleague, Daniel Hanbury, reflects credit on the Pharmaceutical Society of Great Britain.

It is a proof how much Hanbury was appreciated in England, and I would like to bear my testimony to the fact that he was equally esteemed by his colleagues in other countries.

The suggestion of Mr. Greenish, which has since been to a certain extent formulated by Professor Dragendorf, seems well adapted to perpetuate Hanbury's memory. His researches in materia medica were original and thorough.

The Pharmaceutical Society of Great Britain will please accept this, my appreciation of my late friend and colleague and of their desire to do honour to his memory.

JOSEF DITTRICH,
Pharmacist.

Prague, Bohemia,
Feb. 13, 1876.

THE BENEVOLENT FUND.

Sir,—Having on several occasions occupied a place in your columns in striving to bring the claims of this important fund before the notice of the trade, I was greatly pleased with your editorial article, which appears to me clear, candid, and an exhaustive reply to every objection that can be urged against subscribing.

It has always seemed to me a stigma upon our trade that almost nine-tenths of the number should refuse in any way to contribute to so praiseworthy an object, and now that one vote can be secured for half-a-crown, two for five shillings, and so on in proportion, it is to be hoped scarcely an individual connected with the trade will remain a non-subscriber.

If this desirable result be realized, and the 12,000 who now give nothing become contributors, we shall have an amount raised annually sufficient for all emergencies.

I still adhere to an opinion expressed by me in your columns some years since, that to accomplish this it will be necessary for a personal canvass of every shop in the trade to be made; the sooner something of the sort is done the better.

ONE WHO HAS KNOWN THE DRUG TRADE
MORE THAN THIRTY YEARS.

TABLESPOONFULS, ETC.

Sir,—I have carefully read Mr. Proctor's letter on the existing methods of measuring doses, and after considering a variety of plans for the improvement of the present very unsatisfactory way in which doses are divided, I have come to the conclusion that little cylindrical cups, either of glass or earthenware, accurately made and holding only their respective doses—say, one teaspoonful (ʒj), one dessertspoonful (ʒij), and one tablespoonful (ʒiv)—would be the most desirable.

I admit there are glass and earthenware measures already in use, but then we have to charge 6*d.*, 9*d.*, or even more for them, and it is not in the province of poor people to pay for extras in times of sickness; nor is it always agreeable to the inclination of the affluent to buy a measure. But if our enterprising friends, Messrs. Maw, Son and Thompson, or any other sundries firm, would take the matter in hand, I think they would be able to supply us with these little measures so cheaply that we might even give them away to our customers with their mixtures.

The shape I would suggest for the teaspoonful measure would be that of an ordinary one drachm deep pill box (on a foot if preferred), and the word "tea" made in it if of glass, or printed on it if of earthenware, and the other sizes the same shape in proportion, labelled respectively "dessert" or "table." These measures need neither have lips nor handles, because with care the contents could, if desired, be poured into another vessel to be mixed perhaps with water or other vehicle.

But what I wish for is a simple, cheap, and exact measure, representing the usual doses prescribed, and I think this plan would be solving a difficulty which has presented itself for many years.

The present graduated glass measures are very confusing to people who are not over intelligent, and bottles graduated also for various doses are most likely to mislead.

I think it is generally understood that the different spoons are represented by the measures I have named, although from their want of uniformity they are not to be relied on.

ALFRED WM. SMITH.

Rye, Sussex.

Sir,—Mr. Barnard Proctor in last week's Journal has given prominence to a difficulty which must at one time or another have forced itself on the attention of every pharmacist, but the remedy suggested is by no means equal to the occasion. The addition of the distinction "small and large" tablespoon would be a step in the wrong direction, and only add another element of uncertainty to the present confusion.

I take it that the dispenser's duty is clear when the prescriber orders the dose; thus, "coch. mag." the dispenser should direct "a tablespoonful," leaving the responsibility on the shoulders of the prescriber, who may possibly get his patient to take a share of it. But if a prescriber orders "℥ss," and the dispenser directs "a tablespoonful," he takes the responsibility from the shoulders of the prescriber and places it on his own. This label should be written "a tablespoonful (by measure)," and the same distinction should be carried throughout. For instance, "guttæ" should be rendered "drops," and "minims" "drops (by measure);" "coch. med." should be rendered "a dessertspoonful, " and ʒij "a dessert-spoonful (by measure);" "coch. mag. ij" should be rendered "two tablespoonfuls," and ℥j "two tablespoonfuls (by measure)."

I hope I have made my view of a dispenser's duty clear. When the prescriber orders a definite measure as "℥ss" or "℥j," the label should distinctly bear the words, "by measure."

If this plan were more generally adopted, the graduated measure would become a necessity in every family, instead of being considered a luxury, as at the present time. The spoon, as a measure for medicine, should be banished from every household.

It is most desirable that a system should be generally adopted which, in an emergency, could on sound principles be defended; at present, practice widely differs, however nearly opinions coincide.

THOMAS GREENISH.

20, *New Street, Dorset Square,*
Feb. 16, 1876.

Sir,—The subject broached by Mr. Proctor is one of great importance, but I fear he has placed pharmacists on the horns of a dilemma, by letting it be understood that "half an ounce." in common parlance, may represent either a tablespoonful or a dessertspoonful.

The tea- and tablespoonful are such well known household measurements of fluids that in spite of their variation in size they must long continue to be the domestic measures of medicines as well as other things. The caprice of fashion has of late much enlarged their capacity, but for utility's sake there must necessarily be a limit to this. It is among the poor hospital patients, who cannot afford to buy a measure glass, and whose family heirlooms of these articles in silver too often get into the melting pot, that the difficulty Mr. Proctor points out is most felt. A week's supply of medicine often only lasts a patient four days. So impressed was I with this difficulty whilst revising the University College Hospital Pharmacopœia that I urged upon the committee the necessity of making an alteration with respect to what actual measurement should be understood by a tablespoonful. Having carried my point that the quantities ordered in each formula should represent an ordinary dose, generally it was two tablespoonfuls, I proposed that this should not be understood as one ounce, but ten drachms, or more accurately, as the equivalents in the metric system are given side by side with the English weights and measures, forty cubic centimetres. This I argued would be as near an approximation to the correct measurement as household measures would permit, and would be in accordance with the recognized equivalent of a tablespoonful mentioned in the Paris Codex, from which I quote as follows:—

Une cuillerée à café d'eau commune équivaut à 5 grammes.
,, ordinaire à 4 cuillerées à café ou 20 grammes.

The tablespoonful, "cuillerée ordinaire," here mentioned as equal to 20 grammes, would be equivalent to 5 drachms and 40 minims English, and that from several experiments I made at the time I found to be about the average. The teaspoonful, "cuillerée à café," according to the same scale would be equivalent to 85 minims, or in round numbers might be reckoned as 80 minims. This I found was approximately correct as an average.

As however, the time was not ripe for such a change, conservative ideas prevailed, but the discussion on the metric system about the same time was brought before an evening meeting by Mr. Wood, in April 1872, and seeing how deficient this system was in convenient measures of capacity suitable for dispensing purposes, all fluids being weighed in dispensing by it on the continent, I tried to elaborate the above into quantities which should be actual and definite measurements. I found a similar vagueness occurred with regard to the measurement of drops; only a drop of most tinctures is much less than a minim which it is understood to be equivalent to; a drop of digitalis or aconite, for example, is only about half a minim. I, therefore, would suggest a new name for the accurate measurement of a drop and call it a goutt, equal to 0·05 cc., 100 of which would be a teaspoon. To distinguish these new definite quantities more emphatically I would propose the affix -ful should be dropped from teaspoonful and tablespoonful; let them be understood as so many teaspoons or tablespoons as the case may be.

Tabulated they would appear thus:—

1 goutt =0·05 cc.=0·85 minims.
1 teaspoon = 100 goutts =5 cc. =85 minims.
1 tablespoon=4 teaspoons =20 cc. =flʒv m xl.
1 wineglass =4 tablespoons=80 cc. =fl℥ij flʒvj m 40.

This table presupposes the adoption of the metric system. As a step towards its complete acceptance and for the sake of greater accuracy, I would propose that we ought to suggest to the different medical authorities, that a tablespoonful should no longer be understood to represent half an ounce but five drachms, and a teaspoonful not one drachm, but eighty minims. A ten-ounce bottle would thus contain eight doses of two tablespoons, and an eight-ounce, six similar doses; a two-ounce vial would contain twelve of the new teaspoon doses. If such were adopted glass measures marked with the new tea- and tablespoons would soon become general.

WM. MARTINDALE.

10, *New Cavendish Street, W.*
February 16, 1876.

Sir,—Mr. Barnard Proctor opens up an important subject in the "half-ounce and tablespoonful dose question," one to which too little regard is paid by physicians sometimes and by patients very frequently.

The physician often orders two tablespoonfuls for a dose without giving directions as to the size of the spoon intended, and the result is that an 8 oz. mixture intended for 8 doses is nicely finished in about 5 or 6. In fact there are some tablespoons—one of such I have just measured accurately—7½ fluid drams, that would scarcely hold out 5 doses; and thus the patient gets nearly a double dose, and finds physic-taking rather an expensive luxury, if nothing worse.

Graduated bottles, I think, ought always to be marked in teaspoons or tablespoons, ʒj or ℥ss; otherwise I have found people swallowing for one dose 4 tablespoonfuls, mistaking the ounce graduation for one tablespoonful and taking two of them at once. This is not likely to occur often, but there are some people so foolish, ignorant or careless, that it may occur again as I have known it.

The way I get over the difficulty generally is by supplying to a well-to-do customer a graduated spoonful glass, and to poor folks a measure bottle, ½ oz. or 1 oz., with distinct verbal directions in addition to the written ones, first ascertaining that the ½ oz. or 1 oz. bottles are pretty true sizes.

I find this a very handy and satisfactory method, but I believe a system of exactly graduated bottles would be the best, excepting that they get into use again and again; 6 oz. bottles for strong cough drops, cholera drops or some powerful medicine, and then the ½ oz. graduations may become dangerous. but the 1 oz. ones still more so.

W. R. O. C.

Grimsby, Feb. 12, 1876.

Elegant Dispensing v. Correct Dispensng.

Sir,—I dispensed the enclosed prescription, and found in whatever order of mixing, a separation and deposit of a part of the chloroform.

My customer returned the mixture to me as "not right. It had been made up in London quite clear and bright."

It was evident the London dispenser had for the sake of appearances separated the insoluble part, and sent out the mixture clear. That was *elegant* but not *correct* dispensing.

You can hardly imagine the disadvantage under which a country chemist proceeds to explain to his customer why he is right, and the London house wrong, especially when it happens as in this case the London firm is one of great eminence.

However, I firmly and plainly laid down the rule, that we must follow the prescription, and have no authority to deprive the mixture of any portion of anything which may be prescribed therein, and again I sent the mixture home. Similar cases are not infrequent in the experience of

A COUNTRY M. P. S.

Copy.

℞. Liq. Arsenic Hydrochlor. . . . . ♏. cxxviij.
Tinct. Ferri Perchlor. . . . . . ʒv.
Sp. Chloroform. . . . . ʒv.
Aquæ ad . . . . ℥iv. M.

The Disguising of Poisons.

Sir,—The letter of your correspondent "Swedenborgian," touching upon the abuse of sugar and the danger of making powerful medicines palatable, gives rise to one or two thoughts I should like to express.

The first is that I fear and know that great danger to the public lies in the fashion of christening strong and even deadly medicines with simple and attractive names, and throwing them before the people through any channel—patent medicine dealers of all classes, hairdressers, stationers, country shopkeepers, etc.—who are thus enabled to break through the Poison Act, and to laugh at it, and to hand out narcotic compounds without a word of caution to the ignorant purchasers.

I dare say some of these preparations are labelled "poison" or "caution" or something, but the danger lies in the calling morphia "linseed," "liquorice," "horehound," or any such simple name, giving to the ignorant but feeble notions of its strength, and admitting, in consequence, of its careless administration.

I should very much like to see an alteration in matters of this kind, for the sake of public safety.

W. R. O. C.

Grimsby, Feb. 12, 1876.

"*Delta.*"—The alteration mentioned does not affect your relations with the person to whom you are apprenticed.

W. Wilson.—See "Notes on the Pharmacy of Ipecacuanha," by Dr. Duckworth, in vol. ii. of the present series of this Journal, p. 721.

"*Associate.*"—For formulæ for various preparations of pepsine, including the wine, see vol. iv. [3], p. 695.

"*Quærens.*"—A Preliminary examination was held at the beginning of last month, and a report of the results was published in the *Pharmaceutical Journal* for Jan. 22.

"*Hybrida*" is requested to forward his name and address.

A. Mitchell.—See Professor Tyndall's lectures on Light, which were reported in vol. iii. of the present series of this Journal, and have been published separately by Messrs. Longmans.

A. P. S.—The bark of *Atherospermum moschatum*, Forst., the "Australian sassafras tree," is sometimes, according to Dr. Mueller, used in Australia as a substitute for tea. Administered in a greater degree of concentration it is said to be diaphoretic and diuretic, and prescribed for this purpose by physicians in Victoria. We have been unable, however, to find any formula for a tincture. The receipt of your former communications was acknowledged.

A. R. Wilson.—We thank you for the correction, the necessity for which may fairly be laid at the door of a vicious system of notation.

N. W. S.—*Cherry Tooth Paste.*—Beasley gives the following recipe:—"Prepared coral 8 oz., cochineal 1 oz., cinnamon 2 oz., alum 3 dr., honey 20 oz., water 1 oz.; triturate the cochineal with the alum and water, add the honey, then the coral and cinnamon; leave the whole for twenty-four hours, or till the effervescence has subsided; then rub it with a few drops of oil of cloves, or other aromatic oil." Other recipes were given in vol. i. of present series, pp. 557 and 577.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Siebold, Mr. Smith, Civis, J. N. Reports of meetings of the Sheffield and Leicester Associations have been received, but too late for insertion in the present number.

PRINCEWOOD BARK, A FEBRIFUGE FROM THE BAHAMAS.

BY JOHN R. JACKSON, A.L.S.,

Curator of the Museums, Royal Gardens, Kew.

Under the name of Princewood, two distinct plants are generally known, both of which are natives of the West Indies; one is the *Cordia gerascanthoides*, Kth. a small tree, some twenty to thirty feet high, belonging to the natural order Boraginaceæ, and the other is the *Hamelia ventricosa*, Sw., likewise a small tree, but belonging to a totally different natural family, namely, the Rubiaceæ. These Princewood trees are both noted in the West Indies for their timber, which is produced of sufficient size to yield boards for table and cabinet work. The wood of the *Hamelia* is said to be somewhat soft, but to resemble in grain that of the elm, from which it is sometimes called Spanish elm. Whether the Princewood of commerce, which is used in this country chiefly for inlaying and turning, is the produce of either or both of the trees mentioned above it is not easy to say; they all agree pretty well in point of colour, which is a lightish brown, but the dark brown markings of the *Cordia* are broader and usually more bold than they are in the Princewood of commerce. It, however, is said to be imported from Jamaica, which would lead to the supposition of its being the produce of one or other of the trees referred to or of one closely allied. That the name Prince or Princewood is not confined to the genera *Hamelia* and *Cordia* is proved by the receipt recently at the Kew Museum of samples of bark from the Island of Andros, Bahamas, under the name of Princewood bark. This bark was described as the produce of a shrub or tree growing abundantly on the islands of Eleuthera and Andros, scantily on the island of New Providence, and probably on many of the south eastern islands of the colony. It is said not to be found, however, at Grand Bahama. The bark was described in the letter accompanying the specimen as possessing both astringent and tonic properties to such a degree as to make it quite a popular remedy in the Bahamas for those complaints affecting the mucous membrane of the bowels. Upon receipt of this bark and being guided by the common name, and the tonic properties attributed to it, our thoughts naturally led us to the genus *Hamelia*; fortunately, however, some fruits of the tree yielding the bark accompanied the specimen, and from these it was easy to determine that the plant was no *Hamelia* but *Exostemma caribœum*, R. S. This is described by Grisebach in his 'West Indian Flora' as "a fragrant shrub, ten to twenty feet high," widely distributed in Jamaica, Antigua, Dominica, Trinidad, Cuba, Mexico, and Guiana. It has been known as the Jesuits' bark of Jamaica, and in that island is sometimes called the Sea-side beech. The bark is smooth, of a deep reddish brown, but somewhat greyish on the outside; under an ordinary lens, numerous small crystals are seen distributed over its surface. It breaks with a short woody fracture. In flavour it is at first sweet, changing to an astringent bitterness. A small portion put in cold water quickly tinged the water, which in about ten minutes became as deep a colour as dark brandy. After standing a few hours the water became nearly opaque with a strong earthy smell and bitter taste. This bark, together with other species of the same genus, seem to be well known in the West Indies for their bitter qualities. Grisebach says "Of Quinquina only the spurious barks called 'Quinquina Piton,' or 'China caribæa,' occur in the West Indies—*Exostemma floribundum* and *brachycarpum*," so that the species under consideration seems to have escaped his notice so far as its special medicinal properties are concerned.

Of other species of *Exostemma* the barks of which are febrifugal, may be mentioned *E. cuspidatum*, a small tree, native ot Brazil, where it is called Quino do Mato, and the bark is used as a substitute for cinchona; *E. corymbiferum*, a native of the islands of the Pacific Ocean, the bark of which is very bitter and astringent, and *E. Philippicum*, likewise a small tree, native of the Philippine Islands, with a bitter medicinal bark.

So highly is the bark of the Bahamas Princewood (*E. caribœum*) esteemed in the Islands, that it has been suggested that the tree might prove valuable for acclimatization on the West Coast of Africa. Samples of the bark have been submitted to medical men in New Providence for examination and report.

STUDIES UPON ESSENTIAL OILS.

BY G. DRAGENDORFF,

Professor in the University of Dorpat, and Honorary Member of the Pharmaceutical Society of Great Britain.

(*Continued from page* 642.)

III. Detection of Essential Oils in Drugs, Medicinal Mixtures, and for the Purposes of Judicial Investigation.

From the previous section it may be inferred that essential oils, if they or the portions of plants containing them be subjected to the influence of steam at a temperature 100° C., readily distil over with the water, part—upon the cooling of the distillate—forming a layer at the top or the bottom of the water, and part being dissolved in it. In experiments of the nature indicated by the title of this section, this circumstance may be taken advantage of in order to obtain a liquid which will allow ot the oil being further isolated. As a rule, if it is a dry or pappy mass, or an alcoholic solution that has to be examined, it is advisable to mix the substance with water before the introduction of the steam. In this way, generally only an aqueous solution of the essential oil will be obtained, in which are suspended at most a few drops of the oil. In order to obtain this oil I have recommended in the Russian edition of my 'Ermittelung von Giften' that it should be shaken with petroleum spirit having a boiling point below 45° to 50° C.* This readily takes up the essential oil—both that dissolved and that suspended—from the water, so that only one repetition of the treatment with a fresh quantity of petroleum spirit is required in order to obtain the whole of the oil. The united petroleum washings are then evaporated at the ordinary temperature in a current of dry air, taking care that the vessel is only exposed to the latter exactly to the point when all the petroleum has evaporated. The oil remaining behind can generally be recognized by its smell. It has also been proved by experiments carried out in my laboratory by Herr Osse that the essential oil can be sufficiently isolated from the water even for quantitative analysis by shaking with petroleum spirit.

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* This should be rectified over lard, which will retain the greater part of the odorous compounds.

Such dry substances as part with their essential oil by digestion with petroleum spirit evidently do not require to be distilled. In a state of fine powder they can be macerated a few days with petroleum ether, filtered, etc., and the extract then evaporated. In this manner one of my pupils, Herr Hirschson, has rapidly made qualitative and quantitative estimations of the ethereal oils in gum resins* and resins.†

As a rule, the oils obtained by this method are very pure and colourless, and as already stated they can generally be recognized by their odour. But since the test of smell would always be liable to error, it appeared to me to be desirable to study also some known chemical reactions in order to furnish a surer method of determining the presence or absence of the different oils. I will here detail the experiments I have carried out with this object—experiments which appear to me to be worthy of being prosecuted further. They have been made with oils prepared here, or by Zeise, or else with oils which I believe to have been pure.

I have commenced by experimenting with the following reagents:—

a. A solution of 1 part of bromine in 20 parts of chloroform.

b. Impure chloral hydrate.

c. Alcoholic solution of hydrochloric acid.

d. Pure concentrated sulphuric acid.

e. A solution of 1 centigram of sodium molybdate in 1 c.c. of strong sulphuric acid (Fröhde's test).

f. Fuming nitric acid.

g. Picric acid.

h. Ammoniacal silver solution.

It is evident that these experiments would allow easily of being extended with other reagents.

(*a*) *Solution of Bromine in Chloroform.*—Ten to fifteen drops were mixed with one drop of the essential oil. Usually a coloration took place very quickly, which after a time gradually changed. The observed reactions, part of which are distinguished by their intensity, are described in the following table:—

Ol. Terebinthinæ Rect.: Remained colourless.

Ol. Terebinthinæ Crud.: The same.

Ol. Carui: The same.

Ol. Citri: The same.

Ol. Coriandri: The same.

Ol. Cardamomi Malab.: The same

Ol. Bergamottæ c. Ol. Tereb.: The same.

Ol. Bergamottæ verum: Yellow.

Ol. Caryophyllorum ipse parat.: At first colourless, then clear greenish. (Zanzibar oil: greenish yellow, then yellow brown, then brown).

Ol. Rosmarini: Colourless, afterwards clear greenish; with more bromine, clear violet, then rose.

Ol. Menthæ crispæ: Colourless, afterwards clear greenish blue.

Ol. Majoranæ: Colourless, afterwards green brown.

Ol. Fœniculi: Colourlesss, after twenty-four hours currant red.

Ol. Anisi: Colourless, then a beautiful clear reddish, gradually becoming more intense.

Ol. Anisi stellatum: Colourless, then rose, after twenty-four hours violet.

Ol. Macidis: Colourless, after twenty-four hours brown violet.

Ol. Anethi: Colourless, after twenty-four hours brown.

Ol. Juniperi: Colourless, very quickly green blue.

Ol. Cubebarum: Colourless, very quickly a beautiful blue, then blue violet.

Ol. Piperis: Green blue.

Ol. Zingiberis Bengal.: Dark green.

Ol. Copaivæ: Immediately a splendid full blue.

Ol. Galangæ: Dark blue, then dark green blue.

Ol. Aurantiorum dulc.: Yellow.

Ol. Aurantiorum amarum: Yellow.

Ol. Petit-grains: Yellowish.

Camphor: Orange brown.

Ol. Cinæ: Orange, then gamboge yellow.

Ol. Valerianæ: Orange brown.

Ol. Cumini: Yellow, then brownish.

Ol. Gaultheriæ: Orange.

Ol. Pini Cedri: Dark orange.

Ol. Persicorum: Dark orange.

Ol. Geranii turtici: Yellowish, then green brown.

Ol. Geranii gallic.: Yellowish, then olive green.

Ol. Lavandulæ: Yellowish, then greenish. (Commercial, afterwards grass green and blue green).

Ol. Cajeputi: Yellowish, after twenty-four hours green.

Ol. Amomi: Yellow, then greenish, then grass green then blue.

Ol. Cascarillæ: Yellow, then green and dark green.

Ol. Cinnamomi: Clear yellow, then pale reddish.

Ol. Nucis Moschatæ: Clear yellow, then pale reddish afterwards wine red.

Ol. Thymi: Clear yellowish, afterwards discoloured then violet.

Ol. Lauri: Splendid full violet, then royal blue.

Ol. Santali: Violet brown, then dark blue.

Ol. Calami: Dark green, then dark blue.

Ol. Menthæ pip.: Splendid violet, then cherry red then discoloured violet. (Very resinified oil, orange, then clear yellow.)

Ol. Myrrhæ: At first cherry, then blood red.

Ol. Petroselini: Dirty reddish, then dark and discoloured.

Ol. Galangæ artific.:* Green blue, then violet, then dark violet.

(*b*) *Chloral Hydrate.*—That oil of peppermint becomes red with chloral hydrate was first noticed by Fehn, and this was afterwards confirmed by Flückiger for some sorts of this oil. I have for a long time observed that with my own oil of peppermint the colouring is less clear in proportion as the chloral hydrate is pure, and that with a specimen crystallized in fine rhombs especially it is not perceived Possibly this might furnish a test for chloral hydrate In order to use this observation as a test for essential oils it is necessary to point out which impurity in chloral hydrate is best suited for the purpose, *i.e.* that which will give with oil of peppermint an intense red. I have used a mixture of chloral hydrate and alcoholate which would not crystallize. Its liquid condition facilitated its contact with the essential oil By using two drops of this liquid with one drop of oil, bringing them together upon a watch glass, I obtained the results described in the following table which show that the majority of the oils give a colour reaction with chloral. A glance will show also that in many cases the bromine reaction of an oil is similar to that of the same oil with impure chloral:—

Ol. Terebinthinæ rect.: Colourless, then pale red.

Ol. Terebinthinæ crud.: The same.

Ol. Carui: Remained colourless.

Ol. Citri: Colourless, then yellowish and pale reddish.

Ol. Coriandri: The same.

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* *Pharm. Zeit. f. Russland*, vol. xiv.

† A paper in which the behaviour of the isolated oils with the reagents used by me as described will appear in print shortly.

* This is the same oil as was referred to in my former paper under s. xv.

Ol. Cardamomi: The same.

Ol. Bergamottæ c. Ol. Tereb.: Colourless, then reddish and rose coloured.

Ol. Bergamottæ verum: Colourless, then reddish.

Ol. Caryophyllorum: Colourless, then very pale greenish, then bluish green, upon heating gradually red.

Ol. Rosmarini: Colourless, then passing to a pale violet.

Ol. Menthæ crisp.: Colourless, then bluish and discoloured.

Ol. Majoranæ: Colourless, quickly reddish brown, then tinged with green.

Ol. Fœniculi: Colourless, then a beautiful red.

Ol. Anisi: Colourless, then yellowish, then brownish.

Ol. Anisi stellat.: Colourless, then reddish, afterwards a beautiful red.

Ol. Macidis: Colourless, quickly reddish, then a beautiful rose colour.

Ol. Anethi: Colourless, then brownish, then reddish.

Ol. Juniperi: Colourless, then yellowish, then green brown, green and dark green.

Ol. Cubebarum: Colourless, then greenish yellow, quickly a magnificent green, then edged with blue, and finally a beautiful blue.

Ol. Piperis: Colourless, then reddish violet, afterwards almost colourless.

Ol. Zingiberis: Gradually greenish grey.

Ol. Copaivæ: Colourless, then light brownish, next green, then dark green.

Ol. Galangæ: Immediately a beautiful dark violet, then a deep blue violet.

Ol. Aurantiorum dulc.: Quickly yellow.

Ol. Aurantiorum amar.: The same.

Ol. Petit-grains: Colourless, then brownish, then brown.

Camphor: Remained colourless.

Ol. Cinæ: Quickly yellowish, then light brown.

Ol. Valerianæ: Colourless, then greenish.

Ol. Salviæ: Greenish, then green.

Ol. Cumini: Instantly a beautiful green.

Ol. Gaultheriæ: Remained colourless.

Ol. Pini Cedri: Gradually rose-coloured, then blue violet, finally blue.

Ol. Persicorum: Colourless.

Ol. Geranii turtici: Colourless, then rapidly a beautiful red, then brown.

Ol. Lavandulæ: Colourless, then rapidly green, then light brown.

Ol. Cajeputi: Colourless.

Ol. Amomi: Colourless, then greenish, then green.

Ol. Cascarillæ: Colourless, then green, then lilac.

Ol. Cinnamomi: Colourless, then reddish, then greenish, finally dark green, with violet edge.

Ol. Moschatæ: Colourless, then reddish.

Ol. Thymi: Light brownish, then reddish.

Ol. Lauri: Colourless, then yellow greenish, then grass green, deep green, and bluish green.

Ol. Santali: Rose-coloured.

Ol. Calami: Bluish green, then green.

Ol. Menthæ pip.: Beautiful currant red, then brown. (Resinified: discoloured brown.)

Ol. Myrrhæ: Instantly a magnificent violet red.

Ol. Petroselini: Brownish.

Ol. Galangæ artific.: Dirty grey.

(*c*) *Alcoholic Hydrochloric Acid.*—I have used both a concentrated and a dilute solution, allowing one drop of oil and fifteen to twenty drops of solution to react in a test glass. With the concentrated solution the colour reaction commenced immediately, but passed away rapidly; with the dilute solution the commencement and passing away were more slow, whilst the colour was less intense, but in some cases the colour was purer. In the following table the observations made with the two solutions are placed side by side:—

	Dilute Alcoholic Solution of Hydrochloric Acid.	Concentrated Alcoholic Solution of Hydrochloric Acid.
Ol. Terebinthinæ rect. .	Colourless.	Yellow brown.
Ol. Terebinthinæ crud. .	Colourless.	Yellow brown.
Ol. Carui . . .	Colourless.	Colourless, deep brown red, crystals in 24 hours.
Ol. Citri	Pale yellowish.	Yellow, then cherry red.
Ol. Coriandri . . .	Colourless.	Gradually reddish brown.
Ol. Cardamomi Mal. .	Colourless.	Brownish red, then cherry red.
Ol. Bergamot. c. Ol. Tereb.	Colourless.	
Ol. Bergamottæ ver. .	Yellow.	Orange, then olive green.
Ol. Caryophyllorum .	Colourless.	Brownish.
Ol. Rosmarini . . .	Colourless.	Red brown, then deep cherry red.
Ol. Menthæ crisp. . .	Almost colourless.	Cherry red, then a beautiful deep violet.
Ol. Majoranæ . . .	Brownish red, then brown.	Brown red, then deep cherry red.
Ol. Fœniculi . . .	Colourless.	Brownish, then violet brown.
Ol. Anisi . . .	Colourless, then reddish, then pale red.	Greenish, quickly pure violet.
Ol. Anisi stell. . .	Colourless.	Colourless, brownish red, finally currant red.
Ol. Macidis . . .	Yellowish.	Brownish, then red brown.
Ol. Anethi . . .	Yellowish.	Brownish, then cherry red.
Ol. Juniperi . . .	Brownish red, then brown.	Deep cherry red.
Ol. Cubebarum . .	Gradually rose colour.	Splendid deep violet red, then cherry red.
Ol. Piperis . . .	. . . .	Reddish, then beautiful violet.
Ol. Zingiberis . . .	Discoloured.	
Ol. Copaivæ . . .	Beautiful violet.	Beautiful deep violet red.
Ol. Galangæ . . .	. . . .	Immediately deep violet, then violet brown.
Ol. Aurantiorum dulc. .	Orange yellow, then brown.	Orange, then brown.
Ol. Aurantiorum amar. .	Yellow, then brownish yellow.	Greenish yellow, then olive green.
Ol. Petit-grains . .	Brownish yellow.	Red brown, then dark brown.
Camphor . . .	Colourless.	
Ol. Cinæ	Brownish.	Deep red brown, then deep cherry red.
Ol. Valerianæ . . .	Colourless.	Magnificent cherry red, deep violet red.
Ol. Cumini . . .	Yellow.	Brownish red, then a beautiful dark violet.

	Dilute Alcoholic Solution of Hydrochloric Acid.	Concentrated Alcoholic Solution of Hydrochloric Acid.
Ol. Gaultheriæ.	Colourless.	Greenish yellow, then brown red.
Ol. Pini Cedri.	Violet rose.	Violet.
Ol. Persicorum	Colourless.	
Ol. Geranii turt.	Brownish.	Deep red brown.
Ol. Geranii gall.	Brownish.	Blood red, then blackish.
Ol. Lavandulæ	Brownish yellow.	Brownish red, afterwards darker.
Ol. Cajeputi	Bright rose colour.	Cherry red, gradually discoloured.
Ol. Amomi	Almost colourless.	Deep brown, afterwards splendid violet.
Ol. Cascarillæ.	Brown, then brownish red.	Blood red, then cherry red.
Ol. Cinnamomi	Colourless, then reddish, then red.	Blood red, then olive green.
Ol. Moschatæ.	Dirty violet.	Violet.
Ol. Thymi	Light brownish.	Brownish red, then currant red, then cherry red.
Ol. Lauri.	Rose coloured, then red.	Deep cherry red.
Ol. Santali	Yellowish.	
Ol. Calami	Red, beautiful red.	Deep violet red.
Ol. Menth. pip.	Turbid, then rose, violet, deep blue (resinified brown).	Deep olive green, then deep violet.
Ol. Myrrhæ	Magnificent red.	Emerald green, rapidly a magnificent royal blue, then violet red.
Ol. Petroselini	Pale red, then brownish.	Deep brown, then brown red.

SOME NOTES ON THE PREPARATION OF PHOSPHORIC ACID*

BY E. B. SHUTTLEWORTH.

So much has lately been said on this subject that one almost requires to apologize before making any additional contribution. There are some points, however, upon which I feel tempted to offer an opinion, and, at the same time, would take the opportunity of modifying, amending, or confirming certain statements made in a former paper, published about five years ago,† in which was advocated the use of acid of a much greater degree of strength than that usually employed for the oxidation of the phosphorus. During two years of the intervening period the process indicated was followed, and frequent operations on comparatively large quantities of material afforded ample opportunity for experience.

I am still of the opinion that nitric acid of sp. gr. 1·24 may be safely used. The closest attention of the operator is, however, required throughout, and should the action become violent, by reason of the too great concentration of the acid, or too high a temperature, cold distilled water must be at once added. The frequent addition of cold water, sometimes in unnecessary quantity, forms an objection to the process, as the acid becomes too dilute, and loss of time is the result. Another objection is that open vessels—or at least nothing more than an inverted funnel, placed over the phosphorus—must be employed. The loss of acid, by evaporation, is, therefore, considerable.

In view of these objections I have modified the process, and for about three years have worked it successfully. The improvements may be thus stated, and relate to an operation upon ten pounds of phosphorus :—The employment of a partially or almost closed vessel resembling a tubulated long-necked mattrass, and of ten gallons capacity. The use of a water-bath, the temperature of which can be quickly reduced by the addition of cold water : the action may thus be checked without diluting the acid. At the commencement 1 pound of phosphorus, 24 pounds of nitric acid, sp. gr. 1·315, and 6 pounds of water, are used. Further quantities of phosphorus of like amount are successfully added as dissolved, together with additions of 8 pounds of acid sp. gr. 1·315. Further additions of water are seldom or ever required. The quantity of acid of 1·315—50 per cent. HNO_3—consumed during an operation, ranges from 72 to 78 pounds. The quantity required, theoretically, is 67·72 pounds.

In regard to the concentration of the phosphoric acid, I have found it best to drive off as much as possible of the water and nitric acid in the same vessel in which the oxidation has been carried on, merely removing the upright head or neck. In this way an acid of oily consistence may be obtained which may be further evaporated in platinum or porcelain. Berlin ware and enamelled ware are both sensibly attacked.

Previous to reading the paper presented by Mr. L. Dohme* at the meeting of the American Pharmaceutical Association in 1874, I had been in the habit of carrying the heat as far as incipient redness, allowing the acid to cool, and, next day, dissolving the solid mass in water. Acid so prepared always mixed, without precipitation, with solution of ferric chloride. Mr. Dohme's statement that the concentration should not be carried beyond 450° occasioned, therefore, some surprise. On the next occasion on which ten pounds of phosphorus were oxidized a thermometer was kept in the acid during concentration and the temperature carefully kept under the point indicated. On testing a sample of the product it was found that ferric chloride produced an instantaneous precipitate. The entire product, after cooling, was therefore diluted with water and reduced again, by heat, to the syrupy condition, as directed by Mr. Dohme and others† and on further dilution mixed in all proportions with the test indicated. From this experiment I infer that the conclusion arrived at by the gentlemen referred to will not always hold good, but is dependent on certain conditions not yet perfectly understood.

The process devised by Mr. Markoe, and described at the last meeting of the American Pharmaceutical Association,‡ is a very ingenious one, and may possibly be of use when economy of time is an object. It is not, however, free from danger, as the sequel has proved; and though the late accident could not be charged to the process, yet in inexperienced or careless hands the liability to danger is considerable. There is also a possibility that other compounds than those desired might, under certain conditions, be formed. On the score of economy the process will not compare favourably with that described above.

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* Reprinted from the *Canadian Pharmaceutical Journal* for Feb., 1876.

† *Can. Jour. Pharm.*, vol. v., p. 19.

* *Proc. Amer. Phar. Assoc.*, vol. xxii., p. 431.

† *Proc. Amer. Phar. Assoc.*, vol. xxii., p. 511.

‡ *Can. Pharm. Jour.*, vol. ix., pp. 112, 161, 197.

OBSERVATIONS ON THE OPTICAL DEPORTMENT OF THE ATMOSPHERE IN REFERENCE TO THE PHENOMENA OF PUTREFACTION AND INFECTION.*

BY JOHN TYNDALL, F.R.S.

Professor of Natural Philosophy in the Royal Institution.

(*Concluded from page* 666.)

In further illustration of the dangers incurred in this field of inquiry, the excellent paper of Dr. Roberts on 'Biogenesis,' in the *Philosophical Transactions* for 1874, is referred to. Dr. Roberts fills the bulb of an ordinary pipette up to about two-thirds of its capacity with the infusion to be examined. In the neck of the pipette, he places a plug of dry cotton wool. He then hermetically seals the neck, and dips the bulb into boiling water or hot oil, where he permits it to remain the requisite time. Here we have no disturbance from ebullition, and no loss by evaporation. The bulb is removed from the hot water, and permitted to cool. The sealed end of the neck is then filed off, the cotton wool alone interposing between the infusion and the atmosphere.

The arrangement is beautiful, but it has one weak point. Cotton-wool free from germs is not to be found, and the plug employed by Dr. Roberts infallibly contained them. In the gentle movement of the air to and fro as the temperature changed, or in any shock, jar, or motion to which the pipette might be subjected, we have certainly a cause sufficient to detach a germ now and then from the cotton-wool, which would fall into the infusion and produce its effect. Probably, also, condensation occurred at times in the neck of the pipette; the water of condensation carrying back from the cotton-wool the seeds of life. The fact of fertilization being so rare as Dr. Roberts found it to be is a proof of the care with with which his experiments were conducted. But he did find cases of fertilization after prolonged exposure to the boiling temperature; and this caused him to come to the conclusion that, under certain rare conditions, spontaneous generation may occur. He also found that an alkalized hay-infusion was so difficult to sterilize that it was capable of withstanding the boiling temperature for hours without losing its power of generating life. The most careful experiments have been made with this infusion. Dr. Roberts is certainly correct in assigning to it superior nutritive power. But, in the present inquiry, five minutes' boiling sufficed to completely sterilize the liquid.

Summing up this portion of his inquiry, the author remarks that he will hardly be charged with any desire to limit the power and potency of matter. But, holding the notions he does, it is all the more incumbent on him to affirm that, as far as inquiry has hitherto penetrated, life has never been proved to appear independently of antecedent life.

Though the author had no reason to doubt the general diffusion of germs in the atmosphere, he thought it desirable to place the point beyond question. At Down, Mr. Darwin and Mr. Francis Darwin; at High Elms, Sir John Lubbock; at Sherwood, near Tunbridge Wells, Mr. Siemens; at Pembroke Lodge, Richmond Park, Mr. Rollo Russell; at Heathfield Park, Miss Hamilton; at Greenwich Hospital, Mr. Hirst; at Kew, Dr. Hooker; and at the Crystal Palace, Mr. Price, kindly took charge of infusions, every one of which became charged with organisms. But to obtain more definite insight regarding the diffusion of atmospheric germs, a square wooden tray was penetrated with a hundred holes, into each of which was dropped a short test-tube. On October 23, thirty of these tubes were filled with an infusion of hay, thirty-five with an infusion of turnips, and thirty-five with an infusion of beef. The tubes, with their infusions, had been previously boiled ten at a time, in an oil-bath. One hundred circles were marked on paper, so as to form a map of the tray, and every day the state of each tube was registered upon the corresponding circle. In the following description, the term "cloudy" is used to denote the first stage of turbidity, distinct but not strong. The term "muddy" is used to denote thick turbidity.

One tube of the hundred was first singled out and rendered muddy. It belonged to the beef group, and it was a whole day in advance of all the other tubes. The progress of putrefaction was first registered on the 26th of October. The map then taken may be thus described.

Hay.—Of the thirty specimens exposed, one had become "muddy"—the seventh in the middle row reckoning from the side of the tray nearest the stove. Six tubes remained perfectly clear between the muddy one and the stove, proving that differences of warmth may be overridden by other causes. Every one of the other tubes containing the hay-infusion showed spots of mould upon the clear liquid.

Turnip.—Four of the thirty-five tubes were very muddy two of the them being in the row next the stove, one four rows distant, and the remaining one seven rows away. Besides these, six tubes had become "clouded." There was no mould on any of the tubes.

Beef.—One tube of the thirty-five was quite muddy, in the seventh row from the stove. There were three cloudy tubes, while seven of them bore spots of mould.

As a general rule, organic infusions exposed to the air during the autumn remained for two days or more perfectly clear. Doubtless, from the first, germs fell into them, but they required time to be hatched. This period of clearness may be called the "period of latency," and, indeed, it exactly corresponds with what is understood by this term in medicine. Towards the end of the period of latency, the fall into a state of disease is comparatively sudden; the infusion passing from perfect clearness to cloudiness more or less dense in a few hours.

Thus the tube placed in Mr. Darwin's possession was clear at 8·30 a.m. on the 19th of October, and cloudy at 4·30 p.m. Seven hours, moreover, after the first record of our tray of tubes, a marked change had occurred. It may be thus described. Instead of one, eight of the tubes containing hay-infusion had fallen into uniform muddiness. Twenty of these had produced bacterial slime, which had fallen to the bottom, every tube containing the slime being covered with mould. Three tubes only remained clear, but with mould upon their surfaces. The muddy turnip-tubes had increased from four to ten; seven tubes were clouded, while eighteen of them remained clear, with here and there a speck of mould on the surface. Of the beef, six were cloudy and one thickly muddy, while spots of mould had formed on the majority of the remaining tubes. Fifteen hours subsequent to this observation, viz., on the morning of the 27th of October, all the tubes containing hay-infusion were smitten, though in different degrees, some of them being much more turbid than others. Of the turnip-tubes, three only remained unsmitten, and two of these had mould upon their surfaces. Only one of the thirty-five beef-infusions remained intact. A change of occupancy, moreover, had occurred in the tube which first gave way. Its muddiness remained grey for a day and a-half, then it changed to bright yellow green, and it maintained this colour to the end. On the 27th, every tube of the hundred was smitten, the majority with uniform turbidity; some, however, with mould above and slime below, the intermediate liquid being tolerably clear. The whole process bore a striking resemblance to the propagation of a plague among a population, the attacks being successive and of different degrees of virulence.

From the irregular manner in which the tubes are attacked, we may infer that, as regards quantity, the distribution of the germs in the air is not uniform. The singling out, morover, of one tube of the hundred by the particular bacteria that develop a green pigment shows, that, as regards quality, the distribution is not uniform. The same absence of uniformity was manifested in the struggle for existence between the bacteria and penicillium. In some tubes, the former were triumphant; in other tubes of the same infusion, the latter were triumphant. It would seem also as if a want of uniformity as regards vital vigour prevailed. With the selfsame infusion, the motions of the bacteria in some tubes were exceedingly languid; while in other tubes the motions resembled a rain of projectiles, being so rapid and violent as to be followed with difficulty by the eye. Reflecting on the whole of this, the author concludes that the germs float through the atmosphere in groups or clouds, with spaces more sparsely filled between them. The touching of a nutritive fluid by a bacterial cloud would naturally have a different effect from the touching of it by the interspace between two clouds. But, as in the case of a mottled sky, the various portions of the landscape are successively visited by shade, so, in the long run, are the various tubes of our tray touched by the bacterial clouds, the final fertilization or infection of them all being the consequence. The author connects these views with the experiments of Pasteur on the non-continuity of the cause of so-called spontaneous generation, and with other experiments of his own.*

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* Abstract of part of a paper read before the Royal Society, January 13th, 1876.

The tray of tubes proved so helpful in enabling him to realize mentally the distribution of germs in the air, that on the 9th of November, he exposed a second tray containing one hundred tubes filled with an infusion of mutton. On the morning of the 11th, six of the ten nearest the stove had given way to putrefaction. Three of the row most distant from the stove had yielded, while here and there over the tray particular tubes were singled out and smitten by the infection. Of the whole tray of one hundred tubes, twenty-seven were either muddy or cloudy on the 11th. Thus, doubtless, in a contagious atmosphere, are individuals successively struck down. On the 12th, all the tubes had given way; but the differences in their contents were extraordinary. All of them contained bacteria, some few, others in swarms. In some tubes they were slow and sickly in their motions in some apparently dead, while in others they darted about with rampant vigour. These differences are to be referred to differences in the germinal matter, for the same infusion was presented everywhere to the air. Here also we have a picture of what occurs during an epidemic, the difference in number and energy of the bacterial swarms resembling the varying intensity of the disease. It becomes obvious from these experiments that of two individuals of the same population, exposed to a contagious atmosphere, the one may be severely, the other lightly attacked, though the two individuals may be as identical, as regards susceptibility, as two samples of one and the same mutton infusion.

The author traces still further the parallelism of these actions with the progress of infectious disease. The *Times* of January 17 contained a remarkable letter on Typhoid Fever, signed "M.D.," in which occurs the following statement: "In one part of it (Edinburgh), congregated together and inhabited by the lowest of the population, there are, according to the Corporation return for 1874, no less than 14,319 houses or dwellings—many under one roof, on the 'flat' system—in which there are no house connections whatever with the street sewers, and, consequently no water-closets. To this day, therefore, all the excrementitious and other refuse of the inhabitants is collected in pails or pans, and remains in their midst, generally in a partitioned off corner of the living-room, until the next day, when it is taken down into the streets and emptied into corporation-carts. Drunken and vicious though the population be, herded together like sheep, and with the filth collected and kept for twenty-four hours in their very midst, it is a remarkable fact that typhoid fever and diphtheria are simply unknown in these wretched hovels."

This case has its analogue in the following experiment, which is representative of a class. On November 30, a quantity of animal refuse, embracing beef, fish, rabbit, hare, was placed in two large test-tubes opening into a protecting chamber containing six tubes. On December 13, when the refuse was in a state of noisome putrefaction, infusions of whiting, turnip, beef and mutton, were placed in the other four tubes. They were boiled and abandoned to the action of the foul "sewer gas" emitted by their two putrid companions. On Christmas Day, these infusions were limpid. The end of the pipette was then dipped into one of the putrid tubes, and a quantity of matter comparable in smallness to the pock-lymph held on the point of a lancet, was transferred to the turnip. Its clearness was not sensibly affected at the time; but on the 26th, it was turbid throughout. On the 27th, a speck from the infected turnip was transferred to the whiting; on the 28th, disease had taken entire possession of the whiting. To the present hour, the beef and mutton tubes remain as limpid as distilled water. Just as in the case of living men and women in Edinburgh, no amount of fetid gas had the power of propagating the plague as long as the organisms which constitute the true contagium did not gain access to the infusions.

The universal prevalence of the germinal matter of bacteria in water has been demonstrated with the utmost evidence by the experiments of Dr. Burdon Sanderson. But the germs in water are in a very different condition, as regards readiness for development, from those in air. In water they are thoroughly wetted, and ready, under the proper conditions, to pass rapidly into the finished organism. In air they are more or less dessicated, and require a period of preparation more or less long to bring them up to the starting-point of the water-germs. The rapidity of development in an infusion infected by either a speck of liquid containing bacteria or a drop of water is extraordinary. On January 4th, a thread of glass almost as fine as a hair was dipped into a cloudy turnip-infusion, and the tip only of the glass fibre was introduced into a large test-tube containing an infusion of red mullet; twelve hours subsequently, the perfectly pellucid liquid was cloudy throughout, and full of life. A second test-tube containing the same infusion was infected with a single drop of distilled water furnished by Messrs. Hopkin and Williams; twelve hours also sufficed to cloud the infusion thus treated. Precisely the same experiments were made with herring with the same result. At this season of the year several days' exposure to the air are needed to produce the same effect. On December 31, a strong turnip-infusion was prepared by digesting in distilled water at a temperature of 120° Fahr. The infusion was divided between four large test-tubes, in one of which it was left unboiled, in another boiled for five minutes, and in the two remaining ones boiled, and, after cooling, infected with one drop of beef-infusion containing bacteria. In twenty-four hours, the unboiled tube and the two infected ones were cloudy; the unboiled tube being the most turbid of the three. The infusion here was peculiarly limpid after digestion; for turnip it was quite exceptional, and no amount of searching with the microscope could reveal in it at first the trace of a living bacterium; still germs were there which, suitably nourished, passed in a single day into bacterial swarms without number. Five days have not sufficed to produce an effect approximately equal to this in the boiled tube, which was uninfected but exposed to the common laboratory air.

There cannot, moreover, be a doubt that the germs in the air differ widely among themselves as regards *preparedness* for development. Some are fresh, others old; some are dry, others moist. Infected by such germs, the same infusion would require different lengths of time to develop bacterial life. This remark applies to and explains the different degrees of rapidity with which epidemic disease acts upon different people. In some the hatching period, if it may be called such, is long, in some short, the differences depending upon the different degree of preparedness of the contagium.

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* In hospital practice, the opening of a wound during the passage of a bacterial cloud would have an effect different from the opening of it in the interspace between two clouds. Certain caprices in the behaviour of wounds may possibly be accounted for in this way.

The Pharmaceutical Journal.

SATURDAY, FEBRUARY 26, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE REGISTERS OF PHARMACEUTICAL CHEMISTS AND CHEMISTS AND DRUGGISTS, AND CALENDAR OF THE PHARMACEUTICAL SOCIETY.

THE Registers of Pharmaceutical Chemists and Chemists and Druggists, and the Calendar of the Pharmaceutical Society for 1876, having now been published, we avail ourselves, as in former years, of the opportunity afforded by the notification of the fact to make a few remarks upon some of the relations which these lists bear to each other and to preceding ones. We may as well say at starting, however, that we cannot promise anything so sensational as the statement recently made by a contemporary, and, we suppose, widely circulated, to the effect that for every person who during 1875 entered the business of a chemist and druggist by passing the Preliminary examination four names were removed from the Register. But we may remark that all the credit of such a brilliant invention is fairly due to the "able" writer, and he need not have attempted to share it with the Registrar by attributing to him the truly original statistics upon which it is based. The Registrar did not report that only 71 persons passed the Preliminary during the year, but 416; neither did he report that only 37 passed the Minor, or 4 the Modified; but that 141 passed the Minor, and 13 the Modified. But this by the way.

According to the Registrar's report the number of names on the Register of Chemists and Druggists on the 31st of December, 1875, was 13,276, or a decrease of 10 on the number of the next previous Register. The Register of Pharmaceutical Chemists contains 2335 names, or a decrease of 12, which is less than half the decrease of the previous year. The relative proportion of Pharmaceutical Chemists to the entire body is now 17·59 per cent., against 17·66 last year. The total number of names added to the Register during 1875 was 222, or rather less than half the number added during 1874; but the removals were 232, and we believe that this is the first time that there has been a reduction of the gross total of registered chemists and druggists. Probably some of our readers will look upon this state of things as matter for deprecation; but we do not think that will be the opinion of the majority.

Of course the proportions between examined and non-examined men on the Registers have been considerably modified during the year. In the Register of Pharmaceutical Chemists for 1875, the numbers of these classes were about equal; in that for 1876 the proportion of persons so registered by virtue of having passed the Major examination has increased to 53·87 per cent., and this class is now equal to 9·4 per cent. of the whole number of registered Chemists and Druggists. To the examined class belong also the chemists and druggists who have passed the Minor but not the Major. These now number 1775, or 61·22 per cent. of those registered only as Chemists and Druggists. Together with the 1248 who have passed the Major, they form a total of 4110 persons now on the Register who have passed the qualifying examination, or 33·81 per cent., just one-third, of the whole trade.

These figures may be tabulated thus:—

	1875.		1876.	
	Number.	Per cent.	Number.	Per cent.
Pharmaceutical Chemists:— Examined . . Non-examined	1138 1209 } 2347	8·56 9·10 } 17·66	1248 1087 } 2335	9·40 8·19 } 17·59
Chemists and Druggists (only) who have passed the Minor . . .	1694	15·48	1775	16·22
Remainder, including those who have passed the Modified . . .	9245	66·86	9166	66·19
Total	13,286	100·00	13,276	100·00

It is matter for congratulation that notwithstanding the nearly stationary aspect of the Register, the Calendar shows a marked increase in the number of registered Chemists and Druggists connected with the Pharmaceutical Society. With the exception of the Pharmaceutical Chemist Members every class has shared in the increase; but of Pharmaceutical Chemists there has been a decrease of 9 subscribing, and 8 life members. As all Pharmaceutical Chemists but about 250 now belong to the Society, and this Register can only be recruited by persons who pass the Major examination, it is probable that a slight decrease in this class will occur for some years to come. The Chemist and Druggist Members have increased from 814 to 838; the Associates in Business from 459 to 577, the Associates from 830 to 884, and the Apprentices or Students from 795 to 852. So that of the 13,276 persons now on the Register of Chemists and Druggists, 4383, or 33·01 per cent., are connected with the Society, against 4204, or 31·65 per cent. last year. The following table will show the comparison between the two years:—

	1875.		1876.	
	No.	Per cent.	No.	Per cent.
Pharmaceutical Chemists Members of the Society .	2101	89·77	2084	89·25
Other Registered Chemists and Druggists connected with the Society . . .	2103	19·22	2299	21·01
Total number of Registered Chemists and Druggists connected with the Society	4204	31·65	4383	33·01
Registered Apprentices subscribing to the Society .	795	...	852	..

The Calendar makes manifest that the legislation of the last parliamentary session was by no means without interest to pharmacists, the Appendix relating to Acts of Parliament having been swollen from forty to seventy-two pages. This has been mainly due to the insertion of the Acts, or full abstracts from them, relating to the sale of Food and Drugs, Pharmacy in Ireland, Trades Marks Registration, and Explosives. The Calendar also contains a complete set of the "Tables of Medical Stores," issued by the Board of Trade under the Merchant Shipping Act.

SYNTHESIS OF VANILLIN.

According to a communication recently read before the Berlin Chemical Society by Ferdinand Tiemann, vanillin, the odorous principle of vanilla, must now be added to the list of substances that can be prepared synthetically. The stages of the process are as follows. The reaction between potassium carbolate and carbonic acid yields paraoxybenzoic acid (the analogous reaction with sodium carbolate giving salicylic acid); from paraoxybenzoic acid protocatechuic acid can be prepared, and from protocatechuic acid may be obtained dimethylprotocatechuic acid. When the latter is heated with dilute hydrochloric acid in a sealed tube to 130° or 140° C., among the products of decomposition is found monomethylprotocatechuic or vanillic acid, of which vanillin is the corresponding aldehyd. The retrograde conversion of the acid into the aldehyd has been effected and perfectly pure crystals of vanillin have been thus obtained. The other products of the decomposition of vanillic acid were carbonic acid and guaiacol, the latter boiling at 200° C. and corresponding in every respect with that obtained from beech-wood tar.

THE SCHOOL OF PHARMACY.

The courses of lectures on Chemistry and Pharmacy, and Materia Medica and Botany, in connection with the Pharmaceutical Society's School of Pharmacy, 17, Bloomsbury Square, will recommence on Wednesday, March 1st. Students who have but a limited time at their disposal would find the ensuing five months to be a favourable time for studying at the School; for between the 1st of March and the 31st of July, they would have the opportunity of not only attending in the Laboratory and at the usual courses on Chemistry and Pharmacy, and Botany and Materia Medica, but also the Summer Course on Systematic and Practical Botany, at the Royal Botanic Society's Gardens, in Regent's Park.

THE EVENING MEETING.

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, March 1. The papers to be read are—"On the Preparation of Ferrous Phosphate of the British Pharmacopœia," by Mr. Rees Price; "Structure and Development of Pareira Stem (*Chondodendron tomentosum*, R. et P.)," by John Moss, F.C.S.; "On the Degrees of Accuracy given by Druggists in the Dispensing of Prescriptions in Different Parts of the Country," by William Thomson, F.C.S. The chair will be taken at half-past eight precisely.

ROYAL INSTITUTION.

The following is the corrected list of probable arrangements for the Friday Evening Meetings at the Royal Institution before Easter:—

Friday, Feb. 25. The Rev. Stephen J. Perry, F.R.S., F.R.A.S. "The Transit of Venus."

Friday, March 3. Professor Odling, M.A., F.R.S., M.R.I. "The Paraffins and their Alcohols."

Friday, March 10. Professor W. H. Flower, F.R.S. "The Extinct Animals of North America."

Friday, March 17. Sir Henry Sumner Maine, K.C.S.I. "The State of Feudal Property in England and France on the Era of the first French Revolution."

Friday, March 24. Professor McK. Hughes, Trin. Coll. Cambridge. "The Geological Measure of Time."

Friday, March 31. Professor James Dewar, F.R.S.E. "The Physiological Action of Light." Part II.

Friday, April 7. Edward Burnett Tylor, Esq., F.R.S. "Ordeals and Oaths."

WORK FOR THE SESSION OF PARLIAMENT.

On Monday evening Mr. Cross stated in the House of Commons that it was the intention of the Lord Chancellor to introduce a Bill to amend the Jury law. In reply to another question Mr. Cross said also that he was prepared to bring in a Bill relating to a Public Prosecutor should the other business of the session permit.

On Wednesday, on the motion of Sir John Astley, leave was given to bring in a Bill to make the administration of poisonous drugs and compounds to horses and other animals a punishable offence.

On Tuesday a Deputation of members of the Associated Chambers of Trade had an interview with the Lord Chancellor for the purpose of urging upon him the necessity for a Bill providing for the compulsory registration of firms. The Lord Chancellor in reply said that he would give the subject his best consideration, of which it was well worthy. We have before referred to the assistance such a law would furnish to the correct keeping of the Register.

A DANGEROUS PRESCRIPTION.

An explosion is reported as having taken place in a French pharmacy during the dispensing of a prescription ordering half a gram of chromic acid, and four grams of glycerine. The pupil to whom it was entrusted dissolved the acid in a bottle in a little water, then added the glycerine and shook the whole together. This operation was followed immediately by a loud report and the contents of the bottle were projected to the ceiling of the pharmacy.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The ninth general meeting of the twenty-seventh session of this Association was held at the Royal Institution on the 17th inst. The President, Mr. A. H. Mason, F.C.S., in the chair.

Messrs. W. Edwards and A. J. Lett were unanimously elected members. The following donations were announced: To the library:—*The Canadian Pharmaceutical Journal*, and current numbers of the *Pharmaceutical Journal*: To the museum:—A specimen of Vaseline, from Messrs. Corbyn, Stacey and Co. The following lecture was delivered:—

ON THE RELATIONS OF CHEMISTRY TO PHYSIOLOGY AND PATHOLOGY, WITH SPECIAL REFERENCE TO THE BRAIN.

BY CHARLES T. KINGZETT,

Fellow of the Chemical Societies of London and Berlin.

I propose in this lecture to say something of a study to which in my professional position several years of my life have been devoted, and although it is not a subject which admits of brilliant illustration by experiment, it is most interesting in itself. It is especially interesting, relating as it does to matters which concern the happiness, the health, even the very life of every individual. But it is a subject which perhaps, in a greater measure than most studies, demands a sharpened exercise of the perceptive powers. While, therefore, I endeavour to make my subject as interesting as I can, I will ask you to give that which I feel will constitute your pleasure, viz., your own sincere attention.

The history of chemical science shows that it has been developed first by the accumulation of isolated facts; secondly, by the discovery of determining influences, and of certain relations between those facts; thirdly, by the deduction of general laws from larger series of observations than those which give rise to special laws. So that eventually it is possible, from given conditions, to predict the next states of certain forms of matter.

On the assumption that the phenomena of life, be it vegetable or animal, stand, like those of dead or inorganic matter, in certain relations to each other, and are of course determined by specific causes; then it is only by the study of these causes that we can be enabled to have the processes involved. Such a search constitutes the most important problem in physiology, for by it, as we have seen, is to be discovered the mutual dependence of the vital phenomena. And here it is that we must have recourse to the chemical method, anatomy alone being insufficient, and even subordinate.

The vital force is of the same class as the chemical force, inasmuch as it only acts when the particles are in contact or at infinitely small distances from each other. Man lives by the metamorphoses of the animal tissues. And what do we mean by this expression? We mean that life is possible only through certain changes of matter which are necessarily going on in the body. And what is chemistry but the study of the laws of changes of matter?

The vast advances that physiology has made in recent times are in no small measure due to the influence exerted by the discoveries and writings of Justus Liebig. He was among the first to expose the non-scientific methods of inquiry employed by many physiologists of his day, and he perhaps more than any other impressed inquirers with the importance of tracing back effects to causes. Thus he has shown (Liebig's 'Animal Chemistry,' 3rd edition) how little is conveyed by stating the effects of the nervous system as due to a nervous force; or by calling a body which exerts a cooling action on the system an astringent. Such notions he demonstrated to have no more worth than the old notions of Lemery, that the particles of acid had the form of spear-heads with barbs, while those of the alkalies were porous, like sponge. The processes of organic nature are chemical processes, and can be discovered only by chemical methods, aided by a logical interpretation of facts. Even Liebig, in the preface to his work already alluded to, acknowledges how greatly he was indebted to the study of Mill's 'System of Logic,' and states further that he can claim no other merit than that of having applied to some special cases, and carried out further than had been previously done, those principles of research which have been laid down by that distinguished philosopher.

Thus, then, we see that the relations of chemistry to physiology are clear and well defined, and may be expressed as the investigation of those chemical processes which are continually occurring in the human economy, and by the performance of which alone man can live in health.

Obviously, therefore, chemistry in this respect must commence with the study of the constitution of the various tissues, organs and juices of the body, for without such knowledge we cannot study the processes in which they participate, any more than we could express in intelligible language the action of hydrochloric acid upon chalk without having previously ascertained the composition of those substances. Having once attained such a position, we may view the matter in the light of "normal chemical standards."*

In the same way, the investigation of pathological processes must follow after the chemical standards of health have been determined, for by pathology we mean the doctrine of the causes and nature of disease, the very idea of which implies that the ordinary vital or chemical processes of life are deflected from the normal course obtaining in health. The method of investigation is, however, the same, and the results may be viewed as the measure of the "morbid declensions" from the ordinary standards.

Thus it will be perceived how vain it would prove on my part to attempt to review, in the space of one short hour, all the relations of chemistry to physiology and pathology; and I have thought it best to treat only of those relations which regard the most important organ of our bodies—the brain.

In doing this I shall chiefly concern myself with the recently published researches of Dr. Thudichum which, again to quote from the Report of the Medical Officer of the Privy Council (new series, No. 3, p. 9), show such "very remarkable evidences of success." In the choice of my subject I have been guided chiefly by the consideration that I am well acquainted with this work, and in fact as professional assistant to Dr. Thudichum have been associated with him in the work itself. The object of these researches was to unfold the chemical constitution of the brain, in order that in time to come it may be in our power to guide or correct those processes through the normal operation of which the brain performs its functions in health. And here I would beg you to reflect one moment on the magnitude and enormous difficulty of this task, and would ask you not to expect more than is claimed in the shape of results. "It is confidently believed that its entirety has been explored in such a manner that fundamental truths cannot have escaped observation," and that what remains to be done is essentially of the character of detail which, however vastly multiplied it may become, will not alter the broad outlines to which this investigation has led (Report p. 203). Those of you who may desire to study this subject more in detail I would refer to Dr. Thudichum's research, which has been published in the Blue Book from which I have quoted.

For such a large inquiry, resource must be had to ox-brains, although I should state that the examination has also been conducted upon normal brains from healthy human subjects. The brain of an ox weighs on the average 356 grammes, or from 12 to 13 ounces, and in the research of which I am treating nearly 2000 such brains have been employed.

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* Reports of the Medical Officer of the Privy Council, etc., new series, No. 3, p. 8.

I will first review the method of procedure in obtaining from these brains the principles which I shall presently describe. The brains are first carefully skinned and freed by means of forceps from the arachnoid and pia-mater, after which they are cleansed from clot and blood by a temporary submersion in water, which has next to be removed by means of strong alcohol (of 85 per cent.). This operation, which has to be repeated several times, dehydrates the brain matter and eventually furnishes a watery solution which when freed from albumen, etc., by boiling and concentration, is found to contain in part the water extracts of the brain. When the brains are well hardened in the way described they are passed through a mincing machine and the pulp so obtained is then made to pass as a paste with alcohol through a fine hair sieve.

The product is now ready for those operations which are intended to extract from it its chemical principles. It is therefore extracted now with alcohol of 85 per cent. at a temperature of 50°C. and filtered through cloths. By repeating this extraction five or six times there is left finally an albuminous insoluble residue which forms, next to water, the body of greatest percentage in the brain. The alcoholic extracts are united and on cooling deposit a white crystalline and granular precipitate to which the name of "White Matter" has been given. After filtration from this White Matter the extracts are concentrated by distillation and the concentrated liquid allowed to cool, whereby is deposited a semi-solid viscous mass which we have designated "Buttery Matter." From this the mother liquor is freed by filtration through a cloth, after which it is entirely freed from alcohol by distillation and is then still further concentrated by evaporation in open dishes. During this operation oily drops and lumps form, but these when cold become semi-solid and flaky and can be separated by filtration in the hot. This deposit, named by us the "Last Oily," which has for the most part the same composition as Buttery Matter, we shall consider under that heading. The filtrate from the so-called "Last Oily" is concentrated to a thin syrup and constitutes water extracts of brain matter containing in solution the salts, extractives and soluble immediate principles.

There are several methods of extracting from White Matter and Buttery Matter the principles of which they are composed, but here I think it best to confine myself to one method, and one which is the most workable in practice. And as White Matter and Buttery Matter are identical except as regards the relative amounts of the various constituents, the one process is applicable to both.

White Matter consists principally of bodies belonging to the group of cerebrines, cholesterine, kephalines, myelines, and lecithines; so also does Buttery Matter, but it differs principally from White Matter in containing less of the cerebrine bodies.

To isolate these various principles, White Matter and Buttery Matter undergo extraction with ether, which furnishes a red coloured solution, having a strong fluorescence. This extraction leaves, also, the mass of cerebrines behind as a snow white pulverulent whole, which can be afterwards differentiated into the several varieties composing it by suitable treatment.

The ether extracts contain kephaline, to which body the fluorescence is due, cholesterine, lecithine, and myeline. They are concentrated, and on cooling deposit part of the cholesterine in white, pearly, crystalline plates, from which the solution is separated by filtration, after which it is treated with an equal volume of absolute alcohol, which precipitates the kephaline as a reddish-brown viscid mass. This kephaline can be purified by a re-solution in ether and re-precipitation by alcohol, but to obtain it in a perfectly pure state it has to undergo a special treatment—viz., solution in water and re-precipitation therefrom by hydrochloric acid, etc.

Time will not allow me to do more than briefly indicate the outlines of the treatment for obtaining the various principles of brain matter in a somewhat crude state. For those processes it is necessary to employ for absolutely purifying these substances I must refer you again to Dr. Thudichum's publication.

The mother-liquor from which the kephaline has been precipitated is freed from the excess of ether by distillation, and yields on cooling another deposit of cholesterine, after the separation of which by filtration the filtrate is thoroughly precipitated by a solution of chloride of cadmium in alcohol. This treatment yields a precipitate consisting of compounds of kephaline, lecithine and myeline, with cadmic chloride and a mother-liquor which is concentrated nearly to dryness, and yields a further vast mass of cholesterine.

It may be at once stated that cholesterine may be readily purified by re-crystallization from alcohol; sometimes, however, it is necessary to add potash in this operation to free it from certain bodies of a fatty nature, and charcoal to remove certain colouring matters.

The cadmic chloride precipitate above described is split up into its component parts as follows:—It is first extracted with ether, which dissolves the compounds of kephaline but leaves the myeline and the so-named lecithine salt behind as a white pulverulent mass. From these products the immediate principles can be respectively isolated only by long and tedious processes which time will not allow me to enter into here, but which your own reading may teach you.

In addition to the substances I have enumerated there are present in the brain, and are obtained from White Matter, Buttery Matter, and the so-called "Last Oily," certain neutral lipoid matters, the history of which has not been yet thoroughly studied.

In the extraction of White Matter by ether there is left, as I have stated, a snow white pulverulent mass of cerebrines, which contains also some myeline.

The myelines differ from the cerebrines in being phosphorized, and have to be separated from the latter by special methods. The so-called cerebrines consist of at least three bodies—viz., true cerebrine, phrenosine and kerasine, and they can be respectively isolated by fractional precipitation on cooling from a hot alcoholic solution, supplemented by the application of more involved processes.

We have yet to treat of the Water Extracts of Brain Matter. They contain hypoxanthine, kreatine, lactic, and perhaps other extractive acids, and also phosphates, sulphates and chlorides of the metals potassium and sodium. When the brain matter is derived from the ox, also inosite or so-called muscle sugar is present in quantity.

In addition to these matters there are also invariably present in the brain, calcium, magnesium, iron, copper, manganese, etc., etc.

I have thus sketched to you briefly the mode of isolating from brain matter the various principles it contains, but I would ask you, ladies and gentlemen, to bear in mind that only one form of one process has been described, and I have not led you along those paths which we had to travel in the practical isolation from the crude constituents of absolutely individual immediate principles of Brain-substance. But I have endeavoured to lead you to the comprehension that from this marvellous substance have been isolated the bodies which I have here tabulated.

Table showing Constituents of the Brain.—Group of Sulphurized Principles.

Albumin	$C_{72}H_{112}N_{18}SO_{22}$

Group of Phosphorized Principles; Sub-Group of Kephalines.

Kephalin	$C_{42}H_{79}NPO_{13}$
Kephaloidine	$C_{42}H_{79}NPO_{13}$
Oxykephalin	$C_{42}H_{79}NPO_{14}$
Peroxykephalin	$C_{42}H_{79}NPO_{15}$
Amido-kephalin	$C_{42}H_{80}N_2PO_{13}$

Giving compounds with $PtCl_4$, $CdCl_2$, Pb; acids, bases and salts.

Sub-Group of Myelins.

Myelin	$C_{40}H_{85}NPO_8$
Oxymyelin	$C_{40}H_{75}NPO_{10}$
Amido-myelin	$C_{40}H_{82}N_2PO_{10}$

Compounds as with kephalin.

Sub-Group of Lecithins.

Lecithin	$C_{42}H_{83}NPO_9$

Compounds as kephalin.

Group of Nitrogenized Principles.

Cerebrine	$C_{34}H_{68}N_2O_8$
Stearacoaste	$C_{34}H_{68}N_2O_8$
Phreaosin	$C_{34}H_{67}NO_8$
Kerasin	$C_{46}H_{91}NO_9$

Extractive and Secretory Acids,
Uric Acid and Congeners,
New Acids,
Extractive Alkaloids (several new ones),
Urea and Amido-acids.

Group of Oxygenated Principles.

Cholesterin	$C_{26}H_{44}O$
Inosite	$C_6H_{12}O_6$

Lactic Acid, etc.,
Fats and Fatty Acids.

Group of Inorganic Principles.

H_2SO_4 ; HCl ; P_2O_5 ; CO_2 ; H_2O ; K ; Na
NH_3 ; Ca ; Mg ; Cu ; Fe ; Mn

Now let us sketch the characters of the bodies composing this formidable list in a very brief manner.

The albuminous matters from the brain offer no specific difference from similar matter derived from other parts of the body, and exist in the form insoluble in water mainly. The kephalines are all soluble in ether to a red colour, and possess a great affinity for oxygen, and also exhibit a wonderful power of combination which is well explained by the constitution of the body. They contain their phosphorus in the form of glycero-phosphoric acid, which they yield along with neurine when split up by boiling with baryta, etc. The first number of this group—viz., kephalin, $C_{42}H_{79}NPO_{13}$—has been especially well studied—so well, indeed, that of its individuality there is no more doubt than of the individuality of each of yourselves. It is the more interesting seeing that it forms one of the bodies discovered in brain matter by Dr. Thudichum for the first time.

The myelins are white and are not liable to atmospheric oxidation. They are not to be confounded with lecithine which in the form described by Strecker (as obtained from eggs) is very unlike to the myelins. They combine with lead, and from the lead compounds can be obtained the free principles in a purified condition by decomposition with sulphuretted hydrogen in hot alcohol, from which solution on cooling they are deposited in forms easily recognizable under the microscope.

In this lecture the name of lecithine has been repeatedly used as significant of a certain body present in and obtainable from brain-matter. It has been obtained mainly in combination with platinic chloride as hydrochlorate, but this salt proves so unstable as to defy it in great measure those attempts which have been made to elucidate its nature. But it has been proved at least to possess characters different in some respects from the lecithine described by Strecker and Gobley, although it appears to yield similar products of decomposition. My personal belief is that the lecithin of Strecker does not exist in brain-matter; meanwhile, it may be stated that much more work is required in this direction before very absolute statements can be made regarding this really marvellous substance.

Cerebrine, stearoconote, phrenosine, and kerasine, are all well characterized substances and have been deeply studied. The first two are isomeric, stearoconte being formed from cerebrine by heating the latter in excess in alcohol at a greater speed than the alcohol can dissolve it, when the body fuses and becomes insoluble in alcohol. By heating it, however, with benzene it readily dissolves (while cerebrine is absolutely insoluble in cold benzene) and yields on precipitation with alcohol the original cerebrine.

Cerebrine seems to be the di-amidated form of a fatty acid while phrenosine appears to constitute the mono-amidated form. Kerasine has a microscopical character extremely easy to recognize and of such form as to readily enable one to discover the presence of any other substances. These four substances are especially distinguished by their solubility in hot alcohol, and by the purple colour they give with sulphuric acid and sugar, a reaction similar to Pettenkofer's for bile.

Inosite is a sort of sugar, and so far we have not sought for it in human brain-matter, although it is present in amount in that of the ox.

Of the other bodies to which we have alluded as occurring in the brain, I shall only dwell on the presence of copper and manganese because it has been represented to me, that by some this statement has been regarded with doubt. Well, gentlemen, the best way of meeting that doubt is by telling you that we have worked up several thousand ox brains and a large number of human brains, and whenever we have searched for these bodies we have always found them. In the case of copper we have reduced it to the metallic state from a suitable solution, by an electric current, and before you there is a solution of copper (from one and a-half human brains) in which we will now demonstrate its presence.

Moreover, its presence in the brain is after all not so remarkable, for who does not know that Church discovered copper in the colouring-matter of the wings of certain birds? and recently Bergeron and Hote (*Comptes Rendus*, lxxx., p. 268) have published experiments which they say have demonstrated the presence of copper in the kidneys and livers of fourteen human bodies. But these experiments of Bergeron and Hote were we may say unnecessary, for they simply amount to repetitions of those performed by Odling and Dupré many years ago. These chemists published a most interesting paper "On the Existence of Copper in Organic Tissues," in which they described whole series of experiments made upon comparatively large quantities of materials in the years 1856 and 1857. These observers also refer to literature previously existing on the subject, which seems to indicate that so long ago as the latter end of the last century the presence of copper in organic tissues and products had attracted the attention of Margraff, Gahn, and Vauquelin.

Odling and Dupré detected copper in bread, flour, wheat, straw, liver, kidney, blood, flesh, eggs, cheese, etc., and in many instances estimated the amount by most reliable methods. From one of the tables published by these eminent chemists we take the following determinations, 6925 grains of human liver furnished 0·013 grain of oxide of copper, while 6682 grains of sheep's liver furnished 0·281 grain of the same. 1830 grains of human kidney gave 0·015 grain of copper oxide, while human muscle and blood furnished traces. In short they conclude that "the tissues, particularly of the liver and kidney, usually contain copper in very notable quantity," and that "the blood usually contains but very minute traces of copper." At the same time they thus express themselves, "we are scarcely prepared to maintain that copper is a necessary and invariable constituent of living organisms." This expresses all that we are at the present day in a position to state, and here let us leave the subject, and return to our immediate theme.

There is one property common to many of the principles derivable from brain matter, but particularly striking is this in the case of kephalin, which is well worthy of a few moments' consideration. When heated with water kephalin swells, and forms an emulsion which ultimately becomes an imperfect turbid solution, that is to say, it dissolves in a certain manner and in a certain measure, although it passes through many folds of Swedish filtering paper in its turbid state. This substance, however, will not dialyse, and is therefore practically a colloid.

On the other hand, the bodies under the heading "Nitrogenous Group," including cerebrin, phrenosin, and kerasin, behave somewhat differently towards water in which they swell to gelatinous masses without afterwards dissolving. Thus a few grammes of cerebrin will swell to one hundred times or more its original volume. Here I have a little cerebrin in water, and we will hasten the operation by the aid of heat, when, as you observe, it swells like starch, and becomes a solid mass.

Having thus led you to the subject of affinities of these bodies, and as this will be at the foundation of some remarks, I shall have to make as regards the vital functions of nerve matter, with your permission we will consider well the nature of these affinities.

The phosphorized principles of which we have treated, are possessed of acid, alkaline, and alkaloidal characters, that is to say, they combine with alkalies, acids and salts, with great avidity. In the several vessels before you there is contained a weak (1 per cent.) solution of kephalin in water, and I will now add hydrochloric acid to the first, sulphate of copper to the second, sodium arsenite to the third, and platinic chloride to the fourth, when there is produced, as you readily observe, a precipitate in each case. This power of combination, however, can be overcome by water, so that if these precipitates were placed in water on a dialyser, the respective combinants will again press out, leaving behind pure kephalin.

Although this affinity for water that kephalin exhibits is so strong, yet it is not so strong as that exhibited towards metallic oxides, as lead, manganese, copper, and iron, which can be dissociated only by mineral acids. I cannot do better here than quote to you two paragraphs from the summary Thudichum has given of his researches (see page 199 of 'Blue Book'). "We have therefore a diversity of affinities such as is not possessed by any other class of chemical compounds in nature, at present known; and the exercise of these affinities being greatly influenced by the mass of reagent, and the mass of water which may be present, the interchanges of affinities may produce a perfectly incalculable number of states of the phosphorized and consequently of brain matter. This power of answering to any qualitative and quantitative chemical influence we may term the state of *labile equilibrium;* it foreshadows on the chemical side the remarkable properties which nerve matter exhibits in regard of its vital functions.

"From this it also follows that nerve-matter (if only as characterized by the phosphorized bodies) must yield obedience to every, even the slightest, external chemical influence which may reach it by way of the blood. It must take up metals, acids, salts, alkalies, and alkaloids presented by the blood; it can retain only oxides when the serum is again free from the combinants; a watery serum will wash the brain; a more watery one will make it swell and displace mechanically within physiological limits what it can; a still more watery one will make the brain dropsical and produce all the conditions of mechanical pressure on the brain. All these processes are the necessary consequence of the affinities of the phosphorized substances, and these being known, the phenomena could be predicted if they were not sufficiently known as phenomena, though hitherto destitute of an explanation. Thus, the so-called brain fungus, the continued protrusion of brain matter through apertures of the skull produced by mechanical injuries, may, in certain cases, find a physical explanation in simple excessive hydration of the phosphorized (and nitrogenized) principles, producing general intercranial pressure."

Bearing in mind what I have just read to you in cases of poisoning by arsenic or mercury, we should expect to find these bodies present in nerve matter after death had resulted in such instances, and there are records which bear out the truth of these observations. Indeed, but recently, D. Scolosuboff (*Bull. Soc. Chim.* [2] xxiv., 124) (*Journ. Chem. Soc.*, Ser. 2, vol. xiv. p. 92) has published some experiments in which he administered doses of sodium arsenite to dogs, rabbits and frogs, which show that the poison concentrates principally in the nervous substance, smaller quantities being found in the muscles, liver and marrow.

These experiments, following after the research of Thudichum, only confirm in the strongest possible way the statement of Thudichum, that "nerve-matter must take up acids, salts, alkalies and alkaloids presented by the blood."

The phenomenon of the assimilation of arsenic had therefore been predicted, and D. Scolosuboff by his experiments has proved the truth of the prediction.

"These few examples" again to quote the words of Thudichum, "show that the acquisition of chemical statics leads almost necessarily and very easily to chemical dynamics of the brain; and these will in their turn furnish data for physiological and pathological conclusions. But these deducive arguments must be most sparingly and cautiously used until the statics are in a state of perfection and completeness. To argue too far from incomplete data would, seeing the history of biological chemistry during the last thirty years, be a deplorable error."

While we must all appreciate the truth of these words let us cast off the shackles of our prison house of imperfect knowledge, and take a flight of imagination, which, if used scientifically, will enable us to gaze into a sphere as yet unexplored, and at least give us a more expanded view of the laws of nature, if we do not return loaded with golden truths.

Liebig clearly showed how absolutely essential to plant-growth was the minute amount of saline ingredients which plants leave in the form of ash when burnt, and it may now be accepted as an absolute truth that however minute the percentage proportion of each of these ingredients, they are individually as essential to the healthy plant life as a supply of the most weighty constituents. Who can say, therefore, that the small amounts of inorganic ingredients of the brain are not equally necessary to its perfect development and consequent functions, and are not present merely by accident. That this may be so is the more probable, when we reflect that these saline matters are in combination with some of the principles, for unless special methods have been employed to rid cerebrin, phrenosin, and kephalin, etc., from these matters, you will find them invariably present, no matter how many times you have re-crystallized from alcohol the first two-named principles or dissolved in ether the other, and reprecipitated by alcohol.

It is perhaps less probable that the small amount of copper in the brain fulfils any useful function, and it is therefore, perhaps, present as accident only.

Again, in certain cases of softening of the brain, Dr. Thudichum has observed the presence of glycero-phosphoric and fatty acids in the free state. As these matters are never normally present, and as they constitute the decomposition products of some of the phosphorized principles of the brain, the idea is forced upon us that softening of the brain may be expressed chemically as the decomposition of one or more of the phosphorized principles into proximate nuclei.

Let me here distinctly observe how necessary it is for all of us to regard this only as an idea. There are circumstances, as we have seen, which seem to corroborate its truth, but it may be absolutely untrue; in short it is a thought, and not an unscientific one, *i.e.*, a reasonable hypothesis.

(*To be continued.*)

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The half yearly meeting of the members of the Association was held at the rooms, Halford Street, on Tuesday, the 1st instant. The following report having been read, was unanimously adopted :—

"Your Committee at the close of this the fourteenth session of our Association, taking a retrospective view of the past six months, feel, although it is their duty to report the progress and transactions that have occurred, upon the present occasion, that duty they esteem a privilege. The session just brought to a close may be unhesitatingly pronounced one of the best, if not the best since the Association has been in existence. It is true, we are unable to boast, during the past term, with regard to any of our students having won distinction at Bloomsbury Spuare, but in that we find nothing to discourage us, seeing the majority are unable according to the new regulations of the Pharmaceutical Society to present themselves as candidates for examination, and the number is limited who are eligible. The attendance of our classes has been very encouraging, notwithstanding there have been two held each week. A desire on the part of those attending to increase in knowledge, by appreciating the instruction given has been very apparent, much to the gratification of the teachers, thereby enabling them to review their work with satisfaction.

"Through the kind liberality of two gentlemen, (members of the Association) two prizes were offered for competition at the close of the session, value 10*s.* 6*d.* and 12*s.*, the subject of the first examination being Practical Chemistry, conducted by Mr. W. Clark. Mr. Shakespeare was the successful candidate. The subject for the second was Materia Medica, open to junior members only, conducted by Mr. Baron ; Mr. Fry being successful. The Committee also offered a prize, value 5*s.*, to be competed for amongst the juniors ; the questions for this examination were taken from work done during the session, and conducted by the class teachers ; in this case Mr. Grey was successful. These measures have been adopted in order that a spirit of perseverance and determination to excel might be excited, and that the younger students especially should have a sure foundation whereon to build their pharmaceutical edifice.

"The Committee have great pleasure in stating for the benefit of those friends who have been unable to pay a personal visit, that the past session will long be esteemed an important one in connection with the history of the Association, seeing that since the last report was issued, we have removed from our old and somewhat inconvenient rooms to others more commodious, and decidedly better adapted in every respect. The laboratory, in which formerly only one student could with ease pursue his studies, had long been felt inadequate to our necessities, and especially since the board of examiners require a deeper knowledge of chemistry at the hands of Minor students. This indeed, was a very important feature, with regard to the wants of the institution ; the Committee, therefore, was anxious to procure a remedy as soon as circumstances would permit, or an opportunity present itself. Such, however, has at length arrived, and in our laboratory, if required, six students may work with comfort. We are also well supplied with water, fire, gas, etc., so that it is now within the reach of all, to acquire a complete knowledge of this particular branch of pharmaceutical education. Our lecture-room too, possesses greater advantages than the Association has hitherto had, being larger, and in every way more suitahle.

"Forty-one classes have been held during the session, conducted by Messrs. Clark, Cadoux, Baron, Shakespeare, and Hammond. Three lectures have been delivered by Messrs. J. Young and W. Clark ; and two papers read by Messrs. Raynor and Garrett.

"The Committee in thanking very heartily those gentlemen who have so willingly placed their time and services at the disposal of the Association, feel they are not only giving expression to their own sentiments, but to those of all the students.

"The number of members upon our books is 31. The Committee notice with regret the removal to other spheres of labour, some who would, in all probability, have rendered valuable assistance to the Association ; it is, however, earnestly hoped, that those who shall occupy their respective places, will avail themselves of the great opportunities afforded them.

"In conclusion, the Committee express their very hearty thanks to the honorary members, and all who have so kindly assisted them in their efforts to make the society prosperous, sincerely hoping each member of the Association will continue to persevere, so that they may accomplish that for which the Institution has been established, assuring them that by steady and systematic application, they may easily overcome what to some appear insurmountable difficulties, and reflect great lustre not only on themselves, but upon the Association to which they belong."

After the usual votes of thanks to the retiring Committee and the Class Teachers, the members proceeded to elect the Committee for the ensuing session, with the following result :—

Mr. Baron, President, Mr. Garrett, Vice-President, Mr. Hammond, Hon. Sec., Mr. Clark, Treasurer, Mr. Butler, Mr. Shakespeare and Mr. Duncalf.

The statement of accounts showed a balance in hand of £10 9*s.* 7*d.* ; the receipts during the half-year having been £22 4*s.* 4½*d.*, and the expenditure £13 19*s.* 5*d.*

A programme of classes for the ensuing session has been issued.

The opening meeting of the present session was held on Tuesday evening, February 8th, 1876, in the Association Rooms, Halford Street, when the President, Mr. W. B. Baron, delivered his inaugural address.

After some introductory remarks, Mr. Baron said, that in his opinion, one great difficulty with which this and all kindred associations have to contend, was the limited area from which the students were drawn ; a difficulty it must be confessed that could scarcely be obviated. Another difficulty was the brief stay that, in the ordinary course of things not only students but tutors make : this also could not at present be remedied. Lastly in order, but greatest in importance and in disastrous effect was the disinclination manifested by a very large number to serious, earnest, systematic study ; this was the lamentation everywhere. From learned professors down to private teachers came the cry, that men will not be real students, that all they want is just enough knowledge to enable them to squeeze through the necessary examinations. This was a most unfortunate state of affairs, but it was probably to be attributed to the fact that we all possess a considerable share of poor human nature. Men with rare, very rare, exceptions like to shirk any work not deemed absolutely necessary. It was to be feared that Leicester had not altogether escaped this prevailing taint; and therein lay one of the chief dangers to which the association was exposed. Take the past session, described by the secretary as "one of the best, if not the best ever held," what was found? First, that on the register there were the names of some 33 members ; second, that forty lectures were delivered during the session on the various subjects embraced in the pharmaceutical curriculum ; third, that the average attendance per lecture was 8 or 9; fourth, that out of the 30 or so eligible students only 9 presented themselves for the various examinations held at the close of the session ; fifth, that any one of the four classes has rarely indeed been composed of the same members on successive nights. These facts taken together indicate a somewhat loose state of affairs. The subject had caused the Society much anxiety, and after a considerable amount of thought, it had been decided to introduce several new features this session. With the view of checking the desultory attendance that had so often been the case, it had been decided that for the future the members of the Association must decide at the commencement of the session what class or classes they purposed attending, and must then give in their names to the teachers thereof, who would duly register them. The advantages of this regulation would be patent to all. Under the system, or rather want of system, that had hitherto existed, a teacher had had on one night one set of students listening to his carefully prepared lecture, and on the following night, to his great mortification, when he had wished to question the class on his previous lecture, he found, perhaps, before him a totally different set. Under the new arrangement, if, say 12 or 14 students entered their names for the chemistry class, then Mr. Clark would know perfectly well for whom he had to prepare his lecture, and knowing his audience he would be better able to provide the exact sort of mental pabulum needed; he would also naturally expect that these 12 or 14 gentlemen having promised to attend his class would honourably redeem their promise. Further, the committee wished it to be distinctly understood that a person giving in his name not only engaged to attend, if possible every time the class met, but also to attend the examination to be held in each class at the close of the session. With a view to encourage regular attendance and painstaking work it had been resolved that each student who shall obtain at least 40 per cent. of the available marks shall have his subscription returned to him; while the two gentlemen who obtain the highest aggregate number of marks will be awarded the prizes generously offered by two honorary members, Messrs. Butler and Lloyd. After appealing to intending students to second the efforts of the teachers by regular attendance, and careful, thoughtful work at home, Mr. Baron strongly pressed upon them the necessity for home work, and urged them to strive, not merely to pass the necessary examination, but to thoroughly equip themselves for a manly, useful life, by aiming at obtaining the maximum amount of knowledge. The president adverted to the losses sustained by the association by the removal or otherwise of some of its members. The next item, the President said, was unmixed with sorrow. It was his pleasant duty to state that on the previous Friday the Treasurer had had handed to him a cheque for £15, being the amount of a grant voted to the association by the Council of the Pharmaceutical Society. He was sure they would all feel that this bit of substantial help was worth an ocean of pity. It had come at a most opportune time. It would enable them to get several educational appliances sorely needed. And he doubted not they would be able to show as good a harvest from the investment of this £15 as anyone to whom it could have been entrusted.

Glancing beyond the limits of their own circle, the first thing that claimed attention was the alteration made in the examinations. The long looked for change in the "Preliminary" had come at last, and it was now conducted by the College of Preceptors, although a controlling influence was very properly exercised by the Pharmaceutical Society. It certainly had been somewhat singular, he thought, that a board of examiners, appointed with the special view of conducting purely technical examinations should have a purely scholastic one placed under its care. In the "Minor" and the "Major" a change had been made that personally, he strongly regretted, and he thought that regret was shared by others. It had been decided that for the future the names of persons passing these examinations shall be arranged, not as heretofore, according to the degree of merit exhibited, but in alphabetical order, thus withdrawing a powerful incentive to the candidate to excel, and tending to reduce all to a dead level of mediocrity, by withholding the stimulus of the much-coveted star. He earnestly hoped that the examiners would ere long reconsider their decision. The proposed alteration in the fees payable for the "Minor" and the "Major" had again been mooted by Messrs. Williams and Sandford; these gentlemen wished to make the fee for the former £5 5*s.*, and for the latter £3 3*s.* The question had been shelved for the present, and he hoped for ever. It certainly would be an anomaly to charge a higher fee for the lower examination. And, as the "Minor" was often passed by young men at a time when £3 3*s.* could not easily be spared, much more £5 5*s.*, it was to be hoped that the proposed change would not be made. The vexed question "how best to assist pharmaceutical education in the provinces," yet remained an unsolved problem. No scheme had yet been propounded which overcame all the difficulties in the way; and there was he thought little hope, at present, of one that would. The drug trade had of late been somewhat less harassed by vexatious prosecutions under the Adulteration Act. But, the necessity existing for the careful working of this law, and the danger of allowing persons ignorant of business requirements to interfere in trade concerns, had just been exemplified at Sheffield, where that tender and precious thing, a tradesman's reputation, has been cruelly wounded by an analyst's thoughtless report issued under the direction of the town council.

The address was listened to with great attention and interest; the remainder of the evening was occupied with songs, readings, etc.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL ASSOCIATION.

The first monthly meeting for the present session was held on Wednesday evening last, February 9, at the rooms of the Association, Music Hall, Surrey Street. The President, Mr. W. Jervis, in the chair. The minutes of the annual meeting having been duly confirmed, the President called upon Mr. G. Ellinor, M.P.S., to introduce the subject of the evening—viz., "Adulteration Act.—The Sale of Poisonous and Adulterated Drugs by Grocers and Small Shopkeepers":—

Mr. Ellinor then said: Mr. President and Gentlemen,—With regard to poisons and also the dispensing of prescriptions the law is very decisive, but with regard to the sale of drugs quite a different aspect presents itself. In the first place we should be clear in our definitions. I would here make a remark not necessarily for discussion, because all the force of argument can never prove that twenty wrongs make a right. Neither do I wish to be personal in any remark I may make, but we must make a stand somewhere, consequently have a standard. In order to have a definition suitable it is necessary that it should first be a true one, and secondly be understood both by those in the trade and out of it. We have drugs defined in the pharmacopœias, as also chemicals, and such we say have a pharmacopœial standard. That each succeeding pharmacopœia has superseded its predecessor is undoubted, and I think also that it is a fact each pharmacopœia has or had its standard, whether British, London, Edinburgh, or Dublin. There are few present who won't admit that the pharmacopœias are the legal standards or instructions for the making of such preparations named in them, but that deviations may be made; that is, Tr. Rhei, may be made otherwise than from the formula of the B. P., but such deviations should be notified. That these preparations had and still have pharmacopœial and common names known or understood by the chemists generally, but the common names are understood by the public generally. To show my meaning I will introduce a few by way of illustration. You are asked over your counter for one ounce of Friar's balsam, you supply Tr. Benzoin Co.; another will ask for tincture of Benjamin, you supply Tr. Benzoin Co.; in this instance you have two common names for one article, but you would know what was required if asked for by either.

Spirit of Camphor	Tinctura Camphoræ.
Laudanum	Tinctura Opii.
Paregoric Elixir	Tinct. Camph. Co.
Sweet Spirit of Nitre . . .	Sp. Æth. Nit.

Spirit of Sal. Volatile . . .	Sp. Ammon. Aromat.
Cream of Tartar	Acid Tartarate of Potash.
Epsom Salts	Sulphate of Magnesia.
Glauber's Salt	Sodæ Sulphas.
Sugar of Lead	Plumbi. Acetas.
White Copperas or Vitriol .	Zinci Sulphas.
Lenitive Electuary . . .	Conf. Senna.

The articles in the first column are known to the public generally by the first names only, but by both names to the trade. You may enter twenty shops and ask for the articles by the names in the first column, and you will be supplied with the articles in the second column and when questioned each chemist will tell you he understands each name to mean the articles in the second column.

The Adulteration Act cites drugs and food. If we look for a definition of food we might say such articles natural or manufactured, sold or used, for the sustenance of the animal system. And next what is a drug? You may say an article sold by a druggist, but all articles sold by druggists are not drugs, some are chemicals, etc., therefore such a definition would be vague. I think a drug within the meaning of the Act is any article sold for medicinal use, internal or external, poisonous or non-poisonous, by whomsoever sold; therefore the best definition of a drug I can give is "an article natural or manufactured, simple or compound, used as a medicine or remedial agent." In applying this subject I would remind you that we have pharmacopœias past and present, recognized text books on materia medica, containing the names and standard strength of the whole of the articles known to the public generally, and with these books, etc., we need not be at any loss in defining the articles intended by the names and in supplying the representative of the present times.

Therefore, I hold that any article sold for a medicinal purpose or remedial agency comes within the Act known by a pharmacopœial or defined name, private or public. In respect of the private, the maker only can take legal action; whereas on a published formula any commissioner can take action. By private I mean such as Collis Browne's Chlorodyne; by public I mean such as Easton's Syrup. The seller is, and ought to be, responsible for what he sells, whether chemist, druggist, grocer, or any other person; were it not so, it would be impossible to get a conviction. Articles or drugs are sold by grocers and others which have names given them representing and understood to be similar to those known by most here. Tincture of rhubarb, sweet nitre, Friar's balsam, which are here produced. These evidently are not according to the B. P., therefore these sellers are liable to action.

Any article sold under any name having or known by a pharmacopœial or materia medica standard, should come up to the standard specified—*e.g.*, tincture of rhubarb should in all cases refer to the Tr. Rhei., P. B., Friar's balsam to Tr. Benzoin Co., P. B. On these grounds the public should have protection from having any kind of stuff sold them, and should receive the necessary protection from our societies.

There is one thing must be understood, we cannot restrict free trade in these articles under the present condition of the Acts of Parliament; but one thing should be enforced, that any person selling any drug or chemical having a recognized formula under the name given in the standard should bear the test or be actionable. But in order to know that an article is sold for what it is, let every drug or medicinal agent be labelled. In case of an article not being according to B. P., let this kind of label be used as "Tincture of Rhubarb, prepared according to private formula: Sold by ——" (name and address). When not otherwise expressed, all articles shall be deemed to be B. P., or other recognized formula. One thing ought to be enforced, that all articles sold as a medicinal or remedial agent should be labelled with the name and address of the seller.

At the conclusion of Mr. Ellinor's remarks a general discussion on the subject ensued, when Mr. Radley proposed, and Mr. Ward seconded, that definite action in the matter be considered by the Council of the Association at their next meeting.

A cordial vote of thanks having been given to Mr. Ellinor for the able manner in which he had introduced the question, and suitably responded to,

The meeting next considered the advisability or not of applying to the town council for the particulars of Mr. Allen's amended report on the dispensing of physicians' prescriptions. After some discussion it was resolved that the report be applied for.

A letter was read by the Secretary from Mr. Wm. Laird, of Dundee, with which that gentleman had forwarded a one drachm (?) weight, which was 8⅓ grains short—suggesting that possibly similar weights might be the cause of the alleged deficiency in some of the mixtures lately reported upon by Mr. Allen.

A very successful and agreeable meeting was concluded by the nomination of five gentlemen for membership of the Association.

HALIFAX AND DISTRICT CHEMISTS AND DRUGGISTS' ASSOCIATION.

The first meeting for this year was held on Thursday, February 10, at the Old Cock Hotel, Halifax, when Mr. Robert Brook, who succeeded to the presidential chair in November last, delivered an inaugural address.

The following topics were treated in an able and suggestive manner:—The new drugs introduced or re-introduced into English medical practice during the past year, few of which had appeared to be in demand in the locality; the prices obtained for dispensing in relation to the general adherence to the Association's price-list, and the payment for time, skill, and stock compared with the remuneration (so much increased of late years) of the artisan class; the desirability of an increased return for labour expended, the reasons for such an increase, and the difficulty of obtaining it. The present aspect of the patent medicine trade, its recent extensions, and probable contingencies were matters dealt with in the conclusion of an address, which bore much evidence of research, care and ability.

The President was warmly congratulated on resuming his seat, and a long and interesting discussion followed, during which it was agreed to take action upon some of the suggestions at an early date; and the bearing of the Sheffield analyst's report and recent law cases upon the duties, fidelity and privileges of chemists, was subject of general remark.

A communication from the assistants and apprentices employed in the town was read by the Secretary, Mr. Shaw, and received very favourably. The Association has for some time possessed a small but useful reference library, and the young men tender a handsome sum for the purpose of adding new books, and suggest certain works, with regulations for general circulation.

An influential committee was appointed to consider the proposal and report.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday 17th February, 1876, Professor Abel, F.R.S., President in the chair, After the usual nomination and election of fellows, the President announced that Mr. James Duncan had presented the Society with a most life-like and spirited marble bust of Dr. Hofmann. He then called upon Professor Frankland to deliver his lecture "On Some Points in the Analysis of Potable Waters." After alluding to the incalculable importance of water analysis in a sanitary point of view, not only in showing the *present* organic impurity, but also as giving evidence of *past* pollution, the lecturer proceeded to describe the most recent improvements in the combustion method of determining the amount of carbon and nitrogen in water residues. A full discussion of the variation in purity of the water supplied during the past eight years by the various London companies then followed, illustrated by most excellent diagrams, and the lecturer concluded by pointing out some of the objections to the other well-known processes employed for water analysis. Owing to the lateness of the hour, the discussion was adjourned until the ensuing meeting, which will take place on Thursday, March 3.

Parliamentary and Law Proceedings.

POISONING BY LAUDANUM.

On Monday an inquiry was held by Dr. Hardwicke, in Bayswater Road, on the body of General Alexander Peter Le Messurier, aged 77, a retired officer of the British Army, of No. 5, Inverness Place.

Captain James Le Messurier, of the 10th Hussars, said he resided at Eastbourne Terrace. When he last saw the General a month ago, he was in excellent health. He had retired upon a pension of £1000 per annum, but it seemed his affairs were administered by a cousin, who resided with him. He was apprised of deceased's death by a former servant, and on calling at the house an attempt was made to prevent his seeing the body, but he determined to do so, and when he heard that the General had been poisoned he felt it his duty to demand an inquest.

Ellen Quill said she acted as servant and nurse to the General, who complained of nothing but pain in his legs. He was perfectly well and sensible up to Wednesday afternoon last, when at half-past two he had his lunch in his room as usual. She then observed a bottle on the table which she had not seen before. She took it down and showed it to Mr. Thomas Le Messurier, the General's cousin, who said it was laudanum. About an hour after the General's bell was rung violently, and on her going up he told her had taken poison. She ran down and told Mr. Thomas, who bade her run for the doctor.

Mr. William Ward Leatham, of 80, Gloucester Road, said he had attended the deceased for some time. All he suffered from was dyspepsia and old age. He had seen deceased an hour before this event casually, and he then complained of his legs and said he had got some laudanum to rub them with. When sent for he found him exceedingly drowsy and suffering from some narcotic, and he found a four-ounce bottle which had contained laudanum, and the General said he had taken it all. He applied the stomach-pump and galvanized deceased and rubbed him, but without effect, and he died on the following morning. There was no label on the bottle.

Mr. Thomas Le Messurier said he was cousin to the General, and resided with him at 5, Inverness Place. He managed the affairs of the deceased. He was himself a wholesale stationer by trade. When the witness, Ellen Quill, came down with the bottle containing the laudanum she showed it to him. As she admitted she had taken it away clandestinely and deceased had previously told him he had got it to rub his legs, he told her to take it up and put it where she had found it, honestly believing that the General had got it for that and no other purpose When the nurse came down and said he had taken the laudanum, he went up, and the deceased said to him "Tom, I'm dying," and handing him a letter (produced), added, "this will tell you all about it." The letter was in the General's handwriting, and commenced by saying "My life has been most unhappy," and after stating that a brother general and some others whom he named had by their conduct deprived him of his legitimate money, he concluded by requesting his cousin to have the review of his services in the army, which he had left behind him, published. The witness was subjected to cross-examination to show that he had all the affairs of the deceased in his own hands, and that the will of the deceased was made in his favour.

The Coroner said the evidence completely exculpated the last witness from any criminal imputations.

The jury acquiesced in this, and returned a verdict "That the General committed suicide by taking the laudanum while in an unsound state of mind," adding that they considered Mr. Thomas Le Messurier censurable for having allowed the poison to be again taken up and placed in the room under the circumstances.—*Times*.

ALLEGED ADULTERATION OF WHISKEY.

On Friday, February 18, John Stewart, landlord of the Lord Hill public-house, North Wharf Road, attended at the Marylebone Police Court, having been summoned by the Vestry of Paddington, for selling adulterated whiskey. Mr. M. Williams prosecuted; Mr. Thomas defended.

On a previous hearing Thomas Clifford, Sanitary Inspector of the parish, said that on the 18th of November last he went to the defendant's premises and purchased a bottle of whiskey. The spirit was drawn from a tap, and on asking how much he had to pay for it he was told 4*s.* He said he did not know how that could be so; he could buy whiskey at 3*s.* 6*d.* a bottle at other places. The woman who served him said "Very well, pay 3*s.* 6*d.*" He afterwards told her who he was, that he had purchased the whiskey to have it analysed, and that if she chose she might have a part of it. She declined to have any, saying that she had plenty of the same sort there. The analyst of the parish, Professor Anderson, to whom the spirit was taken, certified that it contained foreign spirit otherwise than whiskey, and among its ingredients there was, in his opinion, methyl alcohol, or wood spirit. It was a hot, not to say fiery, compound, and would certainly be injurious to the health of those who drank it. Professor Anderson, cross-examined, said that he detected methyl alcohol in the whiskey by the sense of smell. In the whiskey in question in the hundred parts there were 40·5 of alcohol, 59·4 of water, and 0·1 of solids. It also contained fusel oil, but there was no chemical means of getting at it or weighing it. Some whiskey sold contained only a trace of whiskey, and if drank in large quantities was calculated to produce insanity. In answer to Mr. Williams, the witness said the fusel oil was not an essential ingredient of whiskey. If it were properly prepared, only the slightest trace of the oil would remain. For the defence Dr. Theophilus Redwood, analyst, of 17, Bloomsbury Square, said that a sample of whiskey received from the defendant's place was found on analysis by him to be moderately good, fusel oil was one of the component parts of whiskey, but a portion of it could be removed. What remained would, after a length of time, become converted into ether, and would improve its quality as wine was improved by age. He could detect no trace of methyl alcohol in the whiskey in question. It was decided, therefore, that a sample of the whiskey should be sent to Somerset House to be analysed.

The following certificate from Mr. Bell, the principal of the Chemical Laboratory at Somerset House, was now read:—"I am of opinion that the sample of whiskey submitted for analysis is a sample of genuine commercial whiskey. It is entirely free from wood spirit, and is a fair sample of ordinary new whiskey, which has, in my opinion, been slightly softened in character by the addition of a small quantity of sherry wine." Mr. Bell, cross-examined, said that the whiskey was one of the ordinary character sold at shops. It was not what was known as the true article, as that would be tasteless. It was whiskey so manufactured and was the product of grain fermented and distilled. There was no foreign spirit in it except that which came from the sherry casks. Commercial whiskey was stored in sherry casks to mellow it. He could not say that the whiskey in question had been so kept. In the whiskey in question there was no methylic alcohol. In testing the whiskey he had used Gunning's test. The witness's method of analysing the whiskey appearing to be at variance with an analysis made by another gentleman on behalf of the prosecution, a further adjournment was asked for.

Mr. Mansfield said that a part of the whiskey in question had been analysed by Mr. Bell, who had as great an experience in these matters as anyone in the United Kingdom, and who said that it was not what was known as adulterated whiskey. It would therefore be a great injustice to the defendant to protract these proceedings any further, he having had trouble, expense, and anxiety enough already. Everybody would, no doubt, regret that the parish in the performance of its duty had met with a discomfiture in matters which were quite beyond its control. The summons would be dismissed and the parish have to pay £8 8*s.* costs.—*Times.*

DEATH FROM AN OVERDOSE OF CORDIAL.

On Friday, February 18, Mr. Herford the city coroner held an inquest in Manchester, on the body of Sophia Taylor, aged 12 weeks. The mother of the child said that she took the child to bed with her on Wednesday night, when it seemed in good health. About 10 o'clock the next morning she found it dead in bed. The night before she had given it about half a spoonful of "Matthews' cordial," which she had obtained at a "cakeshop." It was kept in a bottle there. The child had also had a dose of "Winslow's Soothing Syrup," about a week ago. Witness's husband said it was a pity the child had had the cordial, but he did not apprehend any fatal consequences. The jury returned a verdict of "Died from an overdose of a certain narcotic called 'Matthews' Cordial,'" and condemned the practice of "cordial" being sold by persons not druggists, and the omission of the label from the bottle.—*Manchester Examiner.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

ELEGANT DISPENSING *v.* CORRECT DISPENSING.

Sir,—Under the above heading there appears in last week's Journal a letter from "A Country M.P.S.," stating that a mixture made from the following prescription, in whatever mode of mixing, results in a separation and deposit of part of the chloroform. But this is not all; he adds, also, that it had been previously dispensed by a "London firm of great eminence," who sent it out clear, and therefore must have poured off the clear portion from the chloroform thrown down, or, to use his own words, "it was evident the London dispenser had, for the sake of appearances, separated the insoluble part, and sent out the mixture clear."

Copy of Prescription.

℞ Liq. Arsenic. Hydrochlor.	♏ 128	
Tinct. Ferri Perchlor.	ʒv	
Spirit. Chloroform.	ʒv	
Aquæ ad	℥iv	M.

I find that if the ingredients of which this prescription is composed be of the strength and answer to the tests of the British Pharmacopœia, the mixture may be made without the deposition of any chloroform, perfectly clear, even bright, and without its undergoing any apparent subsequent change. I mixed the tincture of perchloride of iron and spirit of chloroform together, added the liq. arsenic. hydrochlor., then the water, gradually shaking after each addition. The mixture is perfect and without any deposit; there is no necessity to "deprive the mixture of any portion of anything which is prescribed therein."

That a prescription should reach a country chemist, which requires some delicacy in manipulation, is not to be wondered at, or that a dispenser should be occasionally puzzled with the limited pharmacy of some medical practitioner is equally within the range of probability, but it is quite another thing to put forward so grave a charge as that of leaving out a portion of any ingredient for the sake of elegance.

"M.P.S." may rest assured that "firms of eminence" in London, as elsewhere, have attained that position by strict regard, not only to accuracy in dispensing prescriptions, but also to the strength and quality of every preparation in the British Pharmacopœia, on which dispensing so much depends for its uniformity.

The disadvantages in regard to the dispensing of prescriptions under which suburban, provincial, or country chemists labour are usually found to be of their own creation and within their own control, not the result of the accident of position, but subject to the well-known and generally recognized law of "cause and effect."

THOMAS GREENISH.

20, New Street, Dorset Square,
Feb. 23, 1876.

Sir,—Your correspondent, "A Country M.P.S.," is quite right in "laying down the rule" that "we have no authority to deprive a mixture of any portion of anything which may be prescribed therein;" but I think he is in error in arriving at the conclusion, in the case he refers to, that "the London dispenser had, for the sake of appearances, separated the insoluble part (and sent out the mixture clear)."

The truth is, in the prescription given the proportions of water, spirit and chloroform, are very evenly balanced, though balanced just a little on the wrong side. The separation arises, of course, from the circumstance that there is not quite sufficient water to dissolve or absorb the chloroform (1 to 19 of spirit); or what amounts to the same thing, not quite sufficient spirit to permit of the chloroform being taken up by the quantity of fluid ordered. Either therefore, add more water (ʒij) or more spirit, and the problem will be solved. As it cannot, with strict accuracy, be the former, it must be the latter. By the addition of ʒj S. V. R. (less will do if the mixture be carefully manipulated) to the ʒv of Sp. chloroform. before mixing, all separation will be prevented, and the mixture will be perfectly bright and clear. It will be "elegant" and at the same time, to all intents and purposes "correct." If exception be taken to the addition of the spirit (ʒj in ℥iv), and it be asked, "Is it so nominated in the bond?" I reply that the letter of a prescription cannot always be adhered to. Its spirit and intention must be studied, and, as far as possible, correctly interpreted by the dispenser.

W. WILLMOTT.

King's College Hospital,
Feb. 23, 1876.

P.S.—Supposing the dose of the mixture in question to be a teaspoonful, the probability is that, in the hands of the patient, it will become clear before the whole has been taken from the evaporation of the slight excess of chloroform in proportion to the water and spirit contained therein.

Sir,—How differently different persons appreciate any given circumstance! Your correspondent who signs himself "A Country M.P.S." and heads his letter as this is headed, lachrymosely writes "You cannot imagine the disadvantage under which a country chemist proceeds to explain" etc. I confess that I cannot "imagine the disadvantage" as he phrases it. To my mind there cannot well occur a more agreeable incident to break the usual monotony of a dispensing chemist's daily routine, than for a customer to drop in to complain that his or her medicine "has been wrongly prepared," because it differs from some obtained from "a

London firm of great eminence." The pleasure is greatly heightened, should the customer be in a decided "wax," or boiling with indignation, at "your carelessness." You smile in your sleeve, feeling perfectly confident of your power to wield a wand that will cause his "wax" speedily to melt, his indignation to subside, and that the entering lion will be transformed into the departing lamb, profuse probably in his apologies for having even momentarily deemed it possible that you could commit an error. You feel the advantage that the incident will give you; that in future he will place implicit confidence in you and less in the "London firm of great eminence." But to experience this ecstatic pleasure you must have a well-grounded consciousness that you are right, otherwise you will be likely to experience the misery of its antithesis, the luscious nectar will be transformed into the gall of bitterness; unless indeed you are dishonest enough to "lie through a deal board," an accomplishment I regret to say not altogether foreign to the retail drug trade. I am very glad that I was not the "Country M.P.S." who dispensed the mixture in question, for the circumstance would seriously have interfered with my digestion and natural rest for at least a month. Strange that a "Country M.P.S." should be in happy ignorance of having committed a blunder! Should his customer mention the circumstance to the "London firm of great eminence," their statement will be likely to induce him either to "write" A Country M.P.S. "down" a "story teller," or that he is hardly well up in his business. I recommend him at once to look to his Sp. Chloroform. bottle, for it possibly contains undiluted chloroform; it certainly must contain a stronger preparation than Sp. Chloroform., B.P., or there would be no separation of chloroform as represented. The prescription properly dispensed would make a "quite clear and bright" mixture without "separation" or "deposit." It is "evident" the "London firm of great eminence" was right, "A Country M.P.S." wrong. "A Country M.P.S." says that "similar cases are not infrequent in his experience"! Were one inclined to be satirical, one might be tempted to suggest that "A Country M.P.S." is at present dwelling too remote from its banks to be likely "to set the Thames on fire."

ANOTHER COUNTRY M.P.S.

Southampton, Feb. 19, 1876.

Sir,—In answer to the letter with the above heading in the last week's *Pharmaceutical Journal*, I do not think "A Country M.P.S." is warranted in saying that "the London dispenser had for the sake of appearances separated the insoluble part;" for if he first mixes the tinct. ferri perchlor. (B.P.), and sp. chloroform. in the bottle, adds the water gradually, shaking after each addition, and lastly puts in the liq. arsenic. hydrochlor., he will make a mixture which is, and will remain, perfectly clear, as I have myself proved.

A. L. B.

Sir,—"A Country M.P.S." has fowarded a prescription (in last issue) saying it cannot be made up without a separation of chloroform, and that the London dispenser has strained it to give it a bright appearance, which is an unjust assertion and shows "M.P.S.," is not a practical man. I have prepared it from the recipe, and find not the slightest separation, and considering the same quantity of chloroform contained in the B.P. spirit, and the amount of rectified spirit contained in the mixture, viz., ten drachms, it is not at all likely to separate. I would suggest that "M.P.S." should examine his tincture, and see he has the proper spirit, and that it is not half spirit and half water as is often the case, and that tincture was both ordered and used and not liquor ferri. If all right, and he is still unsuccessful, I invite him to try my way of doing it. Fill the bottle about half full of water, add liq. arsenic. hyd., then tr. ferri, shake to get well diffused, then add the sp. chlorofor., and shake well for a few seconds, and fill up the bottle and in a minute or two the mixture becomes perfectly bright, being at the same time elegant and correct.

P.S.—Will "M.P.S." quote some of the other cases that have come under his notice?

A LONDON DISPENSER.

Weymouth, Feb. 22, 1876.

Sir,—I think if your correspondent "A Country M.P.S." had exercised a little more care in dispensing the prescription referred to, he would not have cast such an imputation upon the London dispenser. He will find by adding the sp. chloroformi to the tinct. ferri perchloridi, and then adding them gradually to the *whole of the water* and the liq. arsen. hydrochlor. with agitation, that a permanent mixture will be obtained. If by imperfect dispensing the chloroform is once separated, a difficulty will no doubt be experienced in getting it dissolved, but this ought not to occur.

W. H. P.

Leamington, Feb. 19, 1876.

Sir,—Your correspondent of last week signing himself "A Country M.P.S." will find the mixture he alludes to very easily dispensed, clear and bright without any separation of chloroform, by using distilled in the place of ordinary water. Should the water be very cold indeed it will be found advantageous to very slightly warm it first.

It is scarcely fair, I think, to accuse London dispensers of "cooking" a prescription without a better show of reason for such an attack.

PHARMACEUTICAL CHEMIST.

London, Feb. 23, 1876.

PHARMACY IN PAISLEY.

Sir,—*Apropos* of the correspondence in your columns concerning doctors' shops and medical halls in Glasgow, perhaps a few remarks anent the same crying evil in Paisley will be interesting to some of your readers. Paisley is a flourishing town of some 50,000 inhabitants, within seven miles of Glasgow. It can boast of producing merchant princes, professors, and poets, and a certain class of its inhabitants consider themselves second to nonein politics; but with the particular class we are going to deal with, namely the chemists, advancement appears to be a dead letter. The reason of this I will endeavour in this letter to show. It is an undeniable fact that in this town there are fourteen doctors' shops, and only some three or four what may be called chemists' shops proper, there being a few small huckstering shops in the outskirts of the town where a prescription is dispensed (*sic*) perhaps once in twelve months. Now, Mr. Editor, what I want to bring under the notice of your readers is this glaring fact, that of all the young men and apprentices, twenty-two in number, employed in those so-called "medical halls," not one has faced the examinations in one shape or other, there not being so much as a registered student or apprentice amongst them.

Some of the medical men keep open two shops, and employ mere lads to keep them. They all keep open to a late hour. Not content with making a monopoly of prescriptions, a policy which is followed up to the last letter, they also keep open shop from an hour to two hours later than the chemists, and are entirely to blame for the long hours and Sunday traffic which prevail to such an extent in Paisley. I think, Mr. Editor, you will agree that we have good reason in Paisley, as well as our brethren in Glasgow, to complain of this most unfair and non-professional treatment. I lay these bare facts before the whole trade and leave it to decide whether such a state of things is to be submitted to.

DELTA.

Paisley, Feb. 15, 1876.

TABLESPOONFULS, ETC.

Sir,—Various suggestions have been made by your correspondents to meet the difficulty arising from the inreasing size of spoons used for measuring doses.

There is one plan which has not been mentioned which I have used here for the last two years with much satisfaction.

It is the employment of printed slips, carefully graduated to the number of doses contained in the bottle, and having printed down the side the words, "The quantity here indicated is the exact dose prescribed."

They are in considerable variety, for the different sizes of bottles, and show the part from half to one sixteenth, as may be required.

This method avoids the expense of purchasing and the trouble of using a measure glass, which some people dislike, and certainly removes all responsibility from the dispenser in the event of an overdose being taken.

On the other hand, it meets the objections to graduated bottles, arising from the danger of mistaking the graduation, or of their indiscriminate future use, as stated by "W. R. O. C." in last week's Journal.

Joseph V. Toone.

14, *New Bond Street, Bath, Feb.* 22, 1876.

Sir,—What does a prescriber intend when directing a tablespoonful of a six ounce mixture to be taken for a dose? Invariably, I should say, a twelfth part of such mixture. A calculation of the doses will generally show this, and prove that the "faculty" has not yet awakened to the fact that spoons have of late been made of increased size.

Mr. Greenish's practice is a very safe one, but credit having been given the prescriber for greater accuracy of definition than he is entitled to, does not go far enough. The spoonful should in all cases be measured—not necessarily by means of a glass or earthen measure, for thanks to greater skill and care in the making of dispensing bottles it is possible to obtain the smaller sizes graduated by marks of sufficient accuracy for all practical purposes. When, however, the proportion to be taken is less than a sixteenth, that plan cannot be recommended, and one must fall back on the glass or other separate measure, or, having warned the patient, divide the mixture between two or more graduated bottles of suitable kind.

The extreme variability of "drops," their size being influenced by the nature of the fluid, the size and shape of the edge from which they fall, and by a host of minor causes that have been experimentally investigated, ought long ago to have banished them from the list of measures of medicinal doses. Unless in very exceptional cases the dose should never measure less than a fluid drachm. When smaller quantities are imperatively called for, measured minims should be ordered.

Chemists, however, should both for their own and their customers' sakes advocate the return to the old safe and profitable sixth or eighth part mixture, to the neglect of which form of prescribing may be traced not a few serious dispensing accidents, and much of the grumbling as to the ill-remunerated toil of the dispenser.

The adoption of Mr. Martindale's too ingenious scheme would, in the event of another change of fashion in spoons, land us in confusion worse confounded.

Thos. G. Groves.

Weymouth, Feb. 21, 1876.

Sir,—Although several letters have appeared in the Journal on the above subject there is not one that offers a practicable solution of the difficulty of getting people to take the proper dose of medicine when it is ordered to be taken by spoonfuls.

By one tablespoonful f℥ss is generally understood by physicians and dispensers; also a dessertspoonful is understood to mean ʒij, and a teaspoonful ʒj; any alteration in this scale or in the quantities intended to be understood by the various spoonfuls would lead to general confusion and many errors between physicians and dispensers, because the change would only be adopted by a part of the profession, and a dispenser would not know what quantity was meant by a tablespoonful; therefore, such a change would be bad. At present we know what quantity of medicine a physician intends to be given when he orders a tablespoonful for a dose. Our object is to convey this meaning to the patient or nurse so plainly as to make it impossible for them to make an error in the quantity given in a dose, that is, if they only use a little care.

I think this object might be gained by dispensers attaching a printed label to every bottle of medicine ordered to be taken by spoonfuls, stating the number of doses the bottle contained, and by dividing the bottle by means of paper slips into a number of divisions equal to the number of doses.

A chemist might get a number of labels printed with the words, "This bottle contains doses of medicine." He should also provide himself with a number of paper slips.

As an example we will take an ℥viij mixture ordered to be taken in two tablespoonful doses. The dispenser would place the ordinary label on, directing two tablespoonfuls to be taken for a dose; he would also take one of the new dose labels, put an 8 on it. It would then read, "This bottle contains 8 doses of medicine;" and the paper slip should also have the numerals 1, 2, 3, 4, 5, 6, 7, 8, marked on the divisions. When he had stuck these labels and directions on the bottle of medicine, no one could very well err in the quantity taken as a dose unless through extreme carelessness.

A chemist might also inform his customer "that in consequence of the great diversity in size between the old and new spoons, it was necessary to put on each bottle of medicine ordered to be taken by spoonfuls a label stating the number of doses contained in the bottle, so as to ensure accuracy in the quantity given as a dose," or this latter piece of information might with advantage be printed on the prescription envelope.

This plan would entail very little extra trouble or expense, and I think it very practicable; at least, it would answer for chemists. In most public institutions, the dispensing is done so rapidly as to render such a plan out of place.

Paper slips will divide a bottle pretty accurately if care be taken in sticking them on. An eight ounce bottle containing f℥j will often appear to the uninitiated to contain much more than f℥j, in consequence of the thickness of the bottom of the bottle; it would therefore be advisable for those not used to applying the slips to measure 2 tablespoonfuls of water into the bottle, and noting the height to which it reached, divide the bottle accordingly.

Any other sized bottle and dose could be divided on the same principle; thus a ℥ij mixture in tablespoonful doses would have a slip divided into 12 parts, and the number of doses 12 marked on the dose label. I think very few people would take more than the right dose of medicine if these precautions were adopted. If any careless persons after taking two or three doses of medicine found they were getting on too fast with the bottle, they would probably take less in future for seeing how many doses the bottle should make, and only the most careless and ignorant could make a serious mistake, or take a bottle of medicine intended for 8 doses in 4 or 5. If any mistake did occur in the face of the precautions, and anyone was poisoned, no blame could be attached to the dispenser.

J. W. Taylor.

Lincoln, Feb. 21, 1876.

Permit me to say a few words on the "tablespoonful" question.

Some years ago finding a patient had disposed of a 10oz. mixture containing ʒss acid. hydrocyan. dil. two tablespoonfuls for a dose every four hours, in less than twenty-four hours, I was led to adopt the following label in every case where a bottle is not graduated.—"This mixture should be carefully measured. The bottle contains doses, the number of doses being filled in the blank space." This I have found most useful, and it has been much commended by medical men. I may add should ℥j of a mixture be ordered I should invariably graduate the bottle, and much prefer printed paper graduates as being more correct, if care is exercised in not having them too long (as is usually the case) and properly adjusting for the first and last dose. The note mentioned by Mr. Proctor should always be printed on the prescription envelope. If to these precautions we add the words "by measure" in the cases mentioned by Mr. Greenish, I do not think we can be far wrong. I am afraid Mr. Martindale's suggestions involve too radical a change ever to come into general use, as the difficulty of getting the profession to recognize ʒv as a tablespoonful would I fear be insuperable.

W. H. P.

Leamington, Feb. 19, 1876.

Sir,—On reading the correspondence in to-day's Journal about "Spoonfuls" I was most pleased with the letter of Mr. Greenish. It occurred to me, however, that an additional word might with advantage be added to his suggested "by measure." With great deference to Mr. Greenish's experience and reputation, I would propose that when the physician orders "℥ss," the label should be written thus:—"A tablespoonful (by *graduated* measure) etc." The same rule to be applied to other quantities similarly ordered. By writing "by measure" alone, some patients might fancy it was merely intended to warn them not to drink it out of the bottle or "guess" it, as is frequently done, but to use the spoon in measuring it. Of course pharmacists know quite well what is meant when "by measure" is used; but members of the public who have never seen or heard of a graduated medicine measure glass might not be so clear on the matter.

P. B.

Glasgow, Feb. 19, 1875

Sir,—Since reading the letters in the Journal on the above subject, I have measured some of my own spoons which are I believe similar to those in general use. I found the dessertspoon to hold half an ounce pretty accurately, the teaspoon, 110 minims, or if heaped (*i.e.*, rather overfull, but not running over) two drachms, the tablespoon, if filled in the same way, held one ounce. I have frequently noticed that patients have taken their mixtures in half the time intended, or perhaps made about five doses instead of eight. My own practice in dispensing is to translate "cochl. ij magn.," two tablespoonfuls, but when ʒj is ordered to put the mixture into a graduated bottle.

I cannot agree with Mr. Martindale's suggestions, as I think we should only be creating new difficulties.

H. B. N.

St. Ives, Feb. 21, 1876.

PRESERVATION OF LEECHES.

Sir,—In discharging a debt of gratitude to your correspondent "Hirudo," of September 25, 1875, for his valuable hints on the "preservation of leeches," permit us to bear our testimony to the efficacy of his recommendations. We have tried several methods and have lost hundreds of leeches thereby. We had a batch of 50 and kept them in plain water, which was frequently changed, but lost all to about half a dozen when we came upon "Hirudo's" remarks. With the sickly six we placed about a quarter of an ounce of sesquicarbonate of iron and a handful of rather rusty nails. The effect was astonishing—every one of the six recovered and became lively. Another batch of fifty have since been treated according to "Hirudo's" advice, with the slight exception, that three quarts of water only was used and was not changed for six weeks; the water when changed seemed as good and fresh as on the first day, and the leeches continued lively and well, without a single loss.

CUBLEY AND PRESTON.

4, *High Street, Sheffield.*

ADULTERATION REPORTS.

Sir,—In your issue of the 19th inst., I notice a report, copied from the *Times*, of two cases of prosecution for the adulteration of mustard, heard on the 11th inst., at the Greenwich police court, and which had been instituted on my analyses. It is the rule, rather than the exception, for the reports of adulteration cases which appear in the daily papers to be incorrect, it being frequently even beyond the reporter's power to spell the analyst's name correctly. Such inaccuracies are, however, usually of little moment as chemical figures and results are neither understood nor cared for by the general reader. When, however, incorrect accounts are copied into a scientific journal it becomes worth while to point out their incorrectness.

In the cases referred to I am made to certify that one sample of mustard contained "18 per cent. of starch from wheat and 6 per cent. of turmeric and rye," and that the other sample was mixed with "18 per cent. of starch from wheat and 18 per cent. of turmeric and rye." What I did say was that the samples contained respectively "18 per cent. of starch and heavy traces of turmeric," and "18 per cent. of starch and traces of turmeric."

I added that in the one case the starch appeared to be in the form of wheaten flour with a small proportion of rye flour, and in the other case that the starch was present mainly in the form of wheaten flour.

Kindly allow me to make this correction.

G. W. WIGNER.

79, *Great Tower Street, London,*
Feb. 23, 1876.

GELATUM PETROLEUM.

Sir,—In your last impression* Mr. J. Moss takes exception to the above term on the ground of its "defective Latinity" (?) and also to the synonym for vaseline which the manufacturers have employed—petroleum jelly, one which is explanatory of its consistence and the source from which it is obtained. As I am sponsor for the Latin term Gelatum Petroleum, I contend that it is not defective. It has several times been suggested to me that gelatum petrolei, putting petroleum in the genitive case, signifying jelly of petroleum, would be preferable, but this would be erroneous as there is no such Latin noun as gelatum.

Gelatum petroleum, congealed petroleum, with emphati accent on gelatum (this is why it is put before the noun), to signify that it is not the common or liquid petroleum of commerce, nor is it crude petroleum, but it may be inferred to be one of its products. We apply the same term to olive oil, we say it has congealed, when the palmatine and stearine crystallize out at low temperatures; vaseline in the tropics will liquefy and congeal in a similar manner. I hold, therefore, that the term gelatum petroleum is as concise and definite as any that can be applied to the substance. The name vaseline is objectionable as it conveys to the mind no idea of its source or character. The term proposed by Mr. Moss, Saxoleum inspissatum purificatum, is far-fetched and not free from error. If by Saxoleum we are to understand crude petroleum, then Saxoleum inspissatum is a misnomer when applied to vaseline, because Saxoleum is vaseline plus something else, *i.e.*, the volatile portion.

WM. MARTINDALE.

Feb. 23, 1876.

⁂ Neither of the rival sponsors seem to be happy in the selection of a name for the child of their adoption which is no more gelatinized petroleum than it is inspissated petroleum, but is in reality a substance extracted from petroleum and constituting only a small fraction of the original material. It would seem, therefore, that a trivial name such as vaseline would be the most appropriate designation.—ED. PHARM. JOURN.

"*Sigma.*"—You will find the formula, and comments upon it, reproduced from 'Parrish's Pharmacy,' in Pharm. Journ. for April 22, 1871, p. 857.

W. R. Fowler.—We are not acquainted with any special book on the subject you refer to. The points to be determined are the percentage amount of water, fat, albuminous materials (from amount of nitrogen), carbohydrates, and ash, according to the usual methods.

"*Registered Apprentice.*"—We cannot give you any information on the subject, but it would appear as if your letter has been received as it has not been returned through the Dead Letter Office.

"*Vin. Quinæ.*"—No licence is required for the sale of quinine wine if made according to the British Pharmacopœia and not sold as a proprietary or patent medicine.

A. T. B.—We cannot see how the indenture would be invalidated by the manager leaving. You are not bound to him.

F. B. B.—Where the Inland Revenue authorities fail to give an opinion we should be rash to do so.

R. W. H.—Recipes for Rubini's Camphor were given in vol. i. of present series, pp. 377 and 397.

"*Chemicus.*"—A description of the diploma, which is too long to be quoted here, was published in the first volume of the *Pharmaceutical Journal* (1841–2), p. 264.

A. H. Allen.—The paragraph sent contains nothing beyond what has already been published.

H. G.—It forms a very pale yellow liquid, the colour of which is chiefly due to a precipitate.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Wilkinson, Mr. W. D. Howard, Mr. Bateman, Mr. Best, Mr. Wigner, Mr. J. Husband, Mr. Lloyd, Mr. Bell, Mr. Cotterell, Mr. Swan, "Chemicus," "Hybrida," "Fide sed cui Vide," "Ford," T. B., W. G., A. J. N.

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* *Pharm. Journ.*, Feb. 19, 1876, p. 661.

THE PREPARATION OF THE "FERROUS PHOSPHATE" OF THE BRITISH PHARMACOPŒIA.*

BY REES PRICE.

Having to prepare ferrous phosphate for "Syrupus ferri phosphatis," Mr. Allchin directed my attention to some difficulties he had experienced in making it some time previously, and as I found similar difficulties occur, at his suggestion several experiments were made of which this note is the result. In my inquiries I have had the benefit of his advice and assistance.

It will be as well to state the principle of the process for preparing ferrous phosphate, as given in the Pharmacopœia. Ferrous sulphate, sodic phosphate, and sodic acetate are used. By the action of sodic phosphate on ferrous sulphate, ferrous phosphate, sodic sulphate, and free sulphuric acid are produced. Owing to the solubility of ferrous phosphate in sulphuric acid, sufficient sodic acetate is added to neutralize this acid, by forming sodic sulphate and liberating acetic acid. Ferrous phosphate, according to the compilers of the Pharmacopœia, is insoluble in acetic acid.

The process is mentioned twice in the Pharmacopœia, namely, under "Ferri phosphas" and "Syrupus ferri phosphatis," with these differences:—under "Ferri phosphas," boiling distilled water is ordered as the solvent, and the precipitated ferrous phosphate is to be washed with hot distilled water and dried below 120° F.; under "Syrupus ferri phosphatis," no mention is made of the temperature of the solvent or of the washing solution, and therefore cold water is presumed to be meant. I call attention to these differences, since in my first experiments boiling distilled water was used as a solvent and the precipitated ferrous phosphate washed with hot water, and I found it impossible to obtain the light blue amorphous powder of the Pharmacopœia, but, instead, a dirty-grey-greenish mass; in fact the precipitate was partially decomposed. Also considerable oxidation of the ferrous sulphate took place by dissolving in boiling water, a disadvantage easily avoided as the salt is readily soluble in cold water.

The difficulty experienced in making ferrous phosphate by the official process has been, the impossibility of getting the whole of the iron in solution thrown down as phosphate in the time stated in the Pharmacopœia to be sufficient, or in fact in any length of time. It was found from several trials, after the most careful stirring, and whether the mixed solutions were heated and filtered quickly or were allowed to stand for a considerable time before filtering, that the filtrate, though perhaps filtering comparatively clearly, always on standing developed a cloudiness which eventually became a considerable precipitate.

The two following qualitative experiments will, I think, show the unsatisfactory character of the official process:—

Experiment I.—	Granulated Ferrous Sulphate	112 grains
	Sodic Phosphate	100 „
	Sodic Acetate	37 „
	Boiling Distilled Water . .	4 ounces

(half the official quantities) were taken. The ferrous sulphate was dissolved in two ounces of the water, and the sodic phosphate and acetate in the remaining two ounces (the iron solution had to be filtered owing to some oxidation). The two solutions were mixed, stirred well and then filtered. The filtrate, which had become cloudy, was allowed to stand for forty-eight hours, with frequent stirring, and the dirty-white precipitate which had formed was filtered off. The second filtrate was heated and a further precipitate produced. This was filtered off and the third filtrate remained clear on standing; but on adding K_4FeCy_6 and HCl a precipitate was obtained, showing the presence of iron.

Experiment. II.—The same quantities were used as above, but cold distilled water was the solvent. The mixed solution was allowed to stand in a warm place for forty-eight hours with constant stirring and then filtered. The filtrate becoming cloudy, excess of sodic phosphate was added, when a copious precipitate came down and the clear solution, by filtering, gave no precipitate with K_4FeCy_6 and HCl.

It was thought advisable to ascertain the amount of ferrous phosphate at first thrown down, and that remaining in the solution. For this purpose

1·5	gramme of	Granulated Ferrous Sulphate
1·35	„	of Sodic Phosphate
·50	„	of Sodic Acetate.

were taken. (These proportions represent as nearly as possible those of the Pharmacopœia given under the syrup.)

The salts were dissolved in cold recently boiled distilled water, and the solution well stirred and allowed to stand for half an hour and then filtered. The precipitated ferrous phosphate was washed free from all trace of sulphuric acid and fused with pure fusion mixture and nitre. The fused mass was digested in water and filtered, and the residue weighed as Fe_2O_3. To the filtrate was added sodic phosphate in excess, and the resulting precipitate filtered and treated in the same manner as the first. The second filtrate was found free from iron.

Two experiments gave as follows:—

		Fe_2O_3	Fe
a. 1·5 grm. of $FeSO_4$, 7Aq. taken.	1st precipitation .	·3362 grm.	= ·2353 grm.
	2nd „ .	·1307 „	= ·0914 „
		·4669	·3267*

		Fe_2O_3	Fe
b. 1·5 grm. of $FeSO_4$, 7Aq. taken.	1st precipitation .	·3352 grm.	= ·2346 grm.
	2nd „ .	·1332 „	= ·0932 „
		·4684	·3278*

These results gave a loss of iron on the first precipitation of 28·2 per cent. Of course the percentage of loss incurred would depend to a very great extent on the length of time the solution was allowed to stand before filtration; but as the Pharmacopœia directs the precipitated ferrous phosphate to be filtered quickly, I think the amount of iron lost is hardly likely to be less than the above figure. I venture to suggest that these results may be taken as a proof that serious loss of ferrous phosphate arises in following the Pharmacopœia process, and, if this is so, it is of some importance, since the syrup depends for its strength on the supposition that the whole of the iron is precipitated at once in the state of phosphate.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, March 1, 1876.

* These results are somewhat high, but this is not of importance since the experiments are comparative.

The experiments show that the difficulties in carrying out the official process arise from the solubility of ferrous phosphate in acetic acid; from the acetic acid or acetate present retarding the ready precipitation of ferrous phosphate which might otherwise come down; and from the absence of a sufficiency of sodic phosphate to precipitate the whole of the iron in the presence of acetic acid.

Gmelin states (Vol. V., p. 225) that ferrous phosphate is insoluble in water and ammoniacal salts, but soluble in aqueous acids and ammonia; and I found by actual experiment that ferrous phosphate was considerably soluble in dilute acetic acid. Professor Redwood, in his edition of 'Pereira's Materia Medica' (London, 1872, p. 302), states that acetic acid is added, since in it "the phosphate of iron has been thought to be less soluble." The error has been in adding sodic acetate and in Mr. Gale's original formula (*Pharm. Journ.*, 2nd series) no mention is made of this salt being requisite. The precipitation would be incomplete by merely adding the sodic phosphate to the ferrous sulphate in the proportions stated in the Pharmacopœia, owing to the solvent action of the sulphuric acid set free during the reaction; but I submit that the official process does not avoid the difficulty.

To endeavour to obtain a more satisfactory substitute for the official process, since the presence of the sodic acetate had been found so objectionable, it was decided to omit it and try the effect of adding sodic phosphate in excess. This was found to answer satisfactorily, and a solution of sodic phosphate of known strength (1 gramme in 10 c.c. of water) was added in successive portions to a solution containing 1·5 gramme of ferrous sulphate so long as any precipitate came down. It was found that the ferrous sulphate required about three times (actually 42 c.c. of the solution = 4·2 grammes of sodic phosphate) its weight of sodic phosphate to precipitate the whole of the iron.

Another 1·5 gramme of ferrous sulphate was taken, and three times its weight of sodic phosphate added at once. The filtrates, on testing with potassic ferrocyanide and hydrochloric acid, gave in the first trial no indications of iron, and in the second trial merely a trace (blue coloration). The precipitates of ferrous phosphate were assayed separately for iron, and they gave—

	Fe_2O_3	Fe
(*a*) 1·5 grm. of $FeSO_4$, 7 Aq. taken . .	·4700 grm.	= ·3290* grm.
(*b*) 1·5 grm. of $FeSO_4$, 7 Aq. taken . .	·4677 „	= ·3273* „

This method has been tried on several occasions with larger quantities for making the syrup, and has been always found to work satisfactorily.

It would seem that the difficulty caused by the liberation of sulphuric acid can be overcome by simply adding sodic phosphate in excess. In what manner this excess of sodic phosphate acts in causing the whole of the ferrous phosphate to be precipitated I am unable to explain.

The formula I would suggest as a substitute for the process of the British Pharmacopœia is as follows:—

Granulated Ferrous Sulphate . .	224 grains.
Sodic Phosphate	660 „
Cold Distilled Water	12 ounces.

Dissolve the ferrous sulphate in 2½ ounces of the water, and the sodic phosphate in the remaining 9½ ounces. Mix the two solutions, digest for a few minutes at a gentle heat with frequent stirring, and then allow the solution to stand until the precipitated ferrous phosphate settles down in a dense form, leaving the supernatant liquid tolerably clear. Throw the precipitate on to a filter, wash rapidly with cold distilled water, and proceed for making the syrup as the Pharmacopœia directs.

[*The discussion on this paper is printed at p.* 716.]

STRUCTURE AND DEVELOPMENT OF PAREIRA STEM,*

Chondodendron tomentosum, R. et. P.

BY JOHN MOSS,

Fellow of the Chemical Societies of London and Berlin.

In the *Pharmaceutical Journal*, May 16, 1874, p. 910, I drew attention to the fact that the so-called Pareira *root* as imported was really a mixture of root and stem in about equal proportions. Several packages examined since then have shown an average of not less than 75 per cent. of stem. This extensive substitution of one part of a plant for another of recognized efficacy makes it highly desirable that their relative values as remedies should be ascertained, and it is in anticipation of this being done very shortly that I have commenced an examination of the less known stem as regards its anatomical structure and the principles obtainable from it by the processes known to pharmacists. This paper deals only with the first part of the examination,—that which attempts to elucidate the structure of the stem. I hope to be able to publish the second part very shortly.

Hanbury† has proved that the source of true Pareira root is *Chondodendron tomentosum*, a Menispermaceous plant of Brazil. In my note above referred to, the drug in question was shown to be the stem of the same plant. Pareira root is imported in square shallow baskets (2½ × 2½ × 1ft.) containing about sixty pounds. The baskets are constructed of rectangular open work of broad flattish bands obtained by splitting some tough stem. For the most part there is little difficulty in picking out the stem. Many of the pieces attain a size (length 2 feet, diameter 3 inches) not even remotely reached by the root, which, as I have met with it, is notably uniform in this respect. The stem is not so dark coloured either; the bark is generally easy to see, and invariably shows pulverulent lichens and occasionally a green mossy patch. It is knotted at intervals in a spiral line, and some specimens are covered with warts, whilst others exhibit only a few. A transverse section exhibits the usual appearance of Menispermaceous stems,—sharply defined zones of regular cuneiform woody bundles of open tissue. The section is darker as the stem is older. The centre is occupied by an obvious pith of a close nature, many of the cells even in very young stems being choked by secondary deposits. Markedly distinct from the pith, the first zone surrounding it, which may be taken (with reservations to be afterwards mentioned) as a type of the rest, exhibits, even to the unaided eye, a most remarkable structure. Leaving the woody bundle for notice further on, I will describe its surroundings as they appear in a stem about four years old. Between every two of the woody bundles a dark line passes from the pith or a little outside it, and widening as it approaches the outer part of the section, divides so as to encircle a crescent-shaped area of the same dark colour, which rounds off the base of the woody wedge. This dark coloured tissue yields easily to pressure. Outside it is an unbroken line completely enclosing the woody zone and its belongings, cutting off most completely the medullary rays of the outer zone from those within and from the pith. This continuous line is the least coloured portion of the section and the hardest, being firmer than the wood bundles themselves. It frequently happens, especially in the outer zones, that the dark radial lines are as broad or even broader within than without, and occasionally a woody bundle is inverted, that is, has the wider edge towards the pith. The bark layers are extremely thin and present nothing worthy of remark to the unaided eye.

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* These results are somewhat high, but this is not of importance since the experiments are comparative.

* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, March 1, 1876.

† *Pharm. Journ.*, Aug. 2, 1873, p. 81, and Aug. 9, p. 102.

For microscopical examination of the structure, stems from one year to two years old having a diameter of about six lines were chosen, and for these reasons: in the first place, with a low power one is able to get a more comprehensive view of sections from such stems and to perceive more clearly the relations of the different parts to each other; and in the second place, stems of this age are less liable to be subject to disturbing influences than older and larger ones, and consequently exhibit a more regular arrangement of parts. The advantages of this selection were appreciated as the complex nature of the structure became apparent. The descriptions which follow are the resultant of observations made on sections of the stem under three different conditions,—1, merely soaked in water; 2, bleached by chlorinated lime; 3, stained with aniline red and aniline blue consecutively. By staining in this way the elective power of vegetable tissues for different colouring matters is made subservient to the differentiation of the thickened and non-thickened portions; the former take red, the latter blue also, and hence appear purple.

TRANSVERSE SECTION.

Medulla.—This is composed of ordinary pitted cells, more or less decidedly hexagonal, ·75-1000th to 2·25-1000ths of an inch in diameter. Most of these are very little thickened as to the wall, but here and there are older cells (*a*), either isolated or in groups, which have suffered thickening to a very considerable extent, some indeed are all but choked with deposit; canaliculi traversing the layers of thickening are distinctly visible. The cells decrease in size towards the margin of the pith. In older stems the difference between these two classes of cells is not so sharply marked; the one merges into the other by imperceptible gradations. The least encrusted cells form the passage from the pith to the medullary rays, and gradually losing, as they elongate, their lateral angles, become converted farther on into true tabular cells.

Medullary Rays.—The tabular cells, which only occasionally exhibit a pitted character, increase in length towards the outside, and in those cases where the development has not been impeded by pressure between two woody wedges, in breadth also. This check to lateral growth frequently occurs, and sometimes to such an extent that the cells become almost filiform. The sides of the rays are invariably made up of such narrow cells that it was difficult to follow their outline satisfactorily. The rays bifurcate (*c*) before reaching the base of the woody wedges, and as each division rounds off the base, to meet a corresponding division of the ray on the other side of the wedge, the cells of which it is composed first increase in breadth and become almost square, and then become elongated again.

Woody Bundles.—The regular wedge shape of these is the most pronounced feature of the section. The wood cells are uniform in size throughout and have the walls very much thickened by deposits. Exceedingly large vessels are distributed evenly throughout the bundle, of which they form a considerable portion; they are largest towards the outside. Each bundle of vessels forming the medullary sheath is divided from the apex of the wedge by a very narrow band of cells proceeding from the medullary rays on each side. Each wedge is surrounded by a line of tissue containing a bright yellow or yellow-brown colouring matter, the tissue of the wedges themselves being much paler. In this respect the latter resemble the older cells of the medulla—the younger being more decidedly tinged with colour. Reference has already been made to a hemispherical tract (*b*) which forms the base of the wedge. This consists of cells which so closely resemble those of the wood proper and have such relation to them, as to lead irresistibly to the conclusion that although of more recent formation they are of the same nature—they have the same general shape, but are not so compact; their walls are thickened, but not to the same extent; their colour when bleached or stained is the same. The horns of the crescent rest on the margin of the wedge and enclose a considerable area of extremely thin walled cells some of which are in process of conversion to such as have just been described. The dark colouring matter is found in this area also.

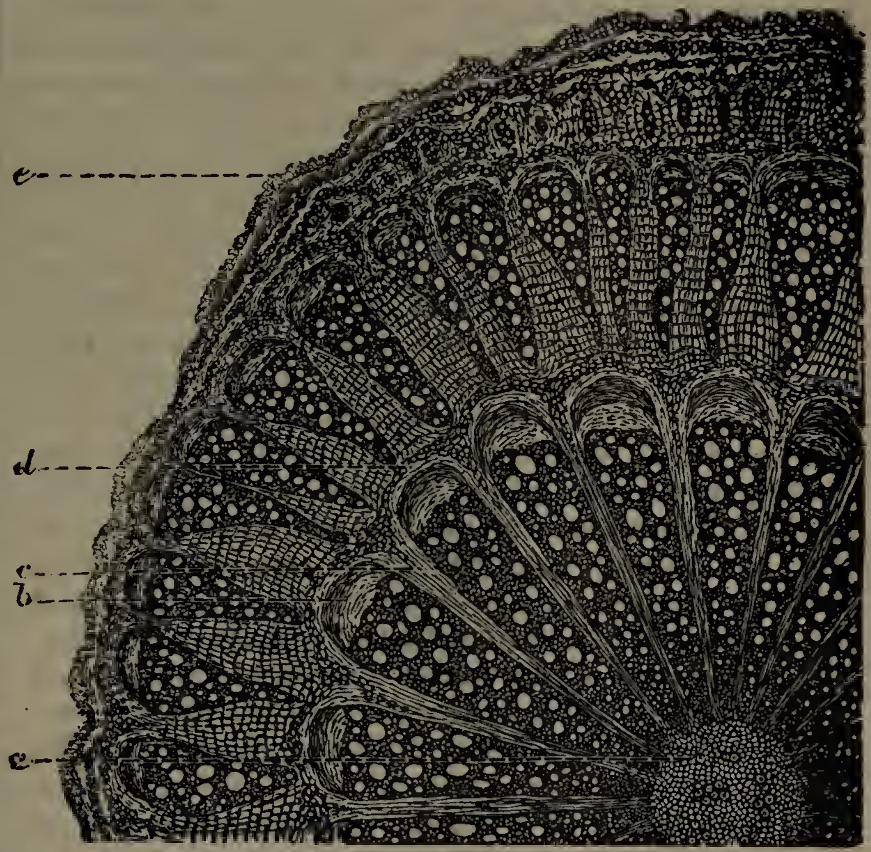

Fig. 1, TRANSVERSE—*a*, thickened cell of pith; *b*, hemispherical area, *Procambium*; *c*, bifurcation of medullary ray; *d*, bundle of prosenchymatous cells in bundle-sheath, *Liber*; *e*, cortical portion. *Magnified nine diameters.*

Bundle-Sheath.—Outside the wedges and their sheath, completely encircling the zone, is a continuous ring of tissue which at first sight seemed to be altogether different from any other observed in the section. This ring (the *bundle-sheath* of Sachs) is repeated outside each circle of vascular bundles. It somewhat resembles the woody tissue but is paler and without vessels. At intervals corresponding with the medullary rays it is extended inwards in a radial manner so as to fit into the fork formed by the division of the rays already spoken of. The cells of which this ring is composed are on close inspection seen to be identical in nature with those of the medulla which have suffered thickening. They are pretty much of the same size, are similarly encrusted, have canaliculi through the thickening, and the thickening is of the same colour; but whereas the cells in the medulla have been subjected to lateral pressure on all sides alike and so have preserved a general roundness of outline, the cells of the band in question have mostly received pressure in a tangential direction and are consequently elongated radially. This feature is more noticeable in those parts of the band opposite to and dipping into the medullary rays than in those which flank the woody wedges. Here another most remarkable feature is detected. The band has been spoken of as continuous, and so it is, but the nature of the tissue is varied by the introduction at regular intervals, corresponding with the crest of the crescent, of bundles of prosenchymatous cells (*d*). These bundles, which are more curved inwards than the ring of which they form a part, have a length, in the direction of the ring, of $\frac{1}{4}$ to $\frac{1}{3}$ that of the base of the wedge opposite to which they occur; this is twice or three times the thickness of the bundles. In a radial direction the sides of the bundles are irregular as if forcibly separated at these parts from tissue of a similar nature. The cells of these bundles are smaller than the wood cells, and have all received deposit to about the same extent; the deposit is uniform in thickness and surrounds a small central cavity.

The arrangement described is repeated with each zone until the cortical portion is reached, with two important exceptions—parenchyma is present in larger proportion near the margin, and the *bundle-sheaths* do not exhibit the masses of prosenchymatous cells. One, or two, sometimes perhaps even three, of the outer *bundle-sheaths* are not fully developed into continuous rings; the outside one of all may join the next within it by one extremity, the other extremity remaining free. The parenchyma between two such sheaths will exhibit no fibro-vascular bundles for one third or half the distance round the stem; in the remaining portion, fibro-vascular bundles in various stages of development are placed at wide intervals (*See Fig.* 1.)

Epiphlœum.—The cells of the cortical layers are flattened in a tangential direction, *i.e.*, at right angles to the axis. They are small and superposed with great regularity in radial lines. The inner portion is highly charged with a dark colouring matter of a different nature from that found in the general parenchyma of the stem. This tissue contains much crystalline matter, especially in the outermost layers of cells.

Longitudinal or Radial Section.

Medulla.—This is made up of cells piled singly in columns, which have the same diameter (1·5–1000th to 2·5–1000ths in) in different parts. The vertical length ($\frac{1}{100}$ in.) of some cells is three or even four times that of others. Variation in this respect is not so marked between cells of the same column as it is when cells of different columns are compared. The more thickly encrusted cells are always found in the same column; some of these were noticed quite $\frac{1}{6}$ of an inch in length and even more. These contain small granular rounded bodies of a dark colour. All other cells contain starch granules in abundance; some which had not been cut through in making the section were filled with them. The cells decrease in diameter towards the outside of the pith, and where in contact with the so-called medullary sheath, they are elongated, and intermingled with others to a greater or less extent. The medullary sheath would doubtless be held to comprise these elongated cells, but the true spiral vessels which impart the distinctive character to it are very few in number—two deep at most.

Woody Bundles.—These consist of pitted cells and vessels. The markings on the cells are either more or less irregularly circular or oval, or merely short horizontal lines. The markings of the vessels are mainly of the latter description, but sometimes those of the former are noticed. It occasionally happens that a minute portion of a transparent brown amorphous substance, which occurs in both cells and vessels, is seen in the centre of one of the circular markings, and thus produces the appearance of a bordered pit; but, independent of this, cells having bordered pits are not rare. The markings of the vessels are arranged in rows of two to three pits abreast, between obscurely undulating lines, or are very regularly distributed over the wall. The brown substance referred to may be observed lying in detached masses in the tissue.

Immediately outside the bundle is a layer of elongated thin-walled cells, which, next to the bundle and less so at the outer portion, are charged with brown colouring matter. In the less coloured part between these, the cells are seen to be fusiform, and to overlap each other to a trifling extent. As the cells are all of the same length, and are placed side by side with great regularity in vertical bundles, the points at which the cells of one bundle are overlapped by the cells of the bundle above or below, are comprised between two horizontal lines drawn very close together.

The whole of this layer corresponds to the hemispherical area spoken of in describing the transverse section, and is the *Procambium* of Sachs—"similar cells combined without intercellular spaces, which has not yet undergone differentiation."

Beyond this, still proceeding outwards, is the bundle of cells which has been described as forming part of the bundle-sheath. These are very large, straight, and the walls are much thickened and without markings. They are true *liber* cells. Their occurrence here will give cause for remark further on.

Medullary Rays.—The tissue of these exhibits the ordinary muriform character. The cells are 2-1000ths to 3-1000ths of an inch in horizontal diameter, and 1-1000 to 1·5-1000ths in vertical diameter. The walls are deeply coloured with a dark brown colouring matter and bear uneven granular deposits. A stray cell of the same nature as those forming the bundle-sheath, is occasionally seen embedded in this tissue, having been wrested from its companion cells in course of growth. Starch was not observed here.

Bundle-sheath.—The cells exhibit the same appearance as in the transverse section. They are irregular in outline, and of the same diameter both ways in those parts of the sheath which come opposite the fibro-vascular bundles; but those cells forming the extensions into the medullary rays are elongated horizontally to two or three times their height.

The cellular tissue in which the fibro-vascular bundles of most recent formation are placed, is composed of cells which are rounded nearest the axis of the stem, and muriform towards the circumference; between these two extreme forms are the necessary connecting ones. This tissue is coloured like the medullary rays. The cells contain abundance of starch and numerous prismatic or cubical crystals. The crystals are most numerous in the outer portions, particularly the cortical layers.

TANGENTIAL SECTION.

Bundle-sheath.—The cells of this structure present a perfectly square outline opposite the medullary rays, and are very regularly placed in vertical rows. Nearer the circumference, where a sheath is cut obliquely, the cells are of course seen of a more elongated form horizontally; but these parts show what can otherwise be seen only in the first formed bundle-sheath—viz., liber cells. Though isolated and very few in number, their length and evenly thickened walls make it impossible to mistake their nature.

Liber-bundles.—These are the only remaining portion of this section which calls for remark. It is here seen that, so far from being the isolated bundles they appear in the transverse section, they actually approach and join each other. The points of juncture are, however, very far apart.

CELL CONTENTS.

Starch.—This was observed in the pith, bundle-sheaths, and general parenchyma outside the first bundle-sheath. Though the amount cannot be said to be large, yet it is freely distributed throughout these portions of the stem. The granules are uniform in shape, being perfectly round or elliptical, rarely muller-shaped or angular. They vary greatly in size; the largest observed was about 1·5-1000ths of an inch in diameter.

Crystals.—These were observed in the bundle-sheaths and the general parenchyma outside the first bundle-sheath, and particularly in the epidermal layers. In form they are either cubical, tabular, prismatic, or spindle-shaped. Small cubical, prismatic, and spindle-shaped crystals ($\frac{\cdot 25-1}{1000}$ths in.) were mostly in the parenchyma; large cubical and tabular ones ($\frac{1-2}{1000}$ths in.) in the bundle-sheaths and epidermal layers. Certain crystals, as well as starch granules, noticed in the wood cells and vessels were probably transferred thither from other tissues in the process of preparing the section for examination. In the wood vessels was abundance of globoid bodies, probably calcium and magnesium phosphates.

GENERAL REMARKS.

Liber.—Decaisne says, "Dans quelques Ménispermées (*Cisampelos Pareira, Cocculus laurifolius*...), des faisceaux nouveaux semblables en apparence, mais dépourvus de vaisseaux spireaux et de liber, se montrent au bout de plusieurs années en dehors des premiers, et forment autour d'eux une couche concentrique; cette formation peut se répéter un grand nombre de fois, et il en résulte l'apparence de plusieurs couches, mais chacune d'elles dépend de plusieurs années de végétation, et non pas d'un accroissement annuel. Aussitôt qu'une formation nouvelle de bois apparaît, les faisceaux ligneux plus anciennement formés cessent de s'accroître, et le cambium de s'organiser en bois parfait. Dans ce cas le liber (n'appartient qu'au cercle de première formation) au lieu de se trouver placé à la circonférence de l'arbre, comme dans tous les végétaux dicotyledonés jusqu'ici connus, l'est au centre et près de la moelle."*

Sachs, speaking of deviations from the normal structure of the stem in dicotyledons, describes one in which "the primary bundles lie in a ring on the transverse section and continue their growth by means of a closed cambium ring, which, however, soon disappears. A new cambium ring is then formed outside the one which has disappeared, and another one again outside this one when it has in turn disappeared. Several circles of fibro-vascular bundles are thus formed, continually increasing in number. In many Menispermaceæ the new outer circle of vascular bundles together with its cambium ring is developed from a ring of meristem† which lies in the primary cortex, and therefore outside the primary bast, a phenomenon which is repeated in the primary cortex as its growth proceeds."‡

These statements by eminent histologists render an explanation of the remarkable structure and development of *Chondodendron* stem comparatively easy.

The peculiarities of structure of this stem depend on the power possessed by the parenchyma, of which it is to so large an extent made up, of rapidly forming *permanent* tissue, *i.e.*, tissue incapable of further development. Each fibro-vascular bundle, even the first zone after several have been successively formed, has a *Procambium* on the outside. This is the hemispherical area already described, and from it new wood is constantly being formed, not merely in young stems, but in old ones also, so that the radial length of the bundle is constantly increasing. Decaisne's statement that each zone "is due to several years of vegetation, and not to one annual growth," confirms me in a conclusion to which I had previously come whilst examining the transverse section of *Chondodendron.* The fibro-vascular bundles of the earlier formed zones are crossed by one or more bands of wood cells, more regular in arrangement than those forming the remainder of the bundles. When two bundles of the same zone are compared with reference to this character, the bands of the one are seen to be opposite to, and but for the intervening medullary rays, continuous with those of the other. Making allowance for the disturbing influences of subsequent development, the bands form a succession of concentric circles passing through the wood bundles, round the pith, and cut by the medullary rays. This character, taken in connection with the presence of a *Procambium* outside the bundle, urges to the conclusion that each zone is finally the result of several successive periods of growth, which may recur annually or oftener. Further, if the first zone of a young stem be compared with the corresponding zone of an older one, the thickness of the latter is seen to be much greater than that of the former. This correspondence between the thickening of the zone and the ageing of the stem is invariable in the numerous specimens of the latter I have examined. I cannot therefore agree that the observation of Decaisne, "as soon as a new formation of wood appears, the bundles previously formed cease to grow, and wood is no longer developed from the cambium," is correct.

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* *Comptes Rendus,* v. 393. Translation.—In some Menispermaceæ (*Cissampelos Pareiræ, Cocculus laurifolius*...) new bundles similar in appearance, but without spiral vessels and liber, are seen after some years outside the first, and form around them a concentric zone; this formation may be repeated a great number of times, and consequently several zones appear, but each of them is due to several years of vegetation and not to one annual growth. As soon as a new formation of wood appears the bundles previously formed cease to grow, and wood is no longer developed from the cambium. In this case the liber (pertaining only to the first zone) instead of being found at the circumference of the tree, as in all dicotyledons hitherto known, is at the centre and near the pith.

† *Meristem,* generating tissue, *i.e.*, one capable of division.

‡ 'Text-Book of Botany.' Translated by Bennet and Dyer, 575-6.

Outside the first zone of bundles a true liber is formed which is at first continuous and well developed. By the general growth of the tissues within, it is subjected to tension which tends to stretch it equally in every part, and by the radial growth of the bundles, where opposite to these, it is pushed directly outwards. The resultant of these two pressures on the liber is the destruction of its continuity by rupture into as many parts as there are fibro-vascular bundles. The parts become further separated by subsequent development of the stem until the true liber is represented only by the regularly recurring bundles of cells which have been described as forming part of the *bundle-sheath*. That these bundles originally formed a ring of smaller diameter than that in which they are afterwards found is abundantly proved by their contour. The radial margins are irregular and have every appearance of having been formed by rupture, and the tangential margins are much more concave than the sheath in which the bundles are found. The development of fibro-vascular bundles outside the liber is explained by the formation of the latter not *outside* the cambium, using that term as defined by Bentley, viz., a layer of vitally active cells from which new zones of wood and new layers of inner bark are developed, but *in* it. The cambium lying outside the liber first develops a mass of parenchyma which is subsequently divided into belts by the formation of bundle-sheaths, then in these belts fibro-vascular bundles make their appearance at considerable but regular intervals. In the course of growth these intervals are diminished, and the procambium of each bundle becomes more apparent. In the second and subsequent bundle-sheaths liber cells are very rare and can be detected only by careful examination. The outermost and least developed bundle-sheath might on superficial examination be mistaken for the *endophlœum*, but more careful observation enables one to recognize an exceedingly thin layer of generating tissue from which epidermal cells are formed on the outside and in which further bundle-sheaths and fibro-vascular bundles are yet to be developed. *In this stem there is no endophlœum, no inner bark consisting of liber cells, other than that between the first and second-formed zones of wood.*

Procambium.—This tissue presents invitations to speculation and suggestion it were almost criminal to disregard. Seeing that the growth of the wood is by differentiation of the procambium, to inquire what are the steps of this differentiation follows almost as a matter of course.

It will be observed in the radial section of the procambium as shown in Fig. 2, that on each side of the central light portion are vertical columns of a darker tissue. These are made up of elongated, comparatively thin-walled cells, tapering from about the centre to each of the extremities, and associated in the manner which is characteristic of ordinary prosenchyma. The strong similarity which subsists between the former and the cells of the woody bundles is irresistibly suggestive of their being in process of conversion into the latter, and to my mind there can be no doubt that such is the case. The next conclusion I have to submit is one for which I have been unable to derive support from the books. It refers to the tissue comprised between the darker columns just spoken of. The cells of which this tissue is composed are shown in the figure somewhat more distinctly than they ever appear under the microscope. In most cases their outline is so vague, indistinct, and shadowy, that one is rather conscious of their presence than certain that he sees them. The cells are arranged side by side in bundles with considerable regularity; they are tolerably uniform in length and their extremities are sharply tapered. In fact the bundle of cells reminds one of a bundle of quill toothpicks, and when piled upon each other as in the tissue, the pointed ends of one set of cells fill the interspaces between the pointed ends of the set of cells above or below. It must necessarily happen from such an arrangement that where two bundles are in contact there is a slight constriction. Such constrictions are shown in the figure. A comparison of the outline of the area occupied by the bundles, with the contour of the mature vessel shown to the right leads to the detection of a community of features. The diameter of the area and that of the vessel are about the same; each shows the constrictions; and in each the constrictions occur at similar intervals. The respective positions of the area and of the vessel and their relations to each other point to a common origin, and I feel to have warrant for stating that the formation of a vessel is unequivocally indicated in this area with the recurring constrictions. If this statement be admitted the after stages in the development of the vessel are comparatively unimportant, yet it is desirable to point out what they may possibly be. By growth of the cells surrounding the area, those within it suffer partial absorption, or are torn asunder. By the flow of liquid along the channel thus formed, the gossamery substance of the ruptured cells is pressed against the sides of the cavity, and cemented there by secondary deposits.

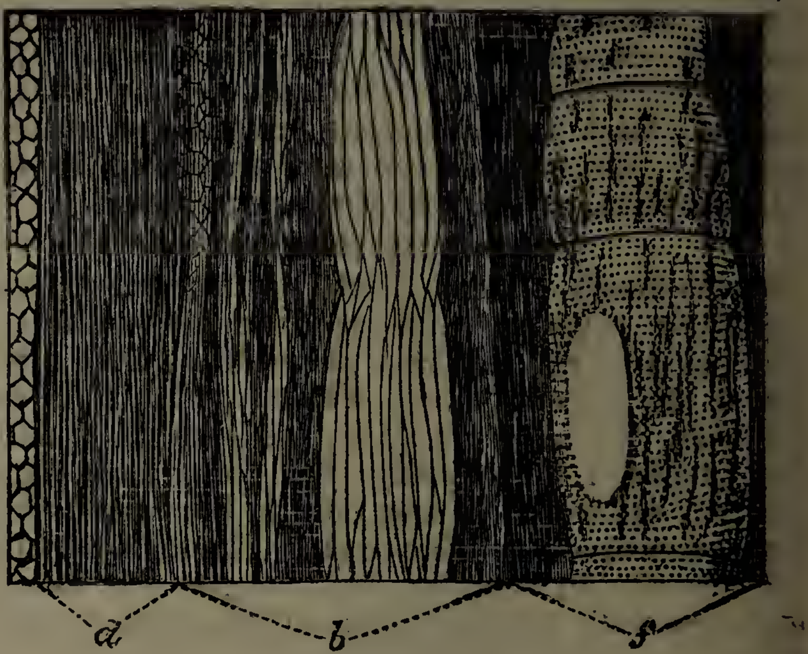

Fig. 2, LONGITUDINAL—*b*, *Procambium*; *d*, *Liber* cells; *f*, wood vessel, with woody tissue on each side. *Magnified eighty diameters.*

This hypothesis will explain the presence of irregularly undulating lines which, it has been stated, are visible on the wall of the vessel. The appearance presented by the lines is just such as would be produced under the circumstances suggested, the lines themselves corresponding to folds of the adpressed cell walls. In the case supposed, the stouter membrane formed at the points of contact of the piled up bundles would be the last to yield, and this frequently remains, even in old vessels, as a perforated septum, or as a band stretched across the cavity. I believe then that there are certain wood vessels in the stem of *Chondodendron* which do not originate in either of the two ways described in text-books. These vessels are not "elongated pitted cells with pointed ends," nor are they "formed from a row of cylindrical cells placed end to end, the intervening partitions of which have become more or less absorbed, so that their cavities form a continuous canal."

There remains for me the pleasant duty of making most hearty acknowledgments to my friend Mr. Stiles for his cordial assistance in preparing some of the sections employed in this investigation.

[*The discussion on this paper is printed at p.* 716.]

COSMOLINE.*

BY W. A. H. NAYLOR.

Two years ago attention was directed to this body by Dr. A. W. Miller, who then made a few experiments with a view of demonstrating its chemical constitution, an account of which is recorded in the *Pharmaceutical Journal* (January 17, 1874, p. 581).

Although Dr. Miller's investigations were of a limited character, he nevertheless regarded them so far satisfactory as to venture to introduce a formula which should correspond to cosmoline itself. The artificial article, however, was not an accurate representative of the original.

No further inquiry seems to have been instituted relative to this body. And it was in the anticipation of arriving at something more definite, that at the suggestion of Mr. Moss it became the subject of experiment. The process by which cosmoline is manufactured is supposed to consist in separating the various volatile hydrocarbons from crude petroleum by distillation; the residuum is then brought into contact with superheated steam, and finally purified by hot animal charcoal.

Cosmoline is a yellow, translucent, fluorescent, semi-solid, melting at 40° C., and having a gravity of 866 at 45° C. It has a slight odour, is non-volatile at ordinary temperatures, but commences to fume at 160° C. It is insoluble in water, slightly soluble in cold alcohol, freely in ether, chloroform, benzol, bisulphide of carbon, and turpentine; from which solutions a crystalline mass is precipitated upon the addition of alcohol. It is soluble in boiling alcohol to the extent of 33·2 per cent. It is perfectly miscible with fixed and volatile oils, also with glycerine. Hydrochloric acid, dilute nitric acid, and liquor potassæ exert no solvent or decomposing action upon it. Strong nitric acid assumes a yellow colour, deepening upon the application of heat, when evidence of a decomposition of the acid is afforded by a copious evolution of peroxide of nitrogen. Strong sulphuric acid in the cold chars it, an effect doubtless due to the presence of hydrocarbons other than paraffins. It may be added that it is entirely free from glycerine.

The first point to be decided in experimenting upon cosmoline was whether it contained other elements in addition to carbon and hydrogen. To ascertain this a combustion was made of which the following is the result:—·083 gramme of cosmoline burnt with lead chromate gave water and carbonic anhydride, corresponding respectively to ·0134 gramme of hydrogen, and ·0684 gramme of carbon, the two together forming 98·59 per cent. of the whole. To this must be added ash, and moisture lost at 120° C.; the former amounting to ·04 per cent., and the latter ·69 per cent. The composition of cosmoline is therefore—

Hydrocarbons	98·59
Moisture	·69
Ash	·04
	99·32

A portion of cosmoline was next subjected to distillation under pressure, by which means it decomposed, the distillate remaining liquid and having a strong smell of common paraffin oil.

It now remained to make an attempt at separating some of the hydrocarbons. To effect this, fractional distillation at first suggested itself as a ready means; but I was subsequently reminded of the tendency of paraffins to decompose even at temperatures below their boiling point; and the question to be solved was to what extent might cosmoline be heated without the bodies composing it suffering decomposition. In the meanwhile this method as a process of separation was deferred, preference being given to one in which solvents might be used. This latter consisted in exposing an ethereal solution of cosmoline to variations of temperature, and noting the appearance of the respective bodies thus separated, the melting point being taken in each case. A portion of cosmoline was dissolved in warm ether, the solution allowed to stand for a time at the ordinary temperature, after which it was exposed to a temperature of 10° C. The precipitated matter was separated by filtration. The filtrate was again exposed to cold as before, and the operation repeated until nothing more separated. The contents of the filter were then examined and the melting point ascertained. This process was repeated at 0° C., and the separated portion examined. The filtrate was subsequently immersed in a mixture consisting of eight ounces of crystallized sulphate of soda and five ounces of hydrochloric acid, and the melting point of the separated matter determined. Finally, the filtrate from this was gently heated on a water-bath to drive off the ether, and the melting point of the residue determined. By this treatment an ethereal solution of cosmoline gave bodies melting at

53·5° C. obtained at a temperature of 10° C.
42·0° C. " " " 0° C.
41° C. " " freezing mixture.
16·5° C. the ethereal residue.

This method of separation by exposure to variation of temperature was extended to the portions of cosmoline soluble and insoluble in boiling alcohol respectively. The portion insoluble in boiling alcohol when dissolved in ether, gave bodies melting at

60° C. obtained at a temperature of 10° C.
55° C. " " " 0° C.
21·5° C. the ethereal residue.

Upon immersing this solution in due order in the freezing mixture, the separated matter was insufficient to admit of its melting point being taken.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, March 1, 1876.

The portion soluble in boiling alcohol when dissolved in ether gave bodies melting at

48·5° C. obtained by freezing mixture.
29° C. the ethereal residue.

The matters deposited at 10° C. and 0° C. respectively, were too small to allow of their melting points being taken.

With a desire to confirm some of these results, recourse was had to the process previously referred to, viz., that of fractional distillation. The first portion distilled over at a temperature of from 160° to 170° C. This was almost colourless, having a strong smell of common paraffin oil, and melting at 16 5° C. It was only partially soluble in boiling alcohol, in these respects corresponding with the "ethereal residue" obtained by repeated exposure to cold of an ethereal solution of cosmoline.

The second portion distilled over at a temperature of from 192° to 200° C. This had less odour than the first, closely resembled it in crystalline appearance and melted at 20° C.

The third portion distilled over at a temperature of from 230 to 240° C. This emitted less odour than either of the preceding, melted at 29° C., and was perfectly soluble in boiling alcohol. In these characters, also in crystalline appearance, it corresponds with the "ethereal residue" of the portion soluble in boiling alcohol. In consequence of the small quantity of cosmoline originally taken for the purpose of distillation, the several products were so small as to render re-distillation impracticable.

From the foregoing experiments it must be understood that I do not represent each of the portions separated as described above as being a perfectly pure and definite body, for it is probable such is not the case. That it is possible to separate from cosmoline portions having melting points so far removed from each other, by a process which cannot be supposed to have caused decomposition in the original body, shows that it is a mixture, and we conclude from its general behaviour that the mixture is one of *paraffins*.

In conclusion, I beg to express my indebtedness to Mr. Moss, not only for suggesting the object of experiment, but also for the time and means necessary for conducting the work which he has so kindly placed at my disposal.

THE DOMESTIC MEASUREMENT OF DOSES.*

BY ROBERT FARQUHARSON, M.D.

The scrupulous accuracy with which prescriptions are made up by the highly educated dispensers who are now entrusted with this duty, perhaps tends to make practitioners careless regarding the exact mode of administration of their drugs. For convenience in out-patient departments, the time honoured teaspoon or tablespoon is invariably recommended for the division of doses; and we console ourselves for our want of scientific precision by the belief that these domestic measurements usually correspond to certain definite standards laid down in our text-books. Sometimes, however, we find complaints made that our medicine will not last out the week; and, on inquiry, we find, that the patients have consumed nearly double the proper quantity during that time, although they have conscientiously endeavoured not to exceed the regulated number of tablespoonfuls. This happens so often, and is productive of so much waste and annoyance, that I have lately, with the kind assistance of Mr. Marriott, dispenser to the Western General Dispensary, made a careful inquiry into the capacity of our common domestic measures with the following results.

I will first consider drops which are in occasional use, and which are held in a vague way to be about equal to a minim, although the more educated student of pharmacy would probably tell us that, on an average, they are only equal to half that quantity. Of

Distilled water . . .	56	drops	represent	60	minims
Tinctura opii . . .	113	,,	,,	60	,,
Tinctura digitalis . .	114	,,	,,	60	,,
Liq. morphiæ hydrochlor.	100	,,	,,	60	,,
Oxymel scillæ . . .	80	,,	,,	60	,,
Syrupus papaveris . .	75	,,	,,	60	,,
Glycerine	45	,,	,,	60	,,
Spiritus ætheris nitrosi	114	,,	,,	60	,,
Tinctura camphoræ comp.	112	,,	,,	60	,,
Acid. sulphuricum dilut.	55	,,	,,	60	,,
Oleum ricini	55	,,	,,	60	,,
Spiritus terebinthinæ	110	,,	,,	60	,,
Oleum anisi	100	,,	,,	60	,,

The next point is to inquire in how far the size of the drop is influenced by the shape of the bottle in which the fluid is contained. The experiments just noted were all made by means of an ordinary beaked minim-measure, and I found barely a shade of difference between this and a small phial brought by a dispensary patient. But, on making comparative observations with tinctura opii, I obtained the following variations from my original estimate of 113 drops to 60 minims. Out of the ordinary surgery bottle, I obtained 83 drops to 60 minims, and from a large twelve ounce bottle in the possession of a patient 93 drops became the equivalent; and, although these differences are considerable enough in themselves, the bottles in ordinary use differ but little from one another, and it will therefore be seen that the quality of the fluid is the main factor in regulating the size of the drops.

But drops after all are comparatively seldom used, and the universal engine for the division of doses is the tablespoon, which homely implement is always at hand, and is held to represent a certain fixed quantity. In a series of seven selected at random, and apparently differing very widely in shape and in size, I discovered the following remarkable variations. No. 1, contained six drachms; No. 2, six drachms; No. 3, eight drachms; No. 4, eight drachms; No. 5, eight drachms; No. 6, five and a half drachms; No. 7, five drachms.

It was found that a difference of from one to two drachms is made by the spoon being only moderately or completely filled; and of any oily fluid, at least an additional drachm can be readily added. The result, therefore, that even the smallest tablespoon does not hold less than five drachms, and that the largest contains at least an ounce, must completely alter our notions of prescribing; for we can surely no longer pin our faith to the regulation quantity of half an ounce, which this domestic measure is usually believed to contain. The dessert-spoon was found to be equal to from four to six drachms; whilst four specimens of teaspoons were found to contain respectively, eighty minims, ninety minims, and two drachms.

The wineglass must complete the series; and, in five experiments, No. 1 was found to hold three ounces and two drachms; No. 2, two ounces and six drachms; No. 3, three ounces; No. 4, two ounces and a half; and No. 5, two ounces and two drachms—thus exceeding pretty considerably in every case the regulation quantity of two ounces. So much, then, for the safety and accuracy of the modes of measurement most commonly employed.

It would clearly be difficult, if not impossible to expect any reform in this direction to come from the overcrowded hospital out-patient rooms; but it is not too much to insist that, in the wards and in private practice, graduated measures should invariably be used as a matter of routine. We shall thus secure not only greater safety in dealing with poisonous drugs, but greater scientific accuracy in any therapeutical observations we may wish to make upon our patients. But tablespoons which hold an ounce, and wineglasses which contain more than three ounces, can hardly be said to fulfil either of those requirements.

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The Pharmaceutical Journal.

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PATENT MEDICINES.

ALTHOUGH it would be manifestly out of place to enter upon the discussion of this subject while it is under the consideration of the Council of the Society, it has been of late so freely commented upon by some of the medical papers, that we shall scarcely be exceeding our province by placing before our readers a statement of the objections urged against the present system of permitting the sale of secret remedies under the title of Patent Medicines, and some account of the suggestions that have been offered with the object of preventing the evil effects which sometimes result from their use.

The *Lancet* is very decided in its denunciation of the system which admits of the sale of poisons and various potent drugs in the form of patent medicines, and expresses the opinion that it is scarcely credible, considering the enthusiasm excited by various life preserving enterprises, that in this country the open and free sale of poisons should be not only permitted but in reality patronized if they are sold under the Government protection of the patent medicine stamp. The case more especially referred to by our contemporary, is the sale of preparations containing narcotics and intended under various names for administration to infants. It is stated, though upon what authority we are not informed, that scores of children die every year in this country, from the effects of such preparations, and it is suggested that the fact of their being sold under names which do not indicate the presence of dangerous narcotic poison is an additional aggravation of the evil caused by that provision of the Pharmacy Act which permits the sale of patent medicines containing opium for indiscriminate administration to those who are most susceptible to its influence. The *Medical Times and Gazette* adopts a still stronger tone, and speaking not simply in reference to narcotic preparations for infants, but also of patent medicines in general, designates the action of the Government in this matter as conferring "licenses to kill." After pointing out that the stamp duty on patent medicines for the twelve months ending 31st March, 1875, amounted to £109,237, it adds that it would be instructive if it could be ascertained how many deaths took place in the above period as the result of overdoses of quack medicines, administered either in ignorance or with criminal intent, and that we should then know exactly how much per head Government receives for every life that is sacrificed through the uncontrolled sale of deadly poisons in patent medicines.

Though we are disposed to agree with the opinion that there is an obvious anomaly in exempting patent medicines containing poisons from the provisions of the Pharmacy Act, and to admit that the use of such preparations by persons ignorant of their contents is sometimes prejudicial, we cannot regard the views expressed by the *Medical Times and Gazette* as being altogether well founded. In the first place the argument put forward does not apply to all patent medicines, but only to that small proportion of them which does really contain poisonous or potent drugs. It is here that danger is to be apprehended, and as we think, here alone, for it would be impossible to prevent the practice of self-physicing, which is so favourite an amusement with many persons, and if patent medicines were done away with altogether this practice would be in no way interfered with. The exercise of faith and even credulity in regard to medicinal remedies has its seat too deep in human nature to affect seriously the action of the majority of mankind who are, or fancy they are, the subjects of various ailments, and although we quite agree that it would be better for such real or imaginary sufferers if they were to place their faith in the skill and care of men who possess due qualification for the practice of medicine it would be a delusion to expect this principle to be generally acted upon.

Moreover, we think it is an erroneous assumption to regard the patent medicine stamp as conferring any kind of patronage or recommendation from the Government, calculated to enhance the popular estimate of any medicine sold in that way. The real intention of the stamp is to give the purchaser security that he obtains the particular preparation which he desires to have from some reason or other, quite independent of the stamp, and at the same time to protect the man who makes that preparation from fraudulent imitations. As regards that large class of patent medicines, therefore, which are well known to be harmless, and perhaps compounded of the most familiar and innocuous drugs, the action of the Government is in no wise of the objectionable character which is suggested by the *Medical Times and Gazette*, and there seems to be no reasonable ground for urging that it should be discontinued, neither do we believe much would be gained by making the disclosure of the composition of such medicines a condition of awarding their makers the protection of the patent medicine stamp. The same may be said also of a great number of other patent medicines of a more active nature—such as the hundred and one liver pills and antibilious pills, etc., for which there is such a vast demand throughout the country.

But in the case of patent medicines containing the more potent drugs and actual poisons, there is at least evidence that disastrous results do sometimes occur in consequence of their improper administration by persons ignorant of their contents. We have frequently had occasion to record cases in which this has happened in spite of the most ample directions accompanying the medicines, and where it has been evident that greater care would have been exercised in their administration if the potent nature of the drugs contained in the preparations had been known to the persons using them. It is in regard to preparations of this class that there is reasonable ground for applying the argument put forward by the *Lancet* that some means should be adopted of preventing their improper use, and of warning those who use them against the risk it would involve. The facilities with which such preparations can be obtained as compared with the restriction on the sale of the drugs contained in them, tend undoubtedly to create a false sense of immunity from danger which would not be felt in using the drug itself, and many of the accidents which result from the use of this class of patent medicines may be ascribed to the absence of this precautionary influence.

The question how this is to be effected is one of considerable difficulty and it would seem to be one that would be dealt with more fittingly by such a body as the Medical Council than by the Pharmaceutical Society. Still it is a question that very seriously affects the pharmaceutical body. As pointed out by one of our correspondents, the chemist and druggist is not unfrequently subjected to great inconvenience when he has sold patent medicines containing poison and there has been a fatal result from their improper use. His suggestion that the composition of such preparations should be disclosed and that the packages containing them should be plainly marked with the word "poison" would no doubt serve the purpose of enabling the vendor to warn purchasers that they must exercise due caution and it would probably be some protection to the vendor in case of accident occurring. Such a plan would no doubt tend to restrict the sale of a certain class of patent medicines, but it would not at any rate be more a hardship to the proprietors than the restrictions which chemists and druggists are placed under in regard to the sale of certain drugs, while it would be no less justified by consideration for the public safety than the provisions of the Pharmacy Acts respecting the sale of poisons.

While calling the attention of our readers to the letter on the subject which appears in the correspondence columns of this week's Journal we trust that some among them will favour us with such views as they have formed concerning it and that they will give their brother pharmacists the benefit of such suggestions as their individual experience may enable them to afford.

"DULY QUALIFIED."

In the *Pharmaceutical Journal* for February 19 (p. 677), is an account of an inquest respecting a death through aconite poisoning, quoted from a respectable daily paper, in which a medical practitioner is reported to have said in evidence that his assistant, who was a registered chemist and druggist and not on the Medical Register, had prescribed for the deceased on more than one occasion. We thought it pertinent, therefore, at the time, to suggest that an opportunity was afforded to our medical contemporaries for saying whether a chemist and druggist prescribing on behalf of a medical practitioner is less culpable than one who so acts for his own benefit. The suggestion has not been adopted directly, but the *Lancet* of last week pronounces the dispenser "duly qualified," and we suppose this settles the question, although we hardly anticipated the judgment. Still, it may be that even the fact of being on the Register of Chemists and Druggists by virtue of having been in business before the passing of the Pharmacy Act is looked upon as a qualification compared with those possessed by some gentlemen similarly employed. *Au royaume des aveugles les borgnes sont rois!*

A NEW TEST FOR BUTTER.

Take two white mice, place them in separate cages, feed one with the butter under examination, and the other with good salt butter. After a time vary the experiment by giving the good salt butter to the first and the suspected butter to the second. According to the *Manchester Guardian* the method has been already adopted by certain Manchester chemists in the course of an inquiry into a fatal outbreak of diarrhœa at the Manchester Warehousemen and Clerks' School, Cheadle Hulme, the result reported being that each mouse in its turn "showed symptoms of illness accompanied by considerable purging" after feeding on the suspected butter. We suppose the conclusion should have been obvious, but either from a sentiment akin to the prevalent anti-vivisection feeling, or for some other or no reason at all, the jury was not guided by the result of the experiment in its verdict, and even added a rider that there was no evidence of dangerous elements having existed in the food. Such, however, is the general fate of those who are in advance of their times. But the verdict may have been affected by the fact that several children suffered who do not appear to have eaten any of the butter.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, March 9, at 8 o'clock, when a paper will be read on "Vegetable Nutrition," by Mr. W. A. H. Naylor.

Mr. A. Horton Crundall, M.P.S., late of the General Apothecaries' Company, Oxford Street Establishment, has, on the recommendation of Dr. Waller Lewis, been appointed Dispensing Assistant in the Medical Department of the General Post-Office, vice Mr. William Cook, M.P.S., formerly of Grantham, resigned on account of illness, and since deceased.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, March 1, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Atherton, Betty, Baynes, Cracknell, Frazer, Greenish, Hampson, Hanbury, Mackay, Owen, Rimmington, Robbins, Savage, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

THE CHEMISTS' BALL.

The SECRETARY read a letter from Mr. Carteighe, Secretary to the Chemists' Ball Committee, thanking the Council for the use of their rooms for the committee meetings. He also reported that he had received a cheque from the Treasurer of the Committee, for £15, as a donation to the Benevolent Fund.

The following being duly registered as Pharmaceutical Chemists were respectively granted a diploma stamped with the seal of the Society:—

Thompson, Charles.
Walton, Edward Bridges.
Williams, Richard.
Wills, George Sampson Valentine.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

Princep, Philip	London.
Sawden, Alfred	London.
Williams, Richard	St. Clears.
Wills, Geo. Sampson Valentine	London.

Chemists and Druggists.

Bracher, Edwin	Mere.
Colston, Joseph Carter	London.
Edwards, John	Conway.
Horton, George Day	Birmingham.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations and being in business on their own account were elected "Associates in Business" of the Society:—

Minor.

Andrew, Frederick William	Madeley.
Brewster, William	Kingston-on-Thames.
Brown, Arthur Mavor	Swaffham.
Farquhar, James	Perth.
Foster, John	Glasgow.
Graham, John	Lanark.
Hambridge, Thomas	Midsomer Norton.
Harrold, Charles Jesser	Westbury, Wilts.
Hodges, Edwin Goodall	Liverpool.
Ison, Francis	Ashby-de-la-Zouch.
Lomas, Charles Benjamin	Leicester.
Mason, Jonathan	Workington.
Mitton, Richard	Barnoldswick.
Reid, James Arthur	Bathgate.
Thomas, Frank	Boston.

Modified.

Blood, Charles	Formby.
Coates, Richard	Middlesborough.
Grummitt, William Clarke	Castle Hedingham.
Hayward, George	Croydon.

ASSOCIATES.

The following having passed their respective examinations were elected "Associates" of the Society:—

Minor.

Dawson, John William	Alford.
Dee, Walter	Cheltenham.
Goodrick, John	Aldershot.
Grimshaw, Thomas	Preston.
Humphries, Edgar	Sutton Coldfield.
Pain, Arthur	Bury St. Edmunds.
Rogers, William	Bilston.
Senier, Harold	Finsbury Park.
Smith, Charles Albert	Gosport.
Stevens, James	Strood.
Stoddart, Wm. Walter Boycott	Bristol.

Modified.

Battman, Thomas	London.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Artherton, John Henry	Wigan.
Ball, William Benjamin	Abingdon.
Bobby, Charles William	Brixton.
Buck, Charles Burton	Sandgate.
Bullen, George William	Newark.
Bush, Arthur	Barnes.
Cowap, Samuel Evan	London.
Dillon, Charles Linder	Hereford.
Flemons, Joseph	Northampton.
Fowler, William	Sunderland.
Goddard, Enoch William	Nottingham.
Gordelier, Frank Heward	Sittingbourne.
Hogben, Howard	Huddersfield.
Hughes, David	Holywell.
Hughes, John Evans	Pwllheli.
Hugill, Arthur Major	Leeds.
Jennings, Francis Rice	Falmouth.
Jepson, Joseph Morley	Grimsby.
Kelly, Francis Charles	Great Yarmouth.
Knight, Frank	Farnham.
Lambert, Charles Ernest	Durham.
McDonald, Ewen	Inverness.
Mansergh, William	Burton-in-Lonsdale.
Miller, William Henry	Howden.
Milton, Thomas Clement	Exeter.
Smith, Benjamin Mortiboy	Stafford.
Swadling, Arthur Samuel	Reading.
Trevaskis, George Marrack	London.
Waddington, John William	Kettering.
Weavers, James	Richmond, Yorks.
Whelpton, George Bates	Retford.
Wood, Robert	Loughborough.

Two person were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The following names have been restored to the Register of Chemists and Druggists:—

Peters, John	4, High St., Jedburgh.
Ridge, James	Greenhoughs St., Wigan.

COMMITTEES.

FINANCE.

The report of this Committee was received and adopted and various accounts were ordered to be paid.

BENEVOLENT FUND.

The Committee presented a report recommending that the following grants be made:—

£15 to the widow of a former member and annuitant. Applicant had received a previous grant of £10.

£15 to a Registered Chemist and Druggist, having a wife afflicted with paralysis, and seven children. Applicant had a grant of £15 in May, 1874.

The Committee also recommended that the Treasurer be requested to purchase £500 Consols.

The report and recommendations were adopted.

The SECRETARY stated that in response to the circular recently sent out, 85 new subscriptions had been received in January and a still larger number in February.

Library, Museum and Laboratory.

The report of this Committee was presented. It recommended the purchase of the following books for the Library:—

Royle's 'Materia Medica,' 6th edition, by Harley; Carpenter's 'Human Physiology,' 8th edition, by Power; Hassall's 'Food, its Adulterations, etc.'; Wanklyn's 'Tea, Coffee and Cocoa Analysis.' Professor Attfield had presented a copy of the 6th edition of his 'Manual of Chemistry,' recently published.

The Librarian had reported the average attendance in the library during the previous month to be, day 28; evening 12. The circulation of books had been, 156 in town; 23 in the country, to 17 places.

Professor Redwood had reported that he had 57 students attending his class.

Professor Bentley had had 60 pupils since the commencement of the session.

Professor Attfield had had 83 entries since the beginning of the session, 67 now being at work. Every student's bench was occupied, and ten which had been vacated at the half session were already engaged. The arrangements for admitting ten additional students to the laboratories were in progress and would be completed before the end of February.

The Curator had reported the attendance in the museum to be on an average 8, the highest number being 34, on one morning. He had commenced arranging the professors' lecture specimens. The catalogue of the museum was being steadily proceeded with, and the Committee recommended that the materia medica portion should be printed. Also that the Curator be allowed an assistant during the summer months, in order that he may conclude the arrangement of the professors' lecture specimens without letting the ordinary work of his department get in arrear.

The Committee recommended that a Conversazione be held at South Kensington in May next.

The report and recommendations were received and adopted, and the Secretary was instructed to apply to the authorities at South Kensington for permission to hold the Conversazione at the Museum on the 17th May next. The President, Vice-President, Treasurer, and Messrs. Sandford, Betty, and Robbins, were appointed a Committee to make the necessary arrangements in conjunction with the Secretary.

Duplicate Specimens.

Mr. Schacht asked whether it would be possible for the Curator, when arranging the separate specimens for the professors, to form one or two duplicate sets, which might at some future time be handed over to good local societies, and be a very useful mode of assisting them.

The President said the great difficulty would be to find room for storing the extra specimens.

Mr. Robbins added that a considerable number of fresh specimens had to be obtained in order to make one set.

Mr. Schacht said the Bristol Association had never yet asked the Society for any assistance, but it had now obtained a home and its next aim was to form a library and museum, and though the Association might not apply to the Society for pecuniary assistance it would feel it a great privilege to be aided by specimens for the museum. Perhaps the Committee would see if anything of this sort was practicable.

Mr. Greenish said the question was an important one and well worthy the attention of the Committee. He had no doubt the Committee would see if anything could be done.

House.

This Committee presented a report recommending certain arrangements being made in order to secure more efficient ventilation. The report was adopted.

The Calendar.

The Secretary stated that the names of 221 registered apprentices who had been elected between the years 1853 and 1862, and whose addresses were unknown, were still included in the Calendar. Between those dates it had been usual to elect all persons passing the Preliminary examinations under the Pharmacy Act of 1852 as apprentices in connection with the Society, irrespective of annual subscriptions. In 1862, the Council resolved that the free issue of the *Pharmaceutical Journal* to apprentices registered as such between the 1st of July, 1853, and the 1st of October, 1862, should be discontinued at the end of five years from the dates of their respective registration. He would suggest that the Council should now pass a resolution:—

> "That it be an instruction to the Secretary that in future editions of the Calendar the names of those only be published who are either life members or subscribers to the Society."

The omission of their names from the Calendar would in no way be to their prejudice, should they at any future time present themselves for the Minor examination or wish to resume their connection with the Society.

A resolution to the above effect was passed unanimously.

Mr. Shaw suggested that in future editions of the Calendar it would be desirable to publish in one table the poisons contained in schedule A. of the Pharmacy Act, 1868, with the additions that had since been made with the sanction of the Privy Council. On several occasions the Council had had occasion to criticize the conduct of coroners and magistrates in administering the law with regard to the sale of poisons, and he thought it would be very advisable that such functionaries should be enabled to see at one glance what articles were recognized poisons and what were not.

The President said the matter should be carefully considered before the next edition of the Calendar was issued, and if possible Mr. Shaw's suggestion would be adopted.

Law and Parliamentary.

This Committee had held a meeting, when a report was read from the Solicitor, stating the progress of the various cases placed in his hands. The Secretary also had reported that he had communicated with several persons who were alleged to be infringing the Act. Some of the persons referred to had stated that they were about to submit to examination, and in other cases the Committee recommended that the Solicitor be instructed to take proceeding against the persons offending.

The consideration of the memorial from Exeter on the subject of patent medicines had been deferred to the next meeting of the Committee.

Mr. Hampson said the two members of Parliament to whom the memorial was addressed had suggested to the memorialists that the opinion of the Council respecting it should be ascertained, but he did not see that the Council was in a position to propose anything like a radical change in the law with regard to proprietary medicines. It was known that these articles were used all over the kingdom and in the colonies to a great extent, that they formed part of a system which had been in existence a considerable time, and that they were to some extent recognized by medical men; and therefore he thought it would be impossible to make vendors treat them as poisons. To some extent he knew there was a growing feeling against the use of these articles, which he was glad to see, but he did not think anything could be done.

The Secretary having read the memorial and the documents connected with it,

Mr. Greenish said this was a very important question and one which he had thought would have to be dealt with some time or other. A case had happened in his own business, in which a person had purchased a bottle of Neuraline at his shop and another bottle in the neighbourhood, and with the two had poisoned himself. An inquest was held upon him and a verdict that the deceased had killed himself with Neuraline was returned. He (Mr. Greenish) had thereupon determined to label all bottles of Neuraline "poison," and thought the same regulations as governed other poisons ought to be applied to that and similar preparations.

Mr. HAMPSON said Neuraline was already labelled poison, and was supplied in a blue bottle; so that there could be no mistake about its being only intended for external use. He thought the matter had better be again referred to the Committee.

Mr. OWEN thought it was impossible to prevent a man killing himself if he wanted to. According to the notions of some people, a ropemaker ought not to be allowed to sell a piece of rope, or the New River Company should be prosecuted if a man drowned himself.

Mr. SCHACHT considered this was a matter of imperial interest, and not one of detail which should go to a Committee, unless one were specially appointed to consider the general question. The question really was whether any further legislation on this subject should be initiated by the Society.

Mr. MACKAY said the principle enunciated by Mr. Greenish would be very difficult to act upon, as there was a long list of patent medicines all of which would be very fit subjects for a poison schedule.

Mr. FRAZER hoped that no action whatever would be taken. It was simply an attempt to get a further monopoly, because it was well known that in some parts of the country booksellers and others did a large trade in patent medicines. In his opinion there was a great deal too much restrictive legislation already.

Mr. BAYNES could not understand the grounds for interference, because the articles referred to were perfectly safe if taken as directed. Chemists were not supposed to know the composition of patent medicines, and to that extent they were protected.

Mr. WILLIAMS said the Council some years ago came to a resolution that the trade in patent medicines opened the way to the sale of poisons as well as other serious evils, and that the whole of the patent medicine laws ought to be abolished. A committee was appointed to confer with the Government authorities, and the latter were on the point, he believed, of assenting to their proposals; but when the trade became aware of what was in progress, there was such an outcry that the Council had to retrace its steps and let the matter drop altogether. He did not very well see, therefore, how the Society could now approach the Government again to ask it to give up the stamp duty, and he much feared the majority of the trade would still be opposed to its doing so.

Mr. BETTY said the Exeter memorial had arisen entirely from a case of poisoning by chloral hydrate, and it certainly came within the province of the Council to consider whether that substance should be added to the list of poisons. He did not see any objection to the matter being again remitted to the Committee for consideration.

An amendment to the effect that the subject was so encompassed with difficulties that the Council declined to take it up having been negatived, the report of the Committee was adopted.

PRESCRIBING BY CHEMISTS.

The SECRETARY read a letter addressed to the Council by a member of the Society residing at the East End of London, calling attention to the recent decision in *The Apothecaries' Co.* v. *Nottingham*, and asking advice upon it, inasmuch as the Medical Defence Association was threatening to carry out that decision by prosecuting every chemist who might transgress the letter of the law as laid down by the judge in that case.

Mr. WILLIAMS said the Committee had been informed that notice had been given to more than 200 chemists and druggists at the East End that they would be prosecuted, and therefore it was a matter of vital importance to them as a body to see if they could take any steps to prevent what looked like persecution.

Mr. SHAW thought the Council had better get legal advice on the matter, and see if these persons were really liable to prosecution for doing what it had been the custom to do from time immemorial. Where was the line to be drawn between recommending a cough mixture or an aperient medicine and infringing on the domain of the apothecary? No doubt all men desirous of carrying on their business properly knew practically how to draw the line, but if these prosecutions were to be instituted they would need some stricter definition.

Mr. ATHERTON thought the best way would be to apply to the Medical Defence Association.

The PRESIDENT thought the Law and Parliamentary Committee had better be instructed to watch the proceedings of this Association, see what they were going to do, and act accordingly.

Mr. SCHACHT did not think any good would be done by being too hasty. The Council might get an opinion upon any one case, but it would not affect others, as each must stand upon its own merits. This threatened bite might after all turn out to be only a bark.

The PRESIDENT remarked that in Nottingham's case there could be no doubt that the defendant had overstepped proper bounds, and therefore the case should not be regarded as one interfering with the legitimate calling of a chemist and druggist.

Mr. MACKAY said there was an old and true saying that it was well to let sleeping dogs lie. The case referred to was a peculiar one, and he believed the Medical Defence Association would think twice before instituting proceedings all over the country against chemists who were carrying on their business in a legitimate manner.

Mr. SAVAGE concurred. In former times the physicians had made similar complaints against the apothecaries.

Mr. BETTY thought the wisest course would be to take no action at present, but wait the course of events.

On further inquiry it appeared that the circular referred to only drew attention to Nottingham's case.

Mr. OWEN quoted the ruling of Baron Bramwell in that case, showing that he laid down the law very strictly.

Mr. BAYNES said he infringed the law every day, according to that ruling, and so did every chemist and druggist; but it must be remembered that Baron Bramwell's ruling was applied to a special case.

Mr. ROBBINS said in all these cases there was a question of law and a question of fact; the judge laid down the law and the jury decided on the facts. He did not think chemists and druggists need be under much apprehension.

THE PRIZE EXAMINATIONS.

Mr. SCHACHT moved the following resolution of which he had given notice:—

> "That the Committee who reported upon a scheme for the award of the Pereira and other medal prizes be requested to consider the desirability of increasing the number of centres at which the examination shall be conducted.
>
> "That the Committee be requested to consider the desirability of relegating the selection of the special individuals who shall conduct the examinations to the united Boards of Examiners of London and Edinburgh."

He said there seemed to be a strong opinion which was growing rather than lessening, that all rewards issuing from that body should be looked upon as stimuli to study, and should be as general as possible in their application, and not limited to any particular locality. Although some of the Council prizes were limited to certain schools and classes he should like to see all future action in that direction take a more general scope. This particular set of prizes was intended for the encouragement of those who came up from all quarters to pass the highest examination, and was meant to stimulate them to some higher effort than was necessary to enable them merely to pass, otherwise the prizes would have no effect whatever, hence they should be made available to all men equally, and as there was a machinery already existing which had been organized with some trouble and expense, for the supervision of examinations throughout the country, nothing could be said now against the integrity of such examinations. The scheme which had been suggested would certainly act as a barrier in many cases, and if not would impose a fine on the candidates who had not the good fortune to live within a short distance of London or Edinburgh. He saw no reason why this examination should not be conducted in the same way as that for the Bell Scholarship, and therefore he hoped the Council would allow the Committee to reconsider the subject, and see if, without doing injustice to its own expressed opinions, it could not modify the arrangements to meet the necessities of the case. With regard to the latter part of his motion, it arose simply from the feeling which seemed to exist when the matter was last mentioned, that it would be more courteous to both Boards of Examiners to allow them to select their own representatives rather than the Council should select them.

Mr. Shaw seconded the resolution. He said the committee appointed two years ago, took the whole subject of the examination into consideration, when from irregularities reported to have taken place, it seemed necessary to make some alterations. The result was, that the number of places at which examinations could take place was materially reduced, and so far as he knew no irregularities had taken place since, either in connection with the Preliminary examination, or that for the Bell Scholarship. Some gentlemen he knew objected to disturbing what had been done two months ago, but he thought it would be much better to improve the regulations now, than alter them again twelve months' hence. It should certainly be the Society's object to induce as many young men as possible throughout the country to compete for the prizes, because even those who were unsuccessful would obtain the benefit of their exertions, which would be of great service to them in after life. The prize examinations might be guarded by whatever regulations the Council thought necessary, and he could not see why they should not take place at the same time as that for the Bell Scholarship, and if it was thought necessary, the Council might insist on the deputy superintendents who had been appointed being also present.

The Vice-President moved, and Mr. Savage seconded, an amendment :—

> "That Mr. Schacht's motion be referred to the Library, Museum and Laboratory Committee, and that two of the examiners be asked to attend, namely Mr. Carteighe and Mr. Taylor, and also Mr. Schacht and Mr. Mackay."

Mr. Mackay said, referring to the second part of Mr. Schacht's motion, he hoped the Council would agree that it should be sent to the Committee for consideration. It would be in the recollection of the Council that in January last a certain resolution was passed in regard to the examinations in connection with the new prizes, and in which resolution he thought the Scotch Board of Examiners had been treated unfairly, inasmuch, that the questions for the candidates were to be set and arranged by the London Board, copies being sent down to Edinburgh, and that the Board there by one or two of their members were simply to watch that no books or other unfair means should be resorted to by the candidates during the time the written answers were prepared. Now he thought this a mistake, because the two boards being equal and acting in perfect harmony, some arrangement ought to be made by which the Scotch Board should be recognized in framing the questions. He, therefore, moved at the last Council meeting, that some such alterations should be made, and that the January resolution should be rescinded. He had lost his motion, but several members of Council did not vote at all, and others having sympathy with the feeling he had expressed declined to vote, because he had not given the notice of his motion. With such facts, he hoped that the latter portion of Mr. Schacht's motion would not be separated from the first, but that both would go back again to the Committee for re-consideration, feeling assured that some decision would be come to whereby the Board of Examiners in Edinburgh would be fairly recognized, as from its position it was well entitled to be, in connection with these, the highest prizes the Society had to offer.

Mr. Shaw said he did not suppose there would be more than three or four places throughout the kingdom at which it would be necessary to hold these examinations.

Mr. Greenish thought there were good reasons for adopting the scheme which had been approved, but if Mr. Schacht was willing for the question to go again before the Committee he would not enter upon them now. Still he might say that there was a great difference between the examination for the Bell Scholarship and that for the Pereira Medal.

Mr. Schacht said there might be a difference in degree, but he apprehended not in kind.

The Vice-President said he should have been perfectly satisfied for the matter to remain as it was, and he rather objected to re-opening a question which had been carefully considered and decided upon so recently; still he could not forget that Mr. Schacht had stated his inability to be present when it was considered before, and knowing the interest he took in the educational work of the Society, he felt it was due to him that the Committee should be asked to reconsider the question.

Mr. Schacht said the amendment was practically the same as his resolution, with the addition of the four names, and he could therefore have no objection to it.

The first clause of the resolution was then put, with the addition to the Committee of Messrs. Carteighe, Taylor, Mackay and Schacht, and after some further discussion, in the course of which Mr. Schacht explained that he had been entirely under the impression that the regulations for the examinations would not be decided upon until the February meeting of the Council, the second paragraph also was referred to the same Committee.

Alleged Illegal Trading at Glasgow.

The Vice-President moved the following resolution pursuant to notice :—

> "That it be referred to the Law and Parliamentary Committee, to inquire into and report upon (with a view to active measures for the suppression thereof) infringements of the Pharmacy Acts publicly alleged to be extensively committed at Glasgow, and that the name of Councillor Frazer be added to the Committee."

He did so in consequence of several letters which had appeared in the *Pharmaceutical Journal* from Glasgow members complaining that their interests were very much damaged by infringements of the Pharmacy Acts, at which he was somewhat surprised, knowing that only a few years ago the Society had carried on a very successful prosecution for similar illegal practices. Some of the writers having expressed surprise that Mr. Frazer did not enlighten his brethren of the Council on the subject of this illicit trading, that gentleman had written a reply which he was quite sure must have been done hastily and without due consideration, for he knew Mr. Frazer would be the last man to impute anything wrongly to a brother member of the Council. But still no one could read that letter of Mr. Frazer's without feeling that it did cast an imputation on the Council, especially if he referred to a full report of Mr. Frazer's speech on the subject of the Glasgow memorial to which he made reference in his letter. It might naturally be supposed, putting the two together, that Mr. Frazer had brought forward the subject of illegal trading in Glasgow and had failed to receive any support; which certainly he did not remember, and must ask his friend to refer to the occasion. Having, when deputed by the Council to visit the North British Branch, also spent some time in Glasgow, he thought he should have heard something of this sad state of things if it really existed; but he did not. Very likely it was pointed out to him that shops were being carried on by surgeons, but that they had a perfect right to do, and he had no knowledge of any unregistered men carrying on business under colour of a surgeon's name; if he had, he would have investigated the case and brought it before the Council. He should ask Mr. Frazer to second the motion.

Mr. Frazer had great pleasure in seconding the motion at the request of the Vice-President, though he must confess he did not see the necessity for it. The fact was the law was being infringed notoriously over the whole country, and he did not think the fact of two or three letters having been written from Glasgow on the subject should cause it to be singled out for special attention. The cases might be more numerous in Glasgow, and he believed they were, but the same thing went on more or less everywhere. He had repeatedly brought up this question in connection with the examinations because he believed the stringency of their regulations led to these infringements in the same way as illicit distillation was stimulated in old days by the severity of the laws against it. At the same time, as the Act existed, he desired to see it carried out, because as he had had frequent opportunities of observing, as a justice of the peace, legislation was one thing and administration was another. They had simply to administer the law as they found it. There was more difficulty in Scotland than in England, owing to an alteration made in the Act of 1868 in the House of Lords. They could not put a case of infringement into the hands of a public prosecutor, like a case of theft, but had to carry it on themselves, and the one Mr. Bottle had referred to, which was the only successful case he believed in Scotland—at any rate in Glasgow—was conducted by himself. The great difficulty was that they had no direct control over medical men, but he thought whoever sold a poison should be obliged to put his name and address upon it, whether he were a medical man or not.

Mr. Williams said the question which affected the members of the Council as a body was this: When had the Council refused to listen to a complaint properly before them, and when had Mr. Frazer held up his hand on such a question against the whole Council?

Mr. Hampson thought it was undesirable to go into personal questions. It was unfortunately both difficult and costly to prosecute offenders, but the Council must do its best to carry out the law.

Mr. Frazer said he was one of the few who went in for prosecuting not only the small offenders but the large ones. He had proposed it more than once and was prepared to do so now.

Mr. Hampson must confess that whenever the question of prosecutions came up he felt his conscience somewhat prick him, inasmuch as the Society did not interfere with those who were breaking the law with impunity at its own doors, namely, the Co-operative Stores, who were infringing the Act. Even now he thought it was not too late for the Society to take the matter up, and do its duty.

Mr. Baynes said the entire sting which he had felt in the correspondence which had been referred to was that part in which Mr. Frazer stated that he had brought the matter before the Council again and again, and that it declined to entertain the subject. He had no recollection of any such occasion.

Mr. Frazer said he had not intended to convey that he brought forward any formal motion for such a purpose.

Mr. Baynes asked if there were not cases from Glasgow now under the consideration of the Committee.

The Secretary replied in the affirmative.

Mr. Schacht suggested that the Vice-President should withdraw the motion. As a member of the Committee he should be very sorry to receive such a message from the Council, and he understood it was the duty of the Committee to investigate cases submitted to it, but not to initiate inquiries.

Mr. Frazer thought the motion was mistaken as it seemed to reflect upon the Parliamentary Committee.

The Vice-President said he should be happy to withdraw the motion in deference to the wishes of the Council, though he felt rather strongly that the time was coming when it would be necessary to draw the line very clearly between chemists and their practice, and medical men and their practice. That was a matter which seemed of especial importance in Glasgow, because there seemed to be a good deal of illicit trading going on there, and he thought the best thing the Council could do would be to select a strong case and take it to the House of Commons.

Mr. Mackay said Mr. Frazer had disclaimed any intention of casting any reflection on the Council, which he was very glad to hear. He had no doubt that the expression to which objection had been made was written unthinkingly, and that Mr. Frazer regretted having done so.

Exhibition of Scientific Instruments.

The Secretary read a communication he had received from the Committee of the Loan Exhibition of Scientific Instruments, etc., about to be opened at South Kensington, asking him to bring the subject before the attention of the members, with a request that any persons who were willing to contribute would forward a description of the articles they proposed to send to Mr. Cunliffe Owen, at the South Kensington Museum.

The Secretary also stated that he had received letters from Manchester and Leicester, thanking the Council for the recent grants made to the local Societies in those towns.

Report of Examinations.

February, 1876.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major	7	4	3
Minor	26	12	14
Modified	7	3	4
	40	19	21

Seven certificates received in lieu of the Preliminary Examination.

5 University of Cambridge.
1 „ „ Durham.
1 „ „ Oxford.

SCOTLAND.

	Candidates.		
	Examined.	Passed.	Failed.
Major	1	0	1
Minor	4	2	2
Modified	3	0	3
	8	2	6

EXAMINATIONS IN EDINBURGH.

February 16th, 1876.

Present—Messrs. Ainslie, Borland, Buchanan, Gilmour, Kemp, Kinninmont, Tait and Young.

Professor Maclagan was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

One candidate was examined, and failed.

MINOR EXAMINATION.

Four candidates were examined. *Two* failed. The following *two* passed, and were declared qualified to be registered as Chemists and Druggists.

Goodrick, John......................Aldershot.
Grimshaw, Thomas ....Preston.

MODIFIED EXAMINATION.

Three candidates were examined, and failed.

PHARMACEUTICAL MEETING.

Wednesday, March 1, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

The minutes of the previous meeting were read and confirmed.

The following donations to the library and museum were announced, and the thanks of the Society were awarded to the donors:—

To the Library:—'Impairment or Loss of Vision from Spinal Concussion or Shock,' from Mr. Jabez Hogg (Author); 'The Indentification and Microscopical Examination of Crude Drugs and other Vegetable Products,' from M. W. Harrington, M.A. (Author).

To the Museum: — Octahedral Galena, from Mr. R. Palmer; Opopanax, from Messrs. Blake, Sandford and Blake; Pure Creosote and Valerianate of Zinc, from Messrs. Morson and Son; Fine Crystals of Nitrate of Ammonium, from Messrs. Hopkin and Williams; Bitter False Pareira Brava, from Mr. H. Butterworth.

Pill Machine.

Mr. **Cocking**, of Sittingbourne, exhibited a model of a double action pill machine which he hoped would entirely supersede the old piping press. He said that it did the whole of the pill-making by two grooved rollers, and a full sized machine would make ten thousand pills an hour.

A paper was then read on—

The Preparation of the Ferrous Phosphate of the British Pharmacopœia.

BY REES PRICE.

The paper is printed at p. 701. A note on the same subject by Mr. A. Allchin will be printed in our next. The paper gave rise to the following discussion:—

Professor **Attfield** said it might be as well to clear up the chemistry of the matter before discussing its pharmacy. Mr. Price had drawn attention to the fact that sulphate of iron mixed with phosphate of sodium gave free sulpuric acid, and thought it an error that the sulphuric acid should be officially ordered to be neutralized by acetate of sodium, which gave free acetic acid. That could hardly be called an error, because it was pretty well known that phosphate of iron was less soluble in acetic acid than in sulphuric acid; though every pharmacist who had made phosphate of iron must have known or suspected that it was soluble to some extent in acetic acid—every operator must have observed that his filtrate after a short time began to deposit a ferruginous substance which increased more and more until a considerable portion had been thrown down. He himself, however, was not previously aware that so large a proportion as one-fourth of the phosphate of iron might be lost in the process. Mr. Price's suggestion to use excess of phosphate of sodium was most ingenious and valuable, and there could not be much doubt as to the way in which the excess acted. It was well known that phosphate of sodium was a moderately strong alkaline salt. Acids, whether acetic, phosphoric, or sulphuric, would take from it half its sodium. He thought, therefore, that when excess of phosphate of sodium was used in preparing phosphate of iron, its function was to neutralize the free sulphuric acid which would otherwise be present; doing this to the extent of half the sodium in each molecule—Na_2HPO_4, thus yielding NaH_2PO_4. The latter, monosodium phosphate, could be reconverted into the ordinary or disodium phosphate by reaction with carbonate of sodium.

Professor **Redwood** thought his colleague, Professor Attfield, had sufficiently explained the bject and effect of using acetate of soda in the Pharmacopœia process. Although it did not entirely, it did to a great extent, prevent the solution of part of the phosphate of iron that was formed. If the method now proposed would accomplish this more effectually, as appeared probable from what was stated in the paper just read, it would no doubt be a valuable alteration in the process. Some years ago a process was suggested, in which the acetate of soda was replaced by carbonate, and that, according to Mr. Wood, accomplished the object aimed at by Mr. Price, namely, the more complete precipitation of the phosphate of iron. It was well known, although the contrary was sometimes inferred, that ferrous phosphate was not insoluble in acetic acid, and the remark in the edition of Pereira's 'Materia Medica,' to which allusion had been made, had reference to the fact. He certainly had not been aware that the loss of phosphate by the Pharmacopœia process was so great as Mr. Price's experiments indicated. He (Professor Redwood) had found that the precipitate obtained from a given quantity of sulphate of iron and phosphate of soda was much greater when the acetate of soda was added than when it was omitted, thus proving that the acetate did perform a certain valuable function in the process. It would be for further experiments to determine which of the several processes they had to choose between was the best.

Mr. **Brownen** said his attention was called to this preparation some years ago, and he experimented both with the official formula and with that in which sodium carbonate was used, but he did not think either was workable on a large scale. Another plan had been suggested which he had used for some time—viz., by a direct combination of strong phosphoric acid with iron. Phosphoric acid had a strong action on metallic iron, and ferrous phosphate was formed in solution. If the strong phosphoric acid of commerce, with a specific gravity of 1·750, were diluted with an equal volume of water, and applied to iron filings or turnings the action was set up, and after straining the solution it set into a crystalline magma of white and almost pure ferrous phosphate. The crystals appeared to be octahedra, were nearly white, and gave no red colour with sulphocyanide of potassium. After that salt had been washed with warm water, or with a very small quantity of cold water, the preparation of syrup was quite easy; a weighed quantity of ferrous phosphate with a known quantity of diluted phosphoric acid might be mixed with simple syrup in a great many proportions and remain clear.

Mr. **Gale** said the experiments he made some years ago, as referred to in the paper, were made with excess of phosphate of soda. At the same time Mr. Schweitzer, not Mr. Wood, experimented with carbonate of soda.

Mr. **Martindale** thought it would be objectionable to have any excess of phosphoric acid above that present in the present B. P. process, which was equal to 28 minims per fluid drachm of the syrup. Any further excess would make the syrup unpleasantly acid, and would give a greater quantity of phosphoric acid per dose than was intended. In fact some of the preparations mentioned might be more properly called syrup of phosphoric acid, the quantity of iron being so small.

The next paper read was on—

The Structure and Development of Pareira Stem.

BY JOHN MOSS, F.C.S.

The paper is printed at p. 702, and gave rise to the following discussion:—

Professor **Bentley** thought the most obvious remark to make after listening to such a paper was that it showed the absolute necessity of structural botany forming an essential part of the education of a pharmacist, for many of the valuable details given by the author would have been much better appreciated if the whole of the audience had been well informed upon the microscopical structure of plants. It was hardly a paper upon which much discussion could arise, but there were one or two observations he should like to make. In the first place he thought a gentleman who could read so excellent a chemical paper as Mr. Moss did at the last meeting, and follow it at the next with one showing a great deal of botanical knowledge and an acquaintance with the most recent German literature on the subject, was much to be congratulated, and they would all look forward with great interest to the practical paper he had promised for their next meeting. A great deal had been said lately in reference to the comparative medicinal value of the stem and root of the Pareira Brava plant, and much difference of opinion existed on this point, even so high an authority as the late Mr. Hanbury saying he did not imagine there was much difference; and certainly judging by the taste he should be led to the same conclusion. Still the matter was one which required working out thoroughly, especially as a great deal of the stem had recently come into the market. Mr. Moss had gone in considerable detail into the very remarkable structure of the stem of Chondodendron, and no doubt the paper would be studied with great advantage and interest. One of its great peculiarities was the large size of the medullary rays, and their disposition. In most plants the medullary rays proceeded uninterruptedly from the pith to the bark, but in the stem of Chondodendron the medullary rays bifurcated, as had been described, at the end of each wedge of wood; and as each division of the ray joined a corresponding portion of the rays on each side, an arched layer of medullary substance was seen at the base of each wedge of wood, and thus a crenated cellular ring was interposed between each ring of wood. The structure and arrangement of the medullary rays of other Menispermaceous stems which he (Professor Bentley) had examined resembled that now described in detail by Mr. Moss, and they moreover presented other marked peculiarities. Thus, to speak in as simple language as possible, besides these marked medullary rays there was interposed between each of the inner rings of wood a ring of cellular tissue with bundles of isolated liber cells, or in other words, a layer resembling the ordinary structure of the bark; between the outer rings, however, the interposed rings contained no bundles of liber cells, but consisted entirely of cellular tissue. In the stem of another plant, the Gnetum, a somewhat analogous structure might be observed to that of Menispermaceous stems; but here all the rings of wood, the outer as well as the inner, had concentric layers placed between them, composed of ordinary parenchymatous tissue and bundles of liber cells. He had not been able to follow Mr. Moss entirely, but should be glad to know whether he had found bundles of liber cells as well as parenchyma between the outer rings of the wood of Chondodendron as well as the inner. There were several other matters of interest which he (Professor Bentley) would have liked to have spoken of in connection with Mr. Moss's valuable paper, but the matter was of too technical a nature for general discussion.

Mr. Greenish said Mr. Moss had described the medullary cells as being pitted; he should like to know if he had isolated them. Again, with regard to the hemispherical tract, the cells of which were said to closely resemble wood cells, his impression was—indeed, there could be no doubt—that they had received secondary deposits, and were thereby thickened, but when isolated they were cellular, and the walls merely were laminated, showing that they had received successive deposits of tissue. He should like to know if Mr. Moss had isolated these cells, so that he could speak positively to the one set being pitted and the other woody.

Mr. Moss, in reference to the observations of Professor Bentley that the bundle sheath was of common occurrence in Menispermaceous stems, and that it might be regarded as a bark growing between each zone of fibro-vascular bundles, said it was the same in the stem he had examined; there was a bundle sheath outside each woody zone, but it could correspond only with the outer cellular portion of the bark in all the sheaths except the one immediately around the first zone, inasmuch as the liber cells were so very rare that it was difficult to find them except on very prolonged examination. The question whether the bundles of liber cells occurred in the outer bundle-sheaths was already answered in the paper, where he said "the arrangement described is repeated with each zone until the cortical portion is reached, with two important exceptions—parenchyma is present in large proportions near the margin and the bundle sheaths do not exhibit the masses of prosenchymatous cells." In reply to Mr. Greenish he must say he had not isolated either the cells of the pith or of the procambium, but inasmuch as he had described canaliculi as occurring in the cells of the pith, that would be sufficient evidence that the cells there were pitted. He was not quite sure that he understood the other question.

Mr. Greenish thought if the cells in the hemispherica are awere isolated it would be found to be prosenchymatous tissue.

Mr. Moss said the cells were elongated, and associated without interspaces in the usual way of parenchymatous tissue.

Mr. Greenish repeated that he believed that portion would be found to be parenchymatous tissue with a deposit on the walls of the cells.

The last paper was on—

Cosmoline.

BY W. A. H. NAYLOR.

The paper is printed on p. 707.

The President announced that the next meeting would be held on Wednesday, April 5.

Parliamentary and Law Proceedings.

Alleged Adulteration of "Milk of Sulphur."

At the Coleshill Police Court, on Wednesday, Feb. 23rd, before Messrs. R. F. Croxall, E. A. Everitt, G. Skey, and Captain Digby, John Sumner, grocer and druggist, of Coleshill, was summoned by the inspector of the rural sanitary district of Meriden, with having sold, on the 12th day of January, milk of sulphur as unadulterated, it being adulterated with sulphate of lime, to the prejudice of the purchaser. Mr. Seymour, clerk to the sanitary authority, prosecuted; and Mr. Young, barrister, appeared for Mr. Sumner. Mr. Jones and Mr. H. Hadley attended to watch the cases on behalf of the Birmingham Chemists and Grocers' Associations.

Mr. Seymour, in opening the case against the defendant, said the information was laid under the 6th section of the Sale of Food and Drugs Act, 1875, which provided that any person who sold, to the prejudice of the purchaser, any article of food or drug which was not of the nature demanded by the purchaser, should be liable to a penalty of £20. On the 12th of January last the inspector of the local sanitary authority purchased at the defendant's shop a quantity of milk of sulphur, which he subsequently sent to Dr. Alfred Hill to be analysed. Dr. Hill had given a certificate, which stated that according to the result of his analysis, the milk of sulphur contained 59¾ per cent. of sulphate of lime, which was an adulteration and a fraud, and probably injurious to health. Upon that information the summons had been brought, and an adjournment from last week had taken place in order that Dr. Hill might be present for examination. He called

Samuel Bretherton, who stated that on the 12th of January he went to the shop of the defendant and purchased two ounces of milk of sulphur, for which he paid 2½*d.* He told the defendant that he purchased the sample for analysis, and offered to divide it. The next day he took the sample to Dr. Hill, who divided it into two parts. He produced one half, with Dr. Hill's certificate of adulteration.

Mr. Young admitted the sale, and did not object to the putting in of Dr. Hill's certificate.

Dr. Alfred Hill, analyst to the borough of Birmingham and county of Warwick, was the next witness. He deposed to receiving a sample of milk of sulphur numbered 219, but did not know the name of the person from whom it was obtained. He divided it into two parts, one of which he submitted to analysis—microscopical and chemical. On a microscopical examination he found large crystals which ought not to be there, and from which he inferred that sulphate of lime was present. He then treated a portion chemically, and having volatilized all the sulphur, he obtained a residuum of sulphate of lime, amounting to 59¾ per cent. of the bulk. Milk of sulphur was used in skin diseases and as a laxative, but sulphate of lime would counteract the laxative effect. Sulphate of lime was insoluble, and if a rat had suffered from taking it, it would die from concretion of the bowels. In some constitutions sulphate of lime would be very injurious, and would create stone. Dr. Hill read from a work by Professor Attfield the opinion of that gentleman that the quantity of insoluble matter introduced in the manufacture of "milk of sulphur" would be to the prejudice of the purchaser.

Mr. Young, in cross-examination, read from the 'London Pharmacopœia,' published in 1724, in which was stated the difference between lac sulphuris (milk of sulphur) and sulphur præcipitatum. Dr. Hill, however, stated that lac sulphuris and sulphur præcipitatum were one and the same thing. There might be a difference according to the Pharmacopœia of 1724, but every one ought to be bound by the Pharmacopœia of the present day. Mr. Young also read the proportionate constituents of the two articles in question, as given by Gray's 'Supplement to the Pharmacopœia' of 1828; but Dr. Hill said he considered that an obsolete book. Gray distinguished between the two drugs very improperly. Witness knew Professor Redwood by name. Professor Redwood also distinguished between the two drugs—the one being prepared by hydrochloric acid, and the other by sulphuric acid. That was under the old system. He did not agree with Professor Redwood that milk of sulphur was better when it had a foreign admixture. There was no such drug as milk of sulphur mentioned in the newer pharmacopœias. It was called sulphur præcipitatum. It was defined inferentially as being a body having the quality of being "volatilized by heat." This would not be the case with adulterated milk of sulphur. It was a fact that they could not mix sulphur præcipitatum in water, but it could be "rubbed down." It could be mixed with treacle or jam. The adulterated milk of sulphur would mix with water.

Mr. Young: Was it milk of sulphur or sulphur præcipitatum that they used to use at Dotheboys Hall?

Dr. Hill said he should think it was flowers of sulphur. It might have been milk of sulphur, but he had had no experience in prescribing such things. The crystals he had mentioned in his evidence in chief were formed by the introduction of sulphuric acid, and being insoluble, they produced constipation. He was aware that doctors differed. He had never tried an experiment with the crystals on rat, cat, or dog, nor did he make a *post-mortem* examination of the rat he had mentioned. Dealers in chemicals might make distinctions between sulphur præcipitatum and commercial milk of sulphur, and there might be a difference in price.

Mr. Young produced the price lists of several leading wholesale chemists, showing under the heading of "sulphur," eight different preparations, among which were sulphur præcipitatum and milk of sulphur, the former being more than double the price of the latter.

Dr. Hill re-examined: Dr. Muspratt in his recent work on chemistry stated that the presence of sulphate of lime in milk of sulphur was unnecessary, and was injurious to health.

This was the case for the prosecution.

Mr. Young, in defence said, the case turned upon the question of whether milk of sulphur and sulphur præcipitatum were one and the same thing, the affirmative of which he contended the prosecution had failed to prove. He would call the attention of the Bench to the words of the Act of Parliament. In section 6 it was stated that "no person shall sell to the prejudice of the purchaser any article of food, or any drug, which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding £20." He contended that the purchaser had been supplied with the article which he demanded, and that the alleged adulteration was covered by the sub-section of the Act, which said that no offence should be deemed to have been committed "where any matter or ingredient not injurious to health has been added to food or drug, because the same is required for the production or preparation thereof as an article of commerce, and not fraudulently to increase the bulk, weight, or measure of the food or drug, or conceal the inferior quality thereof." That the introduction of sulphuric acid in the preparation of the particular article in question was injurious to health was only Dr. Hill's opinion—a theoretical opinion, which was different from that of Professor Redwood. Sulphuric acid was necessary in the preparation of the article. Why did not the public ask for flowers of sulphur? Because it would not mix with milk or with water. Dr. Hill had told them that sulphur præcipitatum would not mix but milk of sulphur would. He should be prepared to rebut the case for the prosecution by calling scientific witnesses who agreed with the opinion of Professor Redwood, and were prepared to demonstrate its accuracy by experiment in court, if the magistrates desired.

Mr. Alfred Bird, pharmaceutical and analytical chemist, of Worcester Street, Birmingham, was then called. He said he knew the preparations of sulphur. Milk of sulphur was a distinct preparation from sulphur præcipitatum. He had known that ever since the time he was an apprentice. He had always sold the two articles as perfectly distinct. Milk of sulphur was miscible in water. It was a very valuable medicine, and was what the public asked for. Milk of sulphur was used in sciatica, hemorrhoids, and other cases. It was not an impure article. He considered that he should be wrong in selling precipitated sulphur when milk of sulphur was asked for. Chemists were not at liberty to refuse to sell milk of sulphur. He totally disagreed with Dr. Hill's statement. He had not sold more than 7lbs of precipitated sulphur during the thirty-eight years he had been in business, whereas, during the same period he had sold many hundredweights of milk of sulphur. He had appliances in Court to corroborate his evidence by experiment, if the Bench desired. Cross-examined: The cheaper article was sold most because it was the most beneficial. Milk of sulphur would mix with water, and was used as a draught. Precipitate of sulphur was only produced as a chemical curiosity, and there was no use specified for it in the London Pharmacopœia. He remembered it once being put down in a prescription, but it was by one of those medical men who did not know that there were two preparations. The component parts of milk of sulphur were about equal portions of sulphate of lime and precipitated sulphur. Witness did not think the sulphate of lime would have a constipating effect. It would be absolutely inert. Sulphate of lime was not the same thing as plaster of Paris. In order to convert it into plaster of Paris the water of crystallization had to be burnt out.

At this stage, Mr. Croxall said the Bench were of opinion that there were two articles known to the trade as milk of sulphur and sulphur præcipitatum, and that the sample sold was a fair sample of milk of sulphur. The summons, would, therefore, be dismissed.

Mr. Young applied for costs on behalf of the defendant, but the Bench refused to make any order.

Alleged Adulteration of Cocoa.

Mr. Wontner then made an application to the Bench with reference to the summons against the same defendant for the sale of cocoa alleged to be adulterated. He stated that the article sold in this case was a packet of the cocoa prepared by James Epps and Co. The packet bore a statement to the effect that pure cocoa was insoluble, and that it was necessary that it should be "combined with just so much loaf sugar and West Indian arrowroot as will effect its perfect incorporation. We guarantee that no other ingredients than those mentioned are used." A short time back a similar case was tried before the Spalding magistrates, and on a conviction resulting, an appeal was made to the Court of Common Pleas. Justices Brett and Denman there decided that the article was not an adulterated one, but that the label stated on the face what it was; and they therefore quashed the conviction. The appeal being very recent, and press of business very great, it had not yet found its way into the *Law Journal* or *Law Times*, but it was reported in the *Times* of June 7, 1875, a copy of which he had with much difficulty obtained. Under these circumstances he applied to the Bench to dismiss the summons.

Mr. Seymour said the summons in this case had been taken out without his advice, and he was prepared to withdraw the case.

Mr. Wontner said he had come down, at great expense, to represent the manufacturers of the cocoa, although he nominally appeared for Mr. Sumner. He asked the Bench for costs.

The magistrates consented to the withdrawal of the summons, but declined to give costs.—*Birmingham Daily Post.*

POISONING BY HYDROCHLORIC ACID.

A singular case of poisoning has occurred at Harton colliery, near South Shields. Thomas Fife a miner at Harton colliery, on Saturday night, while in company with a fellow workman named George Carr, picked up on the road a bottle containing a liquid resembling whisky, which he gave to Carr to drink. Carr drank some of the liquid, and the result was that he died on Sunday. The bottle was found to contain muriatic acid. Fife has been apprehended.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PATENT MEDICINES.

The following article was published in the *Daily News* of March 2:—

"Nothing shows more strongly the radical difference between the English idea of self-government and the French leaning towards a paternal protection than the most elementary application of the law respecting the issue of patents. The French inventor may, without let or hindrance, launch upon the world a thousand designs to improve its working, or to bring all the enjoyments of the wealthy within the reach of the poor. Brevets are freely issued to all who care for them, with the small formula S.G.D.G. (*sans garantie du Gouvernement*), and they are left to sink or swim according as popular favour supports them or not. With patent medicines, however, the case is altogether different, and none are allowed to be sold unless an accurate specification of their component parts is given, and unless the official analysis completely bears out the inventor's statements. In this country a precisely opposite course is pursued, and whether "they order these things better in France," is at all events a debatable question. In England the manifold system of registering and making specifications of the smallest mechanical improvements, from which the inventor hopes to draw profit, is perplexing, and, in the long run, disadvantageous both to the inventor and to the public. But in the case of patent medicines not the least precaution is exacted, and under cover of the Government stamp, which in the eyes of the ignorant means Government endorsement of the article, the rubbish of quacks, the result of careful experiments, and often the most poisonous compounds, are alike freely and without distinction scattered broadcast over the country. Opium and morphia may no longer be sold by chemists except under special restrictions, but patent medicines containing both or either of these dangerous drugs may be freely sold under Government protection, and with the connivance of the officials who affix the Government stamp."

It is, I consider, worthy of the serious attention of the whole body of pharmacists, whether proprietors of specialities or simple retailers of them. The proprietors of patent medicines scatter broadcast over the kingdom poisons, which, according to the "Sale of Poisons Act," should be sold only by registered chemists, but which any huckster by paying a five shilling license may with impunity retail without any restriction whatever; as, subject to correction, I believe there is no clause in "Poisons Act" to restrict the sale of patent medicines by any one provided with a license.

The over-legislated-for chemist (or more properly drudgerist) is, as we have seen lately on more than one occasion, subject to a vexatious prosecution, pecuniary loss, probably no compensation for same, and also an undeserved character as a careless individual unfitted for his business. A proposed remedy is this; 1st. Government or their officials should no longer blink at the evasion of an Act fraught with the most serious consequences to the public. 2nd. The composition of the medicine should be plainly printed on the outside wrapper and marked "Poison," so that the chemist may be aware of the nature and the public of the danger incurred by taking the same. 3rd. That all penalties connected with prosecution for sale of patent medicines should be at once instituted against proprietor and not against seller. 4th. That a deputation from the Pharmaceutical Society communicate with the Government at once for a short bill respecting the declaration of the composition of patent medicines, to be passed this session. Lastly, That those pharmacists who are so earnestly trying to elevate the status of the chemist should use their influence to discountenance the issue of remedies that are in many cases a disgrace to the intelligence of the nineteenth century, and in the eyes of the public tend to reduce the chemist to the level of Romeo's apothecary.

CIRCUMAMBULANS.

March 3, 1876.

ELEGANT DISPENSING *v.* CORRECT DISPENSING.

Sir,—As I am your only correspondent who, in the preparation of the prescription given under the above heading, obtained results similar to those of "A Country M.P.S.," I am, I fear, involved to some extent in the epistolary caning so freely administered to that gentleman in your last issue. I shall be glad, therefore, if you will kindly allow me another word or two to vindicate the position assumed in my former communication—a position, let me say, to which, after further careful experiment, witnessed by my assistant, I still unhesitatingly adhere.

The gentlemen who write so confidently on the subject, and who attribute our country friend's want of success (?) to his want of skill in manipulation, are evidently under the impression that in trying the form given they obtained a clear mixture by virtue of their own particular methods of mixing; but this in reality is not so. Where a question of great nicety is concerned it is extremely easy to be deceived by results. If these gentlemen will permit me, I will, with all due deference, explain to them how it is they have not, in their experiments, encountered the difficulty complained of. They have simply overlooked for the moment the property attaching to chloroform of rapid evaporation when exposed to the air. The successive additions and agitations which they recommend do not, as they too hastily assume, mix or combine the chloroform, but simply allow the excess to pass off by the exposure involved in the process. If during the operation the cork be kept in the bottle and removed for a second or two only whilst each addition is being made, the operator skilfully preventing all evaporation, and at the same time taking special care not to add more water than will be required to make exactly 4 fluid ounces, which I submit is correct dispensing; a separation and subsequent deposition of a small portion of insoluble chloroform will inevitably occur. This will require a few seconds' exposure to the air, or, as suggested in my last, the addition of a little water or spirit to render it bright. There is no escaping from this, however ingeniously the ingredients may be manipulated. If the mixture be prepared clear in the first place it simply shows that it contains less chloroform or more water than, strictly speaking, is set forth in the law and letter of the prescription.

W. WILLMOTT.

King's College Hospital,
Feb. 29, 1876.

Sir,—Perhaps I may be able to explain how it was that "A Country M.P.S." could not get a clear and bright mixture "by any order of mixing." I have found that if methylated chloroform be used in making sp. chlorof., it does not produce a clear mixture by any order of mixing. If he used chloroform prepared with pure alcohol and did not mix it *sec. artem*, he would not then get a clear mixture. I get one perfectly clear and bright with the latter by rather more than half filling the bottle with water, mixing the sp. chlorof. and tinct. ferri perchlor., and adding this to the water little by little, shaking between each addition, and lastly adding the liq. arsen. hydroch. I have before me two bottles of it, the one made with sp. chlorof. prepared with methylated chloroform, and the other made with sp. chlorof., prepared with Duncan and Flockhart's pure chloroform, and both are mixed as above; the former is "muddy," but gets clear as the chloroform goes to the bottom, and the latter quite clear and bright. If he does use methylated chloroform (as very many chemists do) and the London firm use the B. P., your correspondents must forgive him, and our Southampton friend withdraw his assertion that his bottle "certainly must contain a stronger preparation than sp. chloroformi, B. P." But on the other hand, if he used chloroform B. P., I would suggest, with "A London Dispenser," that he be sure his S. V. R. is not half spirit and half water, and that he is using tinct. not liq. ferri perchlor.

We might be able to help him out of some of his other difficulties would he give them publicity.

After "A Country M.P.S." has been so "pegged away at," he may possibly require a tonic. If so, let me recommend him the following, prescribed by an eminent doctor (or rather doctress) here:—

℞	Quin. Disulph.	ʒss.
	Acid. Nitric. Dil.	q.s.
	Sodæ Bicarb.	℥ss.
	Aquæ ad	℥viij.
	M. ft. mist. capt.	℥j.

Ter die.

He must be sure to make it clear—*i.e.*, add enough dilute nitric acid to dissolve the quinine before adding the soda (which was evidently the intention of the doctor); for the sake of "correct dispensing" he must not leave it out altogether, as I in my "incorrect dispensing" did.

NIL DESPERANDUM.

Bristol, Feb. 28, 1876.

Sir,—A mountain is sometimes made of a molehill. Some of your correspondents have performed this feat in discussing the above question. Their imaginations having magnified a pigmy into a giant, Mr. Martindale rushes to the rescue with an elaborate *modus operandi* for "laying" him, which, merely to contemplate, well nigh takes away one's breath.

Mr. Proctor, who initiated the correspondence in his long letter of January 27th, started with the assumption of a difficulty where none existed. When the physician ordered "℥ss per die," there could be no doubt whatever as to the exact quantity intended, and it was Mr. Proctor's duty, even had it been a less potent medicine, if he translated "℥ss" into a "spoonful" at all, to have indicated that spoonful which most nearly approximated to "℥ss," viz. a "dessert" (and here in parenthesis it may be observed that dessert spoons vary in size much less than either tea or tablespoons, and that a modern dessertspoonful measures almost accurately ℥ss).

There may be some doubt as to the quantity a physician intends when he orders a "tablespoonful" or a "dessertspoonful," and yet in a rather long experience I have never met with a doctor who did not apprehend, or rather misapprehend that the respective equivalents of "tea," "dessert," and "tablespoonfuls," were ʒj, ʒij and ʒiv, and this accords with the spoonful graduated measures. This is so nearly the universal understanding in the medical profession that the chemist, if conscientious, will so render those familiar terms, using when practicable a graduated bottle to denote the quantity, and when not practicable, supplying a glass measure to those who can pay for one, and to those who cannot a ʒj, ʒij or ʒiv phial, which one would have thought would naturally suggest itself to any and every one.

Mr. Alfred W. Smith's suggestion that enterprising firms should be invoked to make ʒj glass or earthenware measures the shape of a pill box is calculated to excite a smile; they could hardly be used often without meeting with a frequent capsize, and seldom or never without some of the physic being wasted. A phial is infinitely preferable.

In cases where the conscience of the dispenser is not so straitlaced as the consciences of all pharmaceutists ought to be, when a mixture—say M ℥viii is ordered with "*coch. mag. ij. ter in die sum.*"—he may, provided he sees the "medicine" is of that character, which, to use a classic phrase, "will have no more effect than water on a duck's back," and also knows that the patient believes that the more physic he takes the merrier he will be, simply Anglicize the "dog Latin," and no great harm will ensue, though the "M ℥viii" will be consumed in little more than four doses instead of eight.

Possibly, the ventilation of this matter may come under the notice of the medical profession, and, therefore, I would respectfully urge, that the practice of prescribing powerful medicine as "drops" should be discontinued (for only a practised steady hand can "drop" a liquid with exactness), and that ʒj of medicine should be recognized as a minimum dose. Further, that the term spoonful should be utterly discarded, and the directions on mixtures prescribe a certain "part" to be taken, or so many drachms or ounces.

I have been induced to gauge some of the spoons in my house, the following is the result:—Of 3 "tea" the 1st (probably 50 to 70 years old) held 65 minims; the 2nd, a modern spoon, 80 minims; the 3rd, a modern plated spoon, 140 minims! Of 6 "dessert"—all of different patterns—the 1st (probably 100 years old) measured ʒiij full; the 2nd, a modern one, ʒiiiss, and the remaining four all ʒiv; of 2 "table," the 1st (not less than 100 years old), held ʒv¼, the 2nd, a modern full-sized spoon, ʒviiss.

ROBERT CHIPPERFIELD.

Southampton, Feb. 19, 1876.

Administration of Medicines in Wafer Capsules.—We have received a letter from Mr. P. Lauranson, of Blackfriars Road, referring to a paper on this subject read before the Philadelphia College of Pharmacy and reported in this Journal (before, p. 676), and stating that M. Limousin holds patent rights in respect to his invention in this country, and that therefore it cannot be worked here without his license.

J. R. Sumner.—A formula for a very adhesive court plaster was given in the Journal for May 10, 1873, p. 899.

A Caution.—Mr. McNeil writes to give warning against the operations of a female who, during his absence, obtained a quantity of Chilian honey from his shop without paying for it, and could not afterwards be found. The female was from 25 to 30 years of age, about five feet in height, and had a very dark complexion. She represented that the honey was wanted for jelly boiling.

"*Allopath.*"—(1) Any sale of a poison under the Pharmacy Act, without compliance with the provisions of the Act, is illegal. (2) Order it through a respectable bookseller. (3) See the explanation given in the Pharmacopœia. (4) Yes.

P. K.—We do not know. Apply to the Secretary at Apothecaries' Hall.

J. L. Chaplin.—The information you desire is provided as far as available in the pages of the *Pharmaceutical Journal.*

H. W. Lenton.—We are afraid we have not sufficient space at our disposal to allow of our accepting your kind offer to the extent you mention, but should be glad to receive any communication you may think to be of general interest.

COMMUNICATIONS, LETTERS, etc., have been received from Dr. Hesse (Stuttgart), Mr. Hearne, Mr. Swenden, Mr. Cottman, Mr. Bird, Mr. Beach, Mr. Bell, Mr. Chaplin, Mr. Evans, Mr. Jones, Mr. C. Troke, Mr. Siebold, Mr. Taylor, Mr. Jamieson, Decorum, Registered Chemist, Ph.D., M.P.S., E.H., W.J., Mr. Felix Stevens, W.J.B., Student, Alpha.

NOTE ON PERSIAN OPIUM.

BY W. D. HOWARD.

Having recently been requested to examine a sample of fine Persian opium, sent to this country as "perfectly pure," the results of my examination may prove interesting. The opium was light brown in colour, and had been collected without the excessive use of oil. On analysis it yielded me, not previously dried—

	Per cent.
Morphine, crystallized from alcohol	10·40
Codeine (anhydrous)	0·29
Narcotine	2·50
Thebaine	0·57
Cryptopine	0·09
Papaverine	trace.

I am unable to say whether any narceine was present.

Stratford, Essex.

REMARKS on IMPURE POTASSIUM IODIDE

BY THOMAS F. BEST, F.C.S.

Some samples of iodide having been lately submitted to me, for analysis, I beg to call the attention of the trade generally to the presence of an excess of alkali in them (consisting chiefly of carbonate), tabulating the same in their percentage order of impurity.

	Per cent.
No. 1 contains	5·44
" 2 "	5·35
" 3 "	2·32
" 4 "	1·78
" 5 "	·53

Though the last on the list may be considered a comparatively small excess, still it is higher than it should be.

From my own practical experience, I would remark, that commercially pure iodide should not contain more than from ·15 to ·20 per cent.

In a medicinal point of view, I suppose 5 or 6 per cent. would not much deteriorate its physiological action, especially if previously neutralized with a little dilute acetic or hydrochloric acid, as suggested by Mr. Groves in a former number of the *Pharmaceutical Journal.*

On the other hand, should such impure iodide be supplied "in lieu" of the pure article, it may injure the reputation of an analyst or a dispenser (as may be judged by the late Sheffield controversy).

Another point concerning this excess of alkali. Where dispensers have insufficient time for examining their chemicals and drugs, it becomes a constant source of annoyance, precipitating ingredients which ought otherwise to be kept in solution, and thus again altering the nature of the prescribed mixture.

STUDIES UPON ESSENTIAL OILS.

BY G. DRAGENDORFF,

Professor in the University of Dorpat, and Honorary Member of the Pharmaceutical Society of Great Britain.

(*Concluded from page* 684.)

(*d*) *Concentrated Sulphuric Acid.*—This test was used by placing two drops of acid with one drop of oil in a watch glass. The result was as follows:—

Ol. Terebinthinæ rect.: Deep red brown, then blood red.

Ol. Terebinthinæ crud.: Deep red brown, red brown.

Ol. Carui: Gamboge yellow, after a few minutes carmine red at the edges, after twenty-four hours cherry red.

Ol. Citri: Yellow brown, then brown with reddish edges.

Ol. Coriandri: Yellow brown, afterwards reddish, after twenty-four hours reddish edges.

Ol. Cardamomi: Yellow brown, after twenty-four hours violet.

Ol. Bergamottæ: Brown, then discoloured, after twenty-four hours, especially if it contain turpentine, the margin is violet.

Ol. Caryophyllorum: Deep red brown, then blood red, margin cherry red, afterwards blue; after twenty-four hours all violet. (Zanzib. more violet.)

Ol. Rosmarini: Yellow brown, then red brown.

Ol. Menthæ crisp.: Yellow brown, afterwards redder edges, then all cherry red.

Ol. Majoranæ: Yellowish, edges faintly reddish, afterwards all pure red.

Ol. Fœniculi: Brown momentarily, then cherry red, blood red, raspberry red, finally violet.

Ol. Anisi: Raspberry red, afterwards brown violet.

Ol. Anisi stell.: Brown, afterwards blood red.

Ol. Macidis: Orange brown, soon red, finally red brown.

Ol. Anethi: The same.

Ol. Juniperi: Brown, then blood and cherry red.

Ol. Cubebarum: Gamboge yellow; edges gradually red, afterwards raspberry red, violet edged.

Ol. Piperis: Dark orange, then with violet edges.

Ol. Zingiberis: Yellow brown.

Ol. Copaivæ: Yellow brown, afterwards blackish, then reddish edged; after twenty-four hours cherry red.

Ol. Galangæ: Dark brown, violet at the edge.

Ol. Aurantiorum dulc.: Dark brown.

Ol. Aurantiorum amar.: Dark gamboge yellow, soon red at the edge; afterwards brown.

Ol. Petit-grains: Brown.

Camphor: Colourless, afterwards pale yellow.

Ol. Cinæ: Brown, afterwards violet brown.

Ol. Valerianæ: Yellow, then with light red edge; after twenty-four hours light red brown.

Ol. Salviæ: Brown, after twenty-four hours red.

Ol. Cumini: Green, then brown, deep violet, blackish and green brown.

Ol. Gaultheriæ: Light brown, soon a beautiful currant red.

Ol. Pini Cedri: Orange brown.

Ol. Persicorum: Violet red.

Ol. Geranii turt.: Dusky brown.

Ol. Geranii gall.: The same.

Ol. Lavandulæ: Brown, then blood red, then violet brown.

Ol. Cajeputi: Brown, quickly red edged, then faint violet.

Ol. Amomi: Blackish brown, soon blood red, then dark cherry red.

Ol. Cascarillæ: Brown, afterwards violet red edged.

Ol. Cinnamomi: Deep brown, afterwards dusky green, finally blue edged.

Ol. Moschatæ: Dark red.

Ol. Thymi: Dark gamboge yellow, then carmine red, finally brown.

Ol. Lauri: Dark brown; edge soon reddish, afterwards violet brown.

Ol. Santali: Dark blood red.

Ol. Calami: Brown, violet red edge.

Ol. Menthæ pip.: Brown, partially red edged; after twenty-four hours cherry red.

Ol. Myrrhæ: Dark brown, soon black, afterwards in a thinner layer cherry red.

Ol. Petroselini: Dark brown, then blood red, finally cherry red.

(*e*) *Frohde's Test.*—This reagent was used in a similar manner, treating one drop of oil with three drops of the reagent. The colour test was in most cases purer and more elegant than with sulphuric acid. The results were as follows:—

Ol. Terebinthinæ rect.: Brown, then blood red.

Ol. Terebinthinæ crud.: The same.
Ol. Carui: Dark yellow, immediately carmine red.
Ol. Citri: Dark orange brown.
Ol. Coriandri: Brown, then reddish, then black.
Ol. Cardamomi: Brown, afterwards violet edged.
Ol. Bergamottæ: Brown (adulterated with Ol. Tereb.), afterwards red edged.
Ol. Caryophyllorum: Dark blood red, then dark cherry red.
Ol. Rosmarini: Yellow brown.
Ol. Menthæ crisp.: Dark orange, then light brown.
Ol. Majoranæ: Dark yellow, quickly brown, then rose colour at the margin.
Ol. Fœniculi: Brown, soon beautiful cherry red.
Ol. Anisi vulg.: The same.
Ol. Anisi stell.: The same.
Ol. Macidis: Brown, quickly reddish, then again brown.
Ol. Anethi: The same.
Ol. Juniperi: Dark brown, then red edged, then cherry red.
Ol. Cubebarum: Gamboge yellow, gradually a beautiful currant red.
Ol. Piperis: Dark orange, then violet at the margin.
Ol. Zingiberis: Brown red.
Ol. Copaivæ: Brown, gradually rose coloured at the edge, cherry red.
Ol. Galangæ: Dark red brown, violet at the margin.
Ol. Aurantiorum dulc.: Dark brown.
Ol. Aurantiorum amar.: Dark yellow, soon red edged.
Ol. Petit-grains: Brown, afterwards cherry red.
Camphor: Colourless, then passing to a pale reddish.
Ol. Cinæ: Brown, afterwards red edged.
Ol. Valerianæ: Light brown.
Ol. Salviæ: Brown, then beautifully red edged.
Ol. Cumini: Green, almost instantly deep brown, then dark cherry red.
Ol. Gaultheriæ: Dirty brown, quickly red, then cherry red.
Ol. Pini Cedri: Brown red.
Ol. Persicorum: Violet red.
Ol. Geranii turtic.: Brown.
Ol. Geranii gall.: Black brown.
Ol. Lavandulæ: Brown, afterwards reddish edged.
Ol. Cajeputi: Brown, afterwards violet at the margin.
Ol. Amomi: Dark brown, quickly blood red, then cherry red.
Ol. Cascarillæ: Brown, quickly violet.
Ol. Cinnamomi: Dark brown, quickly green, finally blue edged.
Ol. Moschatæ: Dark red.
Ol. Thymi: Brown, soon a beautiful red at the margin.
Ol. Lauri: Brown, quickly red edged, afterwards a dirty cherry red.
Ol. Santali: Blackish red.
Ol. Calami: Dark brown, then blood red.
Ol. Menthæ pip.: Brown, then violet red, then a dirty cherry red.
Ol. Myrrhæ: Dark brown, almost black, here and there blue violet.
Ol. Petroselini: Dark brown, soon dark red brown.
Ol. Galangæ artific.: Violet brown.
Ol. Pulegii: Light green.
Ol. Pimentæ: Blood red.

(*f*) *Fuming Nitric Acid.*—In each of these experiments three to five drops of the acid were mixed in a test glass with one drop of the oil. In many cases a very energetic action followed, causing a perceptible hissing noise. The results are given in the following table:—

Ol. Terebinthinæ rect.: Hissed upon mixing; red, then brown.
Ol. Terebinthinæ crud.: The same.
Ol. Carui: Hissed; beautiful red, then brown.
Ol. Coriandri: Like Ol. Tereb.
Ol. Cardamomi: The same.
Ol. Bergamottæ: The same; no hissing with the resinified oil.
Ol. Caryophyllorum: Red brown.
Ol. Rosmarini: Red, then brown; no hissing.
Ol. Menthæ crisp.: Yellow brown.
Ol. Majoranæ: Like Ol. Citri.
Ol. Fœniculi: Hissed; brown.
Ol. Anisi vulg.: The same.
Ol. Anisi stell.: Like Ol. Tereb.
Ol. Macidis: Deep blood red, then cherry red.
Ol. Anethi: Like Ol. Tereb.
Ol. Juniperi: The same.
Ol. Cubebarum: At first like Ol. Tereb., then green.
Ol. Piperis: Very violent reaction, orange brown.
Ol. Zingiberis: Brown.
Ol. Copaivæ: Brown, then red, then blue violet.
Ol. Galangæ: Like Ol. Piperis.
Ol. Aurantiorum dulc.: Brown yellow.
Ol. Aurantiorum amar.: Like Ol. Tereb.
Ol. Petit-grains: The same.
Camphor: Yellow.
Ol. Cinæ: Like Ol. Tereb.
Ol. Valerianæ: Yellow brownish.
Ol. Salviæ: Like Ol. Tereb.
Ol. Cumini: Hissed; brown.
Ol. Gaultheriæ: Deep blood red, then cherry red.
Ol. Pini Cedri: Red.
Ol. Persicorum: Yellow red, then yellow.
Ol. Geranii turt.: Hissed; brown.
Ol. Geranii gall.: The same.
Ol. Lavandulæ: Like Ol. Tereb.
Ol. Cajeputi: Light yellow.
Ol. Amomi: Red brown.
Ol. Cascarillæ: Violet, then brown.
Ol. Cinnamomi: Magnificent carmine.
Ol. Moschatæ: Blood red.
Ol. Thymi: Hissed; brown.
Ol. Lauri: Blood red, then brown.
Ol. Santali: Yellow, then green.
Ol. Calami: Like Ol. Tereb.
Ol. Menthæ pip.: Brown, under the influence of red nitrous acid vapour.
Ol. Myrrhæ: Beautiful violet red, then brown.
Ol. Petroselini: Hissed; blackish brown.
Ol. Pimentæ: Blood red.
Ol. Pulegii: Violet.

(*g*) *Picric Acid.*—Some time since Frebault observed an interesting colour reaction of picric acid with oil of peppermint.* The acid is gradually dissolved by the oil, and the solution, which at first is yellow, after half an hour becomes gradually green. In twenty-four hours, or sooner if heated, the green colour is very intense. In the presence of water and air the mixture by degrees becomes reddish yellow, and upon shaking the water acquires a red or yellow colour. Upon the comparison which Frebault draws between the green product and chlorophyll, etc., I will not here express an opinion. I have found that other essential oils yield a colour reaction with picric acid, and especially that the behaviour of different oils with picric acid is rather distinct, so that it can be used for their recognition. When from five to ten drops of an oil are brought into contact with 0·05 gram of powdered picric acid, many of the oils readily dissolved the acid in the cold; whilst others only did so with heat, and then only with difficulty. The solutions were at first usually yellow, but by standing or heating the different oils more or less quickly acquired another colour. Some of the solution after standing re-deposited crystals. The solutions mixed with ether, and some of them communicated to the ether the acquired colour. Upon shaking the ether mixture with water a part of the picric acid present was taken up by the latter. My observations on the behaviour of the different oils with picric acid are as follows:—

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* *Pharm. Journ.* [3], vol. iv., p. 977.

Ol. Terebinthinæ rect.: Dissolved in the cold difficultly, easily with heat, to a yellow solution, from which crystals were deposited upon cooling. Ether dissolved the yellow substance, and gave up part of it upon shaking to water.

Ol. Terebinthinæ crud.: The same, but upon warming it the solution passed to a blood red.

Ol. Carui: Dissolved easily in the cold with a yellow colour. The ether mixture was light yellow, and coloured water shaken with it greenish yellow.

Ol. Citri: Like Ol. Tereb.

Ol. Coriandri: Dissolved with difficulty; solution yellow.

Ol. Cardamomi: Dissolved easily; yellow.

Ol. Bergamottæ: Dissolved difficultly; orange yellow (adulterated, yellow); solution gave crystals.

Ol. Caryophyllorum: Dissolved easily in the cold; solution, orange yellow; ether mixture orange; gave up yellow substance to water.

Ol. Rosmarini: Dissolved easily; yellow; ether mixture light yellow; water mixture yellow.

Ol. Menthæ crisp.: Dissolved easily; orange yellow, then olive green; ether mixture yellow; water mixture yellow.

Ol. Majoranæ: Dissolved easily; orange; nevertheless the solution deposited crystals upon standing; ether and water mixtures yellow.

Ol. Fœniculi: Dissolved difficultly; blood red with heat; ether mixture orange; water mixture yellow.

Ol. Anisi vulg.: Like Ol. Caryophyll.

Ol. Anisi stell.: The same.

Ol. Macidis: Dissolved difficultly; orange brown; the solution prepared with heat deposited crystals on cooling.

Ol. Anethi: Dissolved easily; brown yellow; gave crystals on standing.

Ol. Juniperi: Like Ol. Tereb.

Ol. Cubebarum: The same; the solution prepared with heat soon became turbid.

Ol. Piperis: Like Ol. Tereb.

Ol. Zingiberis: Like Ol. Macidis.

Ol. Copaivæ: Like Ol. Tereb.

Ol. Galangæ: Dissolved difficultly; brown to brown black; solution gave crystals.

Ol. Aurantiorum dulc.: Like Ol. Coriandri.

Ol. Aurantiorum amar.: Like Ol. Tereb.

Ol. Petit-grains: Like Ol. Coriandri.

Ol. Cinæ: Dissolved difficultly; red brown; solution gave crystals.

Ol. Valerianæ: Dissolved easily; light yellow; solution gave crystals.

Ol. Salviæ: Like Ol. Coriandri.

Ol. Cumini: Dissolved easily; orange yellow.

Ol. Gaultheriæ: Like Ol. Carui.

Ol. Pini Cedri: Like Ol. Tereb.

Ol. Persicorum: Like Ol. Carui.

Ol. Geranii turt.: Dissolved difficultly; orange brown to brown; ether mixture orange brown; water mixture yellow.

Ol. Geranii gall.: Dissolved difficultly; orange brown to brown; ether mixture orange brown; water mixture yellow.

Ol. Lavandulæ: Like Ol. Tereb.

Ol. Cajeputi: The same.

Ol. Amomi: Like Ol. Caryophyll.

Ol. Cascarillæ: Like Ol. Galangæ.

Ol. Cinnamomi: Dissolved easily; orange, by warming olive green; ether mixture yellow green; water mixture yellow.

Ol. Moschatæ: Like Ol. Macidis.

Ol. Thymi: Like Ol. Majoranæ.

Ol. Lauri: The same.

Ol. Santali: Like Ol. Bergamottæ.

Ol. Calami: Dissolved easily; deep brown.

Ol. Menthæ pip.: Dissolved easily; olive green, by warming deep green; ether mixture green; water mixture yellow. Old strongly resinified oil dissolved at first yellow, afterwards with heat olive green, and gave yellow ether and water mixtures.

Ol. Myrrhæ: Dissolved easily; blood red, with heat brown black; ether mixture olive green; water mixture yellow.

Ol. Petroselini: Like Ol. Caryophyll.

Ol. Galangæ artific.: The same.

(*h*) *Ammoniacal Silver Solution.*—This reagent undergoes, as is known, a reduction with some essential oils, with others none. Among the oils which cause no reduction in twenty-four hours are the oils of turpentine, rosemary, laurel, marjoram, juniper, cubebs, fennel, anise, star anise, geranium, lavender, coriander, sage, valerian, mace, dill, orange, cardamoms, cajeput, myrrh, wintergreen, petit-grains, cascarilla, calamus, and parsley. Expressed bergamot oil becomes yellow with the reagent, but there is no reduction. Ol. cinæ causes in two hours a reduction, which becomes very considerable after twenty-four hours. Oil of thyme becomes brown and reduces immediately, afterwards strongly. Oil of cummin becomes grey and reduces immediately, afterwards strongly. Oil of amomum becomes yellow and reduces, afterwards strongly. The oils of cloves and cinnamon also reduce the solution.

From the more recent investigations upon the composition of essential oils, it follows with tolerable certainty that they consist of a proportionally small number of hydrocarbons and their corresponding hydroxyl and carbhydroxyl derivatives, a class of compounds frequently isomerous or polymerous with one another. The properties in oils of different origin which appeal principally to the senses, especially the smell, appear to be due to an admixture, which is often present only in exceedingly small quantity,* and has been, therefore, hitherto overlooked in analysis. One may venture to express the supposition that generally it is just to these small strongly-smelling admixtures that the colour reactions above described must be attributed, and that, therefore, in this respect they characterize the oils of different origin. Might not these colour reactions be utilized to obtain, in the course of time, a clearer insight into this, for practical purposes, most important portion of the science of essential oils?

RESEARCHES UPON BUCHU.†

BY PROF. E. S. WAYNE.

Buchu from the examinations of previous analysts has been shown to contain an ethereal oil in small quantity, and also that this oil contained a camphor which could be separated from it by exposure to cold. No other proximate principle peculiar to the drug has been proven to exist in it.

In handling large quantities of this drug in a manufacturing way, I have noticed some facts and peculiarities not mentioned by others, and find that the essential oil above mentioned, is not always so simple a body as stated.

Some time since, having occasion to distil off the remaining alcohol from a partially exhausted lot of buchu,

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* The oils of citron and orange, for instance, part with the larger portion of the hydrocarbon almost odourless.

† Reprinted from the *American Journal of Pharmacy*, Jan. 1876.

I obtained in the last runnings of the still a quantity of oil of buchu, in all about twelve ounces, and, upon examining it in various ways, I found that upon treatment with strong liquor sodæ, nearly one-half of the oil dissolved to a clear solution. This solution was separated from the oil unacted upon, and then neutralized by hydrochloric acid, which caused the separation of a white solid crystalline mass; this was thrown into a beaker glass, and washed with water, then dissolved in boiling water, and set aside for results. Upon examining the same some time afterwards, I found that the whole had assumed a highly crystalline state, was colourless, and resembled salicylic acid in form; and upon examining them further, found that they were in fact that acid, and gave all the reactions for that substance, and with ferric chloride gave the beautiful colour reaction, a deep purplish red. I was very much astonished at the result of my examination, and read a paper upon the same at a college meeting some six months ago, and should have published the same then, but wished to verify the above by further experiments, and since then have made several examinations, but not with the same results.

My next experiment was to distil with water 20 pounds of buchu (in all these experiments the short variety was used); the oil was collected and treated with soda, as in the former experiment. I found that the oil obtained from this lot did not dissolve, or lose the same volume that the former did, but that a part formed a clear solution, which, upon being separated and neutralized with hydrochloric acid, became milky turbid in appearance. This was set aside over night, and in the morning the same was found almost transparent, and filled with a mass of long needle-shaped crystals. These were separated by filtration, washed with cold water, and suffered to dry on the filter. They were tested in solution in water, with negative results, except with nit. silver and ferric chloride; that of the ferric chloride was very marked and decided; upon addition of this reagent to the colourless solution it caused an intense bluish black colour even in very dilute solutions, as decided as that of salicylic acid with this reagent, but of a different colour.

Failing in this experiment to obtain the same results as in the former, and thinking over the matter, I thought that probably the alcohol might have caused some change in the former. A quantity of fluid extract of buchu, about six pints, was therefore distilled with the addition of water. I obtained only a small quantity of oil, which, in every respect, gave the same reactions as with that obtained by distilling the buchu with water. With this experiment the investigation was left at rest, until this fall, when it was again taken up, and whilst engaged in it, Mr. W. M. Thompson, of W. H. Merrell and Co., brought me as a curiosity a few crystals of a substance that he said was obtained in attempting to distil off the alcohol from a lot of buchu magma. I immediately recognized them as being the same substance I found in the two last experiments; and learning from him that the whole was just about the same as the mast that I had originally distilled, and found salicylic acid in the oil, I made a request to Messrs. W. H. Merrell and Co., through him, that the same be placed at my disposal, to which they kindly consented. I received a barrel about three-fourths full of the magma, and distilled it with water. I obtained from it a portion or all of the alcohol, and by continuing the distillation and cohobating the watery distillate obtained six gallons of a milky distillate, but only slight traces of oil floating upon it. This distillate was set aside over night, and upon examining the same in the morning, found there had formed nearly two inches deep upon the bottom of the vessel holding the liquid, a mass of long needle-shaped crystals, some an inch and a half long; the supernatant liquid was syphoned off, and the crystals then collected on a filter. These were tested as the former, and with ferric chloride gave the same bluish-black colour. The water syphoned off, and the alcohol distilled from the magma gave the same result. I obtained no oil to test for salicylic acid, and could not detect it in any of the distillates. From this lot of buchu I have obtained nearly three ounces of this crystalline body, in long needle-shaped colourless crystals, having an odour indicative of their origin, yet different. What it is, I am not yet able to say, but shall examine it more fully and report at some future time.

Buchu, from what has been shown, evidently contains some substance that, by its chemical change, will yield salicylic acid, and probably it is the crystalline body I have found in the last three experiments. This is sparingly soluble in water at ordinary temperatures, but, freely at the boiling-point; the latter solution upon cooling, becomes turbid from separation of oil drops, which afterwards turn to crystals soluble in alcohol and ether, and the aqueous solution with ferric chloride forms an intense, I may say inky blue colour, so intense as to render the solution opaque even in a test tube half an inch in diameter.

Nitrate of silver also occasions a precipitate of a purplish colour, deeper than that of chloride of silver exposed to the action of light.

THE DECOMPOSITION OF WHITE PRECIPITATE BY IODINE, CHLORINE AND BROMINE.*

BY V. SCHWARZENBACH.

In pursuing his researches upon the decomposition of white precipitate, the author has found that the action of iodine alone upon it is simply to form mercuric iodide and corrosive sublimate, the amide molecule disappearing without any remarkable phenomenon. In fact, iodine may be triturated with white precipitate, or heated with it in a covered crucible, without any other result being observed, especially in the latter case, than the formation of beautiful red crystals of mercuric iodide. But, if alcohol be added to the mixture in an open vessel, after some time a smart explosion takes place, which inevitably destroys the vessel, if it be of glass, but only to the exact height reached by the surface of the liquid. This result follows alike whether a finely powdered and intimate mixture of both substances is used, or large caked portions of white precipitate and flakes of iodine.

Into a wide necked matrass, having a capacity of 160 c.c., were placed 2 grams of precipitate and 5·04 grams of iodine in large flakes (corresponding to five atoms of iodine and two molecules of precipitate), mixed by simply shaking; over this was poured 60 grams of 80 per cent. alcohol. After eight minutes a slow and irregular disengagement of single bubbles of gases commenced, which continued until an explosion took place at the end of thirty-five minutes. As in other cases where similar proportions, but more thoroughly mixed, had been used, the evolution of gas had been much more rapid, and gave rise to a bubbling appearance, a thermometer was suspended in the liquid, but up to the time of the explosion no rise was observed even of a single degree: the thermometer remained uninjured when the vessel was destroyed. In direct sunlight the explosion followed much more rapidly, frequently in nine or ten minutes. Occasionally if the disengagement of gas is so rapid as to cause a strong bubbling, the deposition of crystalline sublimate during the reaction can be recognized; among the other substances which are scattered by the explosion, red mercuric iodide is met with together with strongly detonating particles of iodide of nitrogen of considerable size. The gas evolved was identified as nitrogen.

Since iodine alone never gave rise to this explosive phenomenon, it appeared as if the alcohol must be looked upon as the determining cause. In order to ascertain whether it acted simply as a solvent, or whether further decomposition took place, it was substituted by other solvents, carbon bisulphide, propylic and amylic alcohols, chloroform and glycerine being used, but without any explosion taking place, even after twenty-four hours.

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* 'Berichte d. Deutschen Chemischen Gesselschaft,' vol. viii. p. 1231.

When, however, six atoms of iodine were used, corresponding to the saturating capacity of the whole of the constituents of the white precipitate, and chloroform or amylic alcohol was added as a solvent, strong detonations occurred in the liquid. Ethylic alcohol therefore appears to be the best menstruum for the iodine in this reaction.

Chlorine gas acts with great energy upon white precipitate. If some of the powder be dropped into an open flask filled with chlorine, it becomes strongly heated after a few minutes, and assumes an appearance of ebullition, followed either by an explosion, or as is more frequently the case by the appearance of a greenish flame. The residue from such an experiment gave no evolution of ammonia with caustic potash, was perfectly soluble in water and consisted entirely of mercuric chloride. In the case of explosion, therefore, the nitrogen is partly converted into chloride of nitrogen, the remainder, as shown by the puffing of the precipitate, being given off in the free state.

The action of bromine upon white precipitate was found to be very analogous to the foregoing.

The author has also extended his investigations to the behaviour of others of the amide group of metallic salts under similar conditions, and has published his results in the paper from which the foregoing abstract is taken.

DESCRIPTION OF A NEW BALANCE DESIGNED BY M. MENDELEEF.*

BY H. W. CHISHOLM, WARDEN OF THE STANDARDS.

In the *Bulletin de la Société d'encouragement pour l'Industrie Nationale,* Mai 1875, p. 241, an account is given of a new balance designed by M. Mendeleef, Professor at the University of St. Petersburg.

The peculiarity of M. Mendeleef's balance is that it *has very short arms.* It is considered that this arrangement will save much time in weighings, whilst at the same time it will give results of weighings quite as accurate as those given by balances of precision with arms of greater length which are now ordinarily used.

Although the long arms of balances now in use are not theoretically required they have been considered practically necessary as increasing the sensibility of the balance.

M. Mendeleef's balance was constructed by M. Salleron, of Paris. Its beam is stated to be only 12 centimetres ($4\frac{3}{4}$ inches) in total length, and from the drawing of it given in the *Bulletin* its height would appear not to exceed 20 centimetres ($7\frac{1}{8}$ inches). All the parts of the beam are of aluminium or alumium-bronze, so as to diminish its weight.

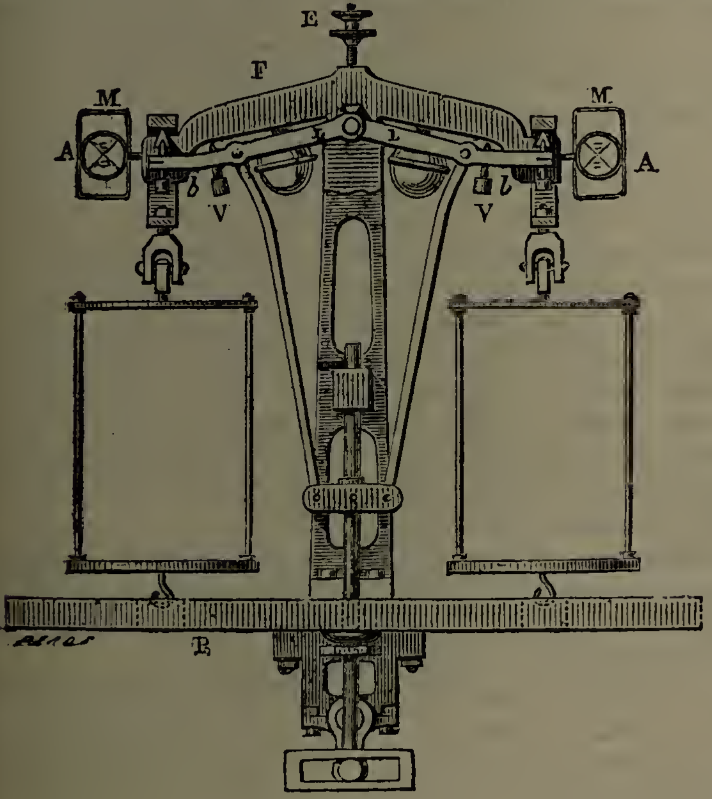

FIG. 1.

The pans of this balance are suspended in the ordinary way by steel knife-edges, bearing on rock crystal planes. Its centre of gravity is regulated by the usual screw placed above the axis of suspension of the beam.

The principal disadvantage of the beam of a balance being very short, is that its oscillations are necessarily of very small extent, and consequently small differences in weights compared are not so easily observed. To avoid this disadvantageous result, instead of following the movements of the beam by means of the ordinary index needle and divided arc, M. Mendeleef has fixed to each end of his beam a ring having stretched across it very fine cobweb threads. Behind the ring is placed a micrometer, M, divided into tenths of a millimetre. By means of a small telescope the slightest movements of the beam can thus be easily followed. With this arrangement it is found that when the balance has one kilogram in each pan, an additional weight of one milligram to either pan causes an inclination of 15 micrometer divisions, so that the error of a kilogram can be thus determined to $\frac{1}{15}$ milligram.

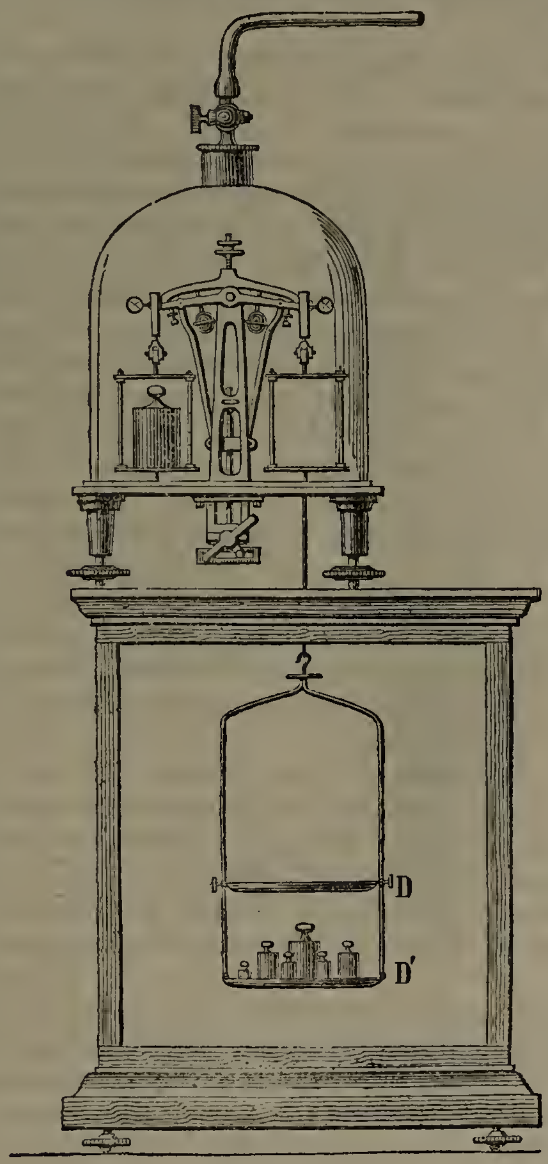

FIG. 2.

This arrangement of telescope and cross-threads is similar to that introduced in Barrow's balance by Professor W. H. Miller, as used by him for his weighings during the construction of the imperial standard pound, and now belonging to the Standards Department, the comparative shortness of the arms of this balance, about 38 centimetres (or 15 inches), having led Professor Miller to employ this method of noting the range of oscillations of the beam.

The principal objection to this method is that it requires the observer to stand in close proximity to one side of the balance, so that there is a tendency to the temperature of the beam becoming unequally affected by the greater heat of the observer's body.

By such an arrangement, the sensibility of the balance is not seriously diminished by this method of construction, as one division of its micrometer scale is equivalent to 0·07 milligram only, whereas one division of the very accurate kilogram balance is equal to 0·15 milligram, the length of the arms of this kilogram balance being nearly 51 centimetres, or 20 inches. This kilogram balance was made specially by Mr. Oertling for the comparison of weights of 1 kilogram, and may be considered one of the finest balances yet constructed.

M. Mendeleef's balance is mounted on a column of platinum. Its size is so small that it can be covered by an ordinary glass bell receiver, which thus allows the weighings to be made in a vacuum without the aid of special apparatus.

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* From the Ninth Report of the Warden of the Standards. We are indebted for the loan of the illustrations to the courtesy of MM. Salleron and Méhu.

This is undoubtedly of advantage in weighings in vacuo, where it is necessary to exhaust frequently.

The capacity of the bell receiver, required for such a balance, is so small (about 2000 c.c. or 120 cubic inches), that it admits of rapid and easy exhaustion. Thus no automatic arrangement for changing the weights, pans, etc., without opening the balance case appears to be required.

An arrangement for putting the beam in motion, or of arresting its oscillation, a little different from that generally adopted, is introduced into M. Mendeleef's balance. The ordinary construction of a supporting horizontal arm or cross-piece for releasing the arms of a balance, by lowering this cross-piece, is well known to chemists and physicists. M. Mendeleef finds that by this ordinary construction, there is a tendency to lateral displacement of the agate bearings upon the steel knife-edges, with an occasional slipping of the bearings. Such a serious fault not only damages the stability of the balance, but also quickly destroys its sensibility by the wear of the knife-edges, and to prevent this, M. Mendeleef substitutes for the horizontal arm two levers, L,L, jointed at an axis placed in the small column supporting the beam; near the extremity of each of these levers, are firmly fixed screws, the conical points of which enter corresponding conical holes in the beam. By this arrangement, all the points of the screws and the bottoms of conical holes continue in contact, without stopping, in all positions of the beam during its oscillations.

Reduced to the dimensions already stated (12 centimetres in length of beam), M. Mendeleef's balance could not be used in weighing bodies of large volume, as there is no room for them in the small bell cover. Its use therefore under these conditions is limited to the comparison and verification of weights of about 1 kilogram and under.

The balance may, however, be used for the purpose of weighing bulky articles, by employing an additional apparatus, and placing the balance on the top of an ordinary glass balance case. From underneath one of the pans of the balance is suspended, by a long wire, a double pan D D′ inside the glass case. Upon the lower pan D′, is placed a series of weights from 1 kilogram to the fraction of a milligram, the beam being counterbalanced by an equal weight placed in the pan, suspended inside the bell cover from the other arm. The body of large volume to be weighed is placed in the upper pan D, and weights are removed from the lower pan D′ until equilibrium is restored. The weights thus removed represent the required weight of the body weighed. This method of weighing by substitution is not new in principle, as is pointed out in the article before referred to. It is a known scientific method of double weighing, whereby the weighings are unaffected by any change in the relative lengths of the arms of the balance.

The notice of M. Mendeleef's design, will, it is hoped, have the effect of drawing attention to the expediency of reducing the length of the beams now generally used for balances of precision, as it appears that results of scientific weighings can be obtained by the use of a balance with a beam of only 12 centimetres in length, just as accurate as with one of 50 centimetres.

THE LABORATORY AT SOMERSET HOUSE.

The following extracts from the report of the Principal of this Laboratory, which appears in the Eighteenth Report of the Commissioners of Her Majesty's Revenue, supplies some details as to the work of this department during the past year:—

"As in previous years, a large number of samples has been received for examination in the Laboratory during the year ended the 31st March last, the average number analysed daily having been 46. Although the abolition of the sugar duties has caused a falling off in the number of samples of sugar examined from 1330 to 132, the increases from other Government departments have more than compensated for this reduction, the total number of samples examined during the year having been 14,243, being an increase of 50 samples over the last year.

"2813 Customs samples have been examined, as against 3024 in the previous year, being a decrease of 211 samples. This decrease is entirely due to the abolition of the sugar duties. After making the necessary deduction for the difference in the number of samples examined, it will be seen that of the other work done for the Customs department there has been an increase, which is represented by 119 additional samples.

"The chemical work for the Board of Trade has greatly increased, the number of samples of lime and lemon juice, and of spirits for fortifying the same, having reached 1339, being an increase over the previous year of 55·8 per cent.

"Last year there was a great scarcity of lemon juice sufficiently good in quality for ships' stores, and, during the present year, large quantities of foreign-squeezed lime and lemon juice have been presented for examination, but a considerable proportion had to be rejected, on account of its having been below the standard. The English squeezers of lemons are now so well aware that only good juice will be accepted that they seldom present inferior or diluted juice for examination; but foreign-squeezed juice is obviously prepared with little care, as it frequently contains common salts, and is sometimes diluted with water. During the past year only 12·6 per cent. of home-squeezed juice presented for examination had to be rejected, while 22·8 per cent. of foreign juice was declined.

"Although the quantity of juice rejected amounted to 23,325 gallons, no member of the trade has questioned the justness of a decision, and it is satisfactory to be able to record this fact, as showing that, while the centralization of the analysis of the juice has been attended with economy, it has led to the establishment of a uniform system, and to the removal of all cause of complaint on the part of the trade.

"The number of samples examined for the India Office was 720, being an increase of 266. The Indian authorities continue to exercise a careful scrutiny over the bulk of the goods sent in, so as to ensure that they are equal in quality to the samples on which the contracts are made. The increased competition in trade has rendered this general scrutiny essential, for it not unfrequently happens that a sample of a superior and unadulterated article is tendered, while the bulk afterwards supplied is either of inferior quality or largely sophisticated.

"Of the medicines used largely in tropical climates, which, on account of the difficulty of procuring them abroad, should be of the best description, and of the greatest purity, cinchona bark has been supplied of very inferior quality, being almost useless as a medicine, and, in one or two instances, the bark examined was not cinchona bark at all. Of the cinchona alkaloids supplied, some of the most expensive have been adulterated with those of little commercial or medicinal value, and, in several cases, one kind has been substituted for another, the substituted article being invariably of less value than the one it was made to represent.

"The class of articles most liable to sophistication appears to be paints. The favourite adulterants are chalk and sulphate of baryta, substances which seriously affect the durability and value of the paints.

"A sample of beeswax was largely adulterated with tallow, and, in a large wine contract, the bulk, when sent in, was not only not equal to the sample submitted for tender, but the contractor was clearly unable to supply a similar article.

"Nine samples, consisting of sealing wax and ink, have been examined for the Stationery Office. One sample of sealing wax which was taken from the supply contained an excess of 41 per cent of earthy matter over the contract sample, and the resins employed were of inferior quality.

"92 samples, consisting of beer and wine for hospital use and ships' stores, have been examined for the

Admiralty. A beer sample taken from the supply was found to be 30 per cent. lower in commercial value than the tendered sample.

"A case occurred during the year which may be interesting to notice as illustrative of the great advantage of chemical analysis in determining the commercial value of different commodities as compared with the opinion of ordinary experts. The Post Office authorities having called attention to the insufficient strength of the stamped newspaper wrappers which are supplied by the Board of Inland Revenue, the contractor was requested to submit a sample of paper of equal weight, but of greater strength than the old. The extra price of the new paper, when calculated on the year's supply, amounted to a considerable sum, and, as it appeared excessive, the paper was submitted to practised paper examiners, who pronounced it not worth the additional cost. At the suggestion of the Secretary, the subject was then referred to this department. The results of the analysis showed that the paper in use contained 15 per cent. of earthy matter, which added to its weight, but not to its strength. In the new paper this was replaced at 15 per cent. of fibre. A microscopical examination of the two papers further showed that the fibrous material of the new was longer and stronger than that of the old paper. The chemical and microscopical examination of the paper, therefore, proved that its superior quality justified the proposed increase in price.

"During the year, 28 cases were heard before the magistrates which were attended by chemical officers from this department. Convictions were obtained in 25 cases, and fines, amounting to £1337, were imposed. The three remaining cases were dismissed, either on some technical objection or other informality, but none failed through any defect in the scientific evidence.

"Two of the above prosecutions were of great importance from a Revenue point of view, the question to be decided being whether home-made wines or sweets could be detected when made the basis of compounded spirits. In Scotland, and other parts of the United Kingdom, where cordials are in general use, it has for many years been the custom with compounders and sweets' manufacturers to prepare a beverage by adding to ginger or other home-made wine, sugar, and duty paid spirit, and to denominate the mixture a British compound or sweets, according as it was sold to a spirit dealer or retailer, or to a person holding a sweets' license only. Three quantities of this preparation were at different times presented for exportation on drawback as compounded spirits, the exporter claiming drawback on all the spirit present in the shipment. As that portion of the spirit which was derived from the home-made wine had not been charged with duty, it was evident that the drawback asked for was excessive, and a fraud on the Revenue.

"In the two first instances, the drawback was refused and the traders cautioned, but in the third case proceedings were taken. It was at once seen by the exporter that, if the presence of home-made wine could be proved, and a judgment given in favour of the Crown, the use of such wine in compounded spirits would, for the future be prohibited. Every effort was, therefore, made by the defendant to prove that the presence of home-made wine could not be detected, and numerous scientific witnesses were produced to support this view. After a protracted trial, the magistrates gave a verdict for the Crown.

"About the same time, proceedings were taken against a compounder of spirits, who had sent a similar article to a spirit retailer, not having a license to deal in home-made wine. A vigorous defence was made, and the same kind of scientific evidence was given as in the previous case, but a conviction was obtained, and, although an appeal was lodged by each defendant, they were not proceeded with.

"During the year, 334 samples of tobacco have been examined, of which 282 were from the Excise and 52 from the Customs. One hundred and eighty of the Excise samples were genuine, and 102 adulterated. The adulterants in 96 samples were sugar, liquorice, sand, vegetable fibre, colouring matter, wood, straw, and lime-tree leaves. The remaining six samples were explosive cigars and cigarettes, and were adulterated with lime-tree leaves and gunpowder, the percentage of lime-tree leaves ranging from 8 to 75, and of gunpowder from 7 to 11 respectively. Of the Customs samples, 23 were obtained from the manufacturers of cavendish and negrohead, in bond for the estimation of moisture. Of the remaining 29, seventeen were genuine, and 12 adulterated with liquorice and sugar.

"The omission in the Act 5 and 6 Vict. c. 93, s. 1, of not defining alkaline salts nor fixing a limit on the quantity to be used in snuff has injured the Revenue, and also those snuff manufacturers who have never used excesive quantities of alkaline salts. The evil has become so general that many manufacturers have desired legislation on the subject, and, with a view to obtain data for settling the question, samples of snuff of different kinds have been obtained from the principal manufacturers in the kingdom. During the course of the investigation many plans for overcoming the difficulty suggested themselves, but nearly the whole of them proved impracticable on closer examination. Thus, it was hoped that, as only certain kinds of snuff required the addition of alkaline salts, their use might be exclusively confined to these particular descriptions. But, on endeavouring to classify the snuffs obtained from the manufacturers, it was found that the samples of each class did not in the least agree among themselves as to composition, and that the names given to the snuffs did not depend on their composition, but on what each manufacturer chose to call them. After very careful investigation and interviews with the trade, it was almost unanimously agreed that the only way of solving the difficulty was to fix a certain amount as the maximum of alkaline salts, including both natural and added, to be present in any sample of snuff, and the proportion which met with most favour as being fair to the Revenue and the trade was about 25 per cent. The trade also were of opinion that alkaline salts should be defined to mean the sulphates, carbonates, and chlorides of potassium and sodium.

"The question of the quantity of sand present in commercial snuff was also carefully gone into, and, as the samples examined contained less than five per cent., this percentage was considered fair to adopt as the maximum.

"As far as the trade, therefore, are concerned, the vexed question of what are alkaline salts, and what should be maximum quantities of salts and sand present in commercial snuff, are now practically settled.

"124 samples of snuff were examined, of which 122 were from the Excise and 2 from the Customs. Three of the Excise samples were adulterated with lime and tonquin beans.

"173 samples of coffee, or substitutes for coffee, have been examined, and of this number 164 were adulterated. The proportion of adulterated samples is greatly in excess of the previous years, on account of a large seizure of roasted acorns having been made at a manufactory in the East End of London; the samples taken contained about 10 per cent. of coffee, the remainder being roasted acorns. Roasted acorns were first placed before the public as "Pelotas coffee," but the manufacture being illegal, it was prohibited. They were next introduced to the public under the name of "Coffee Surrogate," but the manufacture of this has also been stopped, and it is hoped that the seizure and condemnation of the article will be sufficient to deter the firm from again embarking in the trade.

"59 samples of beer, and of substances used in the brewing of beer, have been examined. 31 were found to be genuine and 28 adulterated, the adulterants being common salt, liquorice, treacle, caramel, ginger, and, in one instance, tobacco.

"On account of the heavy duty now charged on sugar used by brewers, and the ease with which it can be dissolved, the temptation to use it without entering it on the brewing paper has greatly increased, and there is but little doubt that it is used in many cases without being charged with duty. One brewer has been detected using it, and fined. The subject, therefore, being of considerable importance to the Revenue, an extensive series of experiments has been made on worts and beer prepared with malt and sugar, for the purpose of devising a method of detecting the presence of sugar. These results have been communicated to the Board in a special report.

"As many statements have been made in public that cocculus indicus is generally used as a beer adulterant, it has been considered advisable that during the past year close attention should be given to the subject. Officers and supervisors of intelligence regularly survey the brewers in the United Kingdom, and not one of them has been able to detect cocculus indicus on a brewer's premises, nor have the samples of beer examined here for many years past contained it. The reports which have, from time to time, been published of cocculus indicus being used as a beer adulterant have not proved satisfactory when thoroughly investigated, but much stress has been laid on the fact that a large quantity of the drug is imported into this country, and that, therefore, it must be used in the way stated. To solve this difficulty, careful inquiries have been made as to what becomes of the cocculus indicus imported, and it has been found that almost the whole of it is again exported, chiefly to Germany, and what is retained for home consumption is, according to returns obtained from wholesale chemists and drug grinders of undoubted respectability, used either for poisoning fish, or, when powdered and mixed with fat, employed as an ointment for killing lice on cattle.

"420 samples of naphtha representing 81,568¾ gallons, have been examined. Of this number three samples, representing 240 gallons, have been rejected as being unfit for methylating purposes. The ground of objection lay in the fact that the naphtha was too pure, and, from inquiries made, it was discovered that the naphtha was of foreign manufacture, and, after having been used as a solvent in some chemical works, had been purified.

"190 samples of ordinary alcohol used in methylation have also been examined.

"473 miscellaneous samples have been examined, comprising acetic acid, "aperitive" liqueur, arrowroot, beer preservative, medicated beer, bitters, compounds, cherry brandy, cider, cordials, concentrated wort, copperas, essences, extract of malt, extract of meat, glucose, hop economizer, hop essence, hop supplement, linseed, liqueurs, madder, methylated rosemary, methylated spirit, naphtha, finish, whiskey, whiskey maturers, nigro-malteine, pain-killer, patent solvents, orange wine, quinine wine, raspberryade, red and white lead, sand, saccharometers, soda, spent lees, spirit, spirit of nitre, sugar, glucose, sumach, tinctures, wash, water, worts, unfermented wines, etc."

THE SHEFFIELD ANALYST'S REPORT.

LETTERS FROM MR. ALLEN.

The following letters from Mr. A. H. Allen, the Sheffield borough analyst, were read at a meeting of the Health Committee of the Sheffield town council, and ordered to be entered on the minutes:—

"No. 1, Surrey Street, Jan. 18.—Gentlemen,—Public attention having been called to my recent report as Borough Analyst to an extent quite unexpected, and erroneous inferences having been drawn from it in several instances, I think it desirable to give some further information on the points in question. Exception has been taken that my statement was not sufficiently explicit respecting the class of druggists chiefly visited by the inspectors. It seems not to be generally known that samples submitted to me are distinguished merely by special marks or numbers, and that I was, and still am, ignorant of the names of the dealers from whom the various articles were obtained, except in a few instances in which the dispenser stamped the prescription. An erroneous impression seems to exist as to the number of mixtures submitted to me for analysis. The total number was twenty. Of these, fourteen were found to have been correctly made up; on three (containing spirit of nitrous ether), I was unable to express a positive opinion: and three contained quantities of the active ingredients which varied considerably from the prescribed amounts. In one case I reported that 122 grains of iodide of potassium were present, against 120 grains prescribed. I consider in this case that the dispensing was performed with every desirable accuracy, a difference of a grain or two in a hundred being a perfectly insignificant variation, and I had no idea it would be otherwise regarded. Of the three instances in which considerable departure from the prescribed amount was observed, I have good reason to believe that neither the iodide of potassium nor quinine was adulterated, nor is either substance liable to any sensible decomposition when kept, as is usual, in the solid state. It is possible that the variations observed may have been due to the quantities having been guessed at, instead of being weighed; but in that case it is curious that all three errors should have been on the side of deficiency. An attempt has been made to show that the expense of iodide of potassium and sulphate of quinine is so insignificant as not to justify my description of them as 'rather expensive remedies.' The retail price of iodide of potassium is about 1*s.* 8*d.* or 2*s.* per ounce, so that the value of the amount in each prescription would be about 5*d.* or 6*d.*, apart from the other ingredients of the mixture. The retail price of sulphate of quinine is ½*d.* a grain, so that the 40 grains introduced would be worth about 1*s.* 8*d.* retail. It is evident that the omission of one-third or one-fourth of the prescribed quantity of quinine would enable the vendor to undersell considerably another dispenser who introduced the full amount. The results of my examination of the twelve samples of glycerine were on the whole by no means unsatisfactory. No gross adulteration was detected, though I think the "best glycerine" should be equal to the standard prescribed in the 'British Pharmacopœia.' Although I distinctly stated in my report that the eleven samples of pepper were a *remanet* from last quarter, it appears to have been supposed that they also were purchased from druggists instead of grocers, as was actually the case. It has been contended that prosecutions ought to have preceded the issue of my report. As the last batch of samples, including twelve prescriptions and twelve glycerines was only received from the inspectors on December 11th, it is evident it was not possible to lay my results before you, and for you to take proceedings between the reception of the samples and the beginning of the year, when the quarterly report (which the Act requires me to make) was due."

Writing again, under date March 2nd, Mr. Allen says: "Since the date of my letter of January 18th, I have for the first time learnt the names of the twenty druggists at whose shops the prescriptions mentioned in my last quarterly report were made up. On examination of the list, it appears that ten of the shops visited by the inspectors were situated on omnibus or coach routes, and that the inaccurately dispensed prescriptions were made up at three of these ten shops. I regret the decision of the committee not to prosecute any of the inaccurate dispensers, as the innocent druggists now lie under a certain suspicion from which due legal action would have cleared them. With reference to the question asked me at the last meeting of the Council which I attended, I desire once more to deny absolutely that there is any foundation for the suggestion that I was either directly or indirectly responsible for the wide and unexpected publicity attained by my last report."—*Sheffield and Rotherham Independent.*

The Pharmaceutical Journal.

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SATURDAY, MARCH 11, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ANALYSTS AND DISPENSERS.

ON a previous page will be found two letters which have been addressed by Mr. A. H. ALLEN, the Sheffield Borough Analyst, to the Health Committee of the Town Council, apparently with the object of clearing himself from responsibility for the publication of his report on dispensing which a few weeks ago produced an ephemeral sensation in some of the daily papers of the metropolis and has since been duly forgotten or exploded like many other of the flatulent productions tendered with the object of silencing the chronic complaint of "nothing in the papers."

Having on two previous occasions commented upon this affair, so far as it seemed to be desirable, while it was still fresh before the public, and while there was reason to fear the chemists and druggists of Sheffield might as a body be unjustly prejudiced no less by the action of the Borough Analyst than by the inaction of the Health Committee of the Town Council, we should have gladly abstained from any further reference to it. In deviating from that course at the present moment we do so with unfeigned regret and solely because we are urged to give publicity to the letters above referred to. Unless we misinterpret these letters they are directed chiefly to the endeavour to establish two points—first, that the Borough Analyst did not make any effort to secure the publication of the substance of his report by the general press, or take any special means to obtain that object; and secondly that the blame of casting a vague and indiscriminate imputation upon the chemists and druggists of Sheffield does not attach to himself, but to the Health Committee of the Town Council, in so far as that body abstained from taking action in the matter by prosecuting those individuals who were charged with having inaccurately dispensed prescriptions and thus made themselves liable to the infliction of a penalty under the Food, Drink and Drugs Act.

As regards the first point we do not hesitate to accept the declaration of the Borough Analyst that there is no foundation for the suggestion that he was either directly or indirectly responsible for the wide publicity attained by the report in which he dealt with the question as to the accuracy with which physicians' prescriptions are dispensed in Sheffield. We do so the more readily, because it seems that this disclaimer of responsibility for publication by the Borough Analyst is mainly urged in reference to our remarks deprecating the growing tendency to sensationalism and notoriety-seeking, which we spoke of at the time as being very undesirably characteristic of the procedure of certain public analysts in carrying out what they believe to be the exercise of their legitimate functions. Indeed, we would go much further than this, since we consider that the question whether the Borough Analyst was or was not responsible for obtaining or promoting the publication of his report is one of very little importance. In the abstract we cannot perceive any sufficient reason for attaching blame to a public analyst for endeavouring to give publicity to the result of his work, inasmuch as it may fairly be assumed that he would do so out of regard for the public good and without committing himself to anything inconsistent with the special nature of his office. But in granting this we must the more emphatically state that we do not in any degree withdraw or qualify the comments we have already made upon the Borough Analyst's report.

In commenting upon the alleged inaccuracies in dispensing at Sheffield, we exercised no reserve in condemning such a proceeding as being altogether base and inexcusable. The point to which we really took exception was the manifest unfairness with which the Sheffield chemists and druggists were treated by the indiscriminate nature of the charge made, and by the neglect of the Borough Analyst to give due consideration to his own results. The bare fact that out of twenty instances in which the dispensing of the Sheffield chemists and druggists was put to the test, there were only four which gave evidence of inaccuracy should, in our opinion, have been sufficient to induce caution on the part of the Borough Analyst in submitting his report on so important a subject. It is in this respect that we consider a censurable responsibility attaches to him. For though we are unwilling to argue from the absurd construction actually put upon the report by the newspapers, it requires but a slender experience of the superficial manner in which such matters are dealt with by ordinary newspaper writers, to enable one to anticipate from the general character and tenour of the report now in question, the probability of its being misused to the detriment of persons who were in reality quite blameless.

As regards the other point referred to in the letters of the Sheffield Borough Analyst, namely, the responsibility of leaving infringements of the law unprosecuted, we must of course absolve him from any direct blame. We must, likewise, share his regret that the Health Committee decided not to prosecute any of the inaccurate dispensers, so far as this course leaves those who are innocent to lie under a certain suspicion from which due legal action would have cleared them. But we cannot overlook the fact that this decision of the Health Committee also tends to operate unfavourably upon the position of the Borough Analyst, since it conveys the suggestion that even the three instances in which he came to the conclusion that there was a breach of the law the Health Committee did not consider there was adequate ground for prosecution.

Here, again, manifest evidence is furnished of the need for exercising caution in dealing with results such as were reported by the Borough Analyst, and of the propriety of such concerted action between that official and the Town Council as would protect innocent persons from unmerited imputations, while providing for the due carrying out of the law.

We cannot now enter into the question whether or not the twenty tests applied by the Sheffield Borough Analyst were applied to persons whose business was of such a nature that the results of these tests could be regarded as indicating the care and accuracy with which physicians' prescriptions are dispensed in Sheffield, for we are not in possession of facts which would enable us to form an opinion on this point. It has been distinctly stated that in the greater number of cases the prescriptions were made up by Chemists and Druggists who were not accustomed to dispense medicines. It is well known that this is the case with many—we might almost say the majority—of Chemists and Druggists, and probably Sheffield is no exception in this respect. On the other hand, the Borough Analyst asserts that ten out of the twenty shops put to the test by him were situated on omnibus or coach routes, and that the inaccurately dispensed medicines were made up at three of these shops. We fail, however, to perceive that this circumstance has much, if anything, to do with the question whether the shops selected were suited for indicating how dispensing is generally conducted in Sheffield, and when we consider the decision of the Health Committee not to prosecute, it becomes very doubtful whether they really were so. Therefore, the only conclusion we can come to from a survey of such evidence as we possess, is that there was no sufficient ground for the "considerable anxiety existing in the minds of some of the inhabitants" of Sheffield as to the care and accuracy with which physicians' prescriptions are dispensed in that town, and we trust that this satisfactory conclusion may not, either in Sheffield or elsewhere, be disturbed by any disregard on the part of Chemists and Druggists of the grave responsibility attaching to this part of their business.

While treating of this subject it will be appropriate to refer to a paper which we understand was read at a meeting of the Manchester Literary and Philosophical Society, on Tuesday evening last, detailing the results obtained by the analyses of some two or three hundred bottles of medicine dispensed in various parts of the kingdom; for judging from the conclusions put forward by the author it is possible that there may be a repetition of the same kind of sensational and alarming newspaper paragraphs which made their appearance after the publication of the Sheffield Borough Analyst's report.

As it was announced, perhaps somewhat prematurely, that this paper was to have been read at the last evening meeting of the Pharmaceutical Society, it is proper to state that when the nature of the paper became known, the trivial and insufficient nature of the grounds upon which conclusions were drawn was so manifest that it was decided not to accept the paper, inasmuch as its production would have amounted to nothing less than a wholesale and indiscriminate libel of that class of chemists and druggists who carry on the business of dispensing, unsupported by any adequate basis of fact and wholly at variance with the general opinion of the medical profession.

If we were to accept the results arrived at by the author of the paper now referred to, we should be constrained to admit that which we believe to be the direct opposite to the truth. Though we do not doubt that differences do exist with regard to the care and accuracy of dispensers, or that in some instances the practice of careful and conscientious weighing and measuring has not altogether superseded the old habit of guessing, no less familiar in the dispensary than in some establishments laying claim to the title of pharmacies, we do not for one moment believe that among the chemists and druggists who direct their attention to the dispensing of medicine as a special feature of their business, there is any reason to question their trustworthiness in executing this work, or for suspecting that the intentions of medical men are not scrupulously regarded in the preparation of medicines.

As evidence that this is the case we can with satisfaction refer to the frequent expression of opinion to that effect by medical men, and to their recognition of the services rendered by pharmacists in various matters connected with the preparation of medicines. The labour expended during the past thirty years upon the advancement of pharmacy in this country would indeed have been ill bestowed if there were any reason to fear that a pharmacist entrusted with the dispensing of a prescription would jeopardize his good repute by fraudulently withholding part of the drugs he charges for, either for the sake of a paltry gain of pence, or with the object of unfairly competing with his neighbours.

It would, moreover, be inconsistent with the most ordinary common sense, to suppose that a class of men who are strenuously endeavouring to secure to themselves more completely the work of dispensing medicines, should be so regardless of their own aims and interest as to execute such work in a manner that would infallibly expose them to the gravest reprehension, besides effectually defeating the object they have in view.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH, EDINBURGH.

The fifth scientific meeting of the session, was held in the Society's Rooms, on Thursday evening, February 24th. Mr. William Gilmour, President of the Branch, in the chair.

Dr. Stevenson Macadam read a very interesting paper on the "Properties of Malt," in which he lucidly and concisely described the process of malting, and also gave particulars of a number of experiments he had made on the subject. The lecturer illustrated his remarks by specimens in different stages of the process, and he was frequently applauded by a numerous and attentive audience.

On the motion of Mr. Blanshard, seconded by Mr. J. R. Young, a hearty vote of thanks was accorded to Dr. Macadam for his interesting paper, which will probably be printed in a future number.

The Honorary Secretary intimated donations to the Library, viz.:—'Notes on Changed Aloin and the Resin of Aloes,' 'Note on Jaborandi,' from Dr. Craig; the *Canadian Journal of Pharmacy*, from the Ontario College of Pharmacy, and the *Journal of the Chemical Society* from John Mackay.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

ON THE RELATIONS OF CHEMISTRY TO PHYSIOLOGY AND PATHOLOGY, WITH SPECIAL REFERENCE TO THE BRAIN.

BY CHARLES T. KINGZETT,

Fellow of the Chemical Societies of London and Berlin.

(*Concluded from page* 692.)

Now, let us again centre our attention on the brain as a whole, and bear in mind that nerve-matter is made up of heterogeneous principles "arranged in such a manner as to banish completely from appearance as chemical individuals;" and to lead you to the thought present in my mind, I will once more quote from Dr. Thudichum's publication ('Blue Book,' p. 197). Dr. Thudichum there writes, "The first striking fact which meets the inquirer, is that nerve-matter contains abundance of water. This, in conjunction with the peculiar manner in which the water is contained engenders a mobility of ultimate particles within certain limits of movement. It also gives penetrability by liquid diffusion while excluding porosity and its capillary effects, by which means a ready nutrition by diffusion in one direction and ready cleansing from the effete crystallizable products of life are ensured. Consequently the brain as a whole is essentially made up of colloid matter and may be compared to a colloid septum, on the one side of which is arterial blood and cerebro-spinal fluid of the ventricles, on the other side, however, is cerebro-spinal fluid of the arachnoidal space and venous blood. It follows, from this, that the large amount of water present in the brain is not there, so to say, mechanically only like water in a sponge, but is chemically combined as colloid hydration water or, better still, water of colloidation."

Now, again let us allow our scientific imagination to come into play. Dr. Thudichum has shown us that the healthy nutrition and functions of the brain depend upon its constitution, in which the character of the water present is most important, and I have pointed out to you that when brain matter after life is placed in alcohol it loses its water, its mobility of particles, and becomes more solid and firm. Is this sort of thing possible in life?

Is it possible that in cases of delirium tremens so much alcohol has been consumed as by its diffusion through the brain in the form of blood, it has robbed nerve-matter of its mobile character and consequently of its power to assimilate its food and of its power to throw off the products of its life functions? These are questions which future research may entirely negative, but they constitute the bases of thoughts that arise in spite almost of ourselves and again they constitute a reasonable hypothesis.

The next consideration I wish to bring before your minds has, at first blush, less probability than the one we have just considered. We have seen that the principles of which brain-matter is composed are *en masse* (with the exception of the albuminous framework) soluble in warm alcohol, although the individual principles are not all soluble under these conditions. Now I have asked myself this question—Can a man consume so much alcohol in the form of stimulants and retain enough in his blood in the unoxidized condition to dissolve traces of matter from his brain? However horrible the thought may be it is less horrible than the disease known as "delirium tremens." I have prepared a dilute solution of alcohol and in it I have placed pieces of brain-matter as derived from the ox at a temperature of the blood, viz., 100° F. At this temperature it has now been digesting some hours, and I will now filter it. You observe that on cooling the filtrate throws down a white deposit of matter which the alcohol has dissolved, a phenomenon which would seem to indicate some actual truth in Shakespeare's words:—"Oh that men should put an enemy in their mouths to steal away their brains!" As regards the experiments I have instituted having reference to the action of small amounts of alcohol and large amounts of water on the brain-matter I will only tell you that they are in progress; I would not like to publish any conclusions that may be in process of formation in my mind until the experimental evidence is much more complete. When that time comes I will publish the evidence *in extenso.*

In leaving the subject of the brain for the moment I here wish to acknowledge my indebtedness to Dr. Thudichum, through whose kindness I am enabled to place before you these rare specimens of chemical principles derived from various physiological organs.

I will yet submit a few instances which are calculated to exhibit, in regard to other vital functions, the relations of chemistry to physiology and pathology. In doing this I will choose the most familiar ones, namely, the functions of the blood and its aëration, and the chemical processes of digestion.

The obvious function of the blood, is to supply nourishment to, and carry away the products of, life from all parts of the body. Its constitution is extremely complex, and may vary according to the nature of the food eaten, and other causes within certain limits; but whatever its constitution there are invariably present in healthy blood these small formations known as blood corpuscles. The composition of these corpuscles depends upon the exercise of their own powers in relation to the surrounding serum of the blood, and is complicated. The most striking constituent is a body which has received the name of hematocrystalline, a body which gives to the corpuscles their red colour. This body always contains four-tenths per cent. of iron, and its analysis leads to a formula for it of $C_{600}H_{960}N_{154}FeS_{3}O_{177}$, with an atomic weight (the greatest ever assigned to a principle) of 13,280. This formula may not be absolutely correct, but that the atomic weight is extremely high there can be no doubt, on account of the complicated function the principle fulfils in the body, and its probable constitution. That constitution can only be learnt by chemolysis, that is by splitting it up by suitable means into the proximate constituents, and these again into their more ultimate derivatives. Omitting other substances present in corpuscles let us centre our attention upon this hematocrystalline, which is literally crystalline and of the rhombohedric system (see Thudichum's 'Physiological Chemistry,' p. 27). A solution of this body in water when diluted sufficiently and examined spectroscopically shows two bands of absorption, and "as the blood of all vertebrates when received within the living blood-vessels shows the same bands, we can assume that hematocrystalline is present in it as such, and not formed by the process of preparing the crystals" (Thudichum). Now Stokes, many years ago, showed that these two bands were characteristic of arterial blood, for venous blood exhibits only one band, and that these properties are attached to hematocrystalline is proved by depriving it of its oxygen, when its spectrum furnishes the one absorption band of venous blood; but by shaking it again with oxygen the double band spectrum is restored. With these data before let us endeavour to follow these properties of hematocrystalline contained in blood corpuscles into its life functions, as displayed in the process of respiration. That these corpuscles are the carriers of oxygen there can be no doubt. For the oxygen is not held in the blood like as carbonic acid exists in seltzer water, that is by solution, but it exists there in combination. In combination with what? We have seen what affinity hematocrystalline has for oxygen, and it is reasonable to suppose that these bodies combine in a loose way, and in this form of combination the oxygen is carried by the blood circulation to the most distant and every part of the human body, where it is given up to the tissues, and they in their turn. return carbonic acid, water, urea, and other substances, which are the products of the metamorphosis of the tissues to the blood. Now this carbonic acid of which we have just spoken is in part dissolved in the blood, in a similar manner to that in which it exists in soda-water, but not entirely so; for to a great extent "it is combined with alkaline bases, particularly sodium" (Thudichum). Now Thudichum supposes that when the venous blood reaches the small breathing-cells the hematocrystalline is oxidized partially into an acid, which he calls hematic acid, which, passing into the serum when the corpuscles arrive in the breathing-cells, decomposes the carbonates in the blood, setting free the carbonic acid, which, with the water vapour, escapes through the lung tissue into the respiratory passages. We shall return to this subject when we come to speak of certain inductive processes of reasoning which J. Stuart Mill developed. In the meantime let us pass on to consider certain changes which occur in the stomach during digestion, a process which is mainly carried on through the agency of hydrochloric and lactic acids, which would seem to be formed by the decomposition of chloride and lactate of sodium in the glands of the stomach into free acids and caustic soda. But, inasmuch as we never meet with caustic soda in the animal economy, at first blush the above explanation would seem to be untrue; but it is easy to comprehend under the ingenious theory of Dr. Thudichum (see his 'Chemical Physiology,' p. 16; and British and Foreign Med. Chir. Review,' Oct. 1861, p. 429; see also enquiry by Pavy in 'Phil. Trans.,' 1863) who supposes that before the soda enters the blood, and is carried away thereby, it has a function to perform, namely, "to protect the stomach against the corrosive action of its own secretion." Under certain abnormal conditions this corrosive action obtains, and gives rise to gastric ulcer, and other pathological processes. In the blood the caustic soda soon becomes carbonate, and the presence of sodium in the bile may be proved, by adding to it, say hydrochloric acid, when at the end of the experiment sodic chloride will be found, whereas it was not present before, but the sodium had been in combination with the biliary acids, taurocholic and glykocholic ($C_6H_{45}NO_{72}S$; and $C_{26}H_{43}NO_6$).

Bearing on the processes we have just been considering allow me to read to you a few words written by Mill, in 1856 (System of Logic, 4th ed., 1856), and which resulted from a consideration of Graham's researches which demonstrate "that gases have a strong tendency to permeate animal membranes, and diffuse themselves through the spaces which such membranes inclose, notwithstanding the presence of other gases in those spaces." Mill then says (p. 523, vol. i.), "The exchange of oxygen and carbonic acid in the lungs is not prevented but rather promoted by the intervention of the membranes of the lungs and the coats of the blood-vessels between the blood and the air. It is necessary, however, that there should be a substance in the blood with which the oxygen of the air may immediately combine; otherwise instead of passing into the blood it would permeate the whole organism; and it is necessary that the carbonic acid as it is formed in the capillaries, should also find a substance in the blood with which it can combine, otherwise it would leave the body at all points, instead of being discharged through the lungs."

Now, although respiration is to be considered as an act of secretion, yet you have seen with me how true were these predictions of Mill. The oxygen of the air combines with the hematocrystalline of the blood and the carbonic acid evolved in the system, combines with the soda (in some measure) present also in the blood. Liebig, however, disputed the presence of carbonates in the blood, on the evidence of some analyses he made of the ash of blood, but in all probability, the phosphorus which we now know to be present in the blood both in the form of phosphates and as phosphorus in organic combination, had determined the substitution and consequent expulsion of the carbonic acid in Liebig's experiments.

"The physiologist, J. B. Willbrand, represented disease, not badly, as the battle of the chemical process with the organic process of life. The chemical process is victorious in death" (Thudichum, Cantor Lectures, *Journal of the Society of Arts*, p. 127, vol. xxiv.), but it also makes sad ravages during life, and perhaps no disease illustrates in a better way the fact that in disease the chemical processes obtaining in health are deflected from their normal course than the disease designated "locomotor ataxia." In this disease the sense of pressure is either entirely or partially destroyed, and doubtless all of you have seen at times such cases in which the sufferers proceed step by step, and with that heavy tread which seems to indicate that they are not quite certain when their feet first touch the ground, and in truth this is so, although they are still susceptible to the senses of pain, heat, and cold. Well, in this disease, the spinal marrow undergoes what is termed "degeneration;" there is, that is to say, a chemical process at work in the substance of the marrow, which results in the production of a body not yet well studied, but which is quite abnormal, and consists of matter like to cellulose or starch corpuscles. What is the nature of this body, and how has it been produced? These are the questions that chemistry must solve, and they can only be solved when it is in our power to make a quantitative analysis of nerve matter. The day when this shall be possible is not so far removed as you may think, for as I have told you we are already far advanced on this particular road of research, and truths which now take the form of nebulous patches of ideas, will develop into the constellations of truth; in fact we stand mentally in the condition of one who having been blind, receives some degree of light, and "sees men like trees walking." When we can answer the questions I have asked, then comes in the possibility of guiding or correcting those processes constituting "amyloid degeneration," either in a preventive or curative way; but till then, never, except it should be hit upon by sheer accident.

I am glad to be able to quote to you the words of such high authority as Mr. John Simon (the medical officer of the Privy Council and Local Government Board) on the necessity of acquiring a knowledge of brain chemistry. In his report, from which I have already quoted (page 8), he writes, "Especially a leading fact in typhus, one which may be in intimate relation to the killing power of the disease, and which it is on all accounts necessary to have as completely as possible understood, is the fact of the action on the nervous system; and clearly no true chemical knowledge of that morbid action would be possible, till greatly improved knowledge of the normal brain chemistry should be supplied."

Thus I have sketched the chemistry of the brain, and some of the relations of that chemistry to physiology and pathology, and if in so doing I have caused you to travel over ground, the character of which has shocked your nerves, I feel that you will pardon me, for if your nerves have been shocked, remember kindly that all we have considered has had for its object the placing of those same nerves in a position in which they can be guided and corrected.

Mankind in general little reflects how much it owes to chemical science and to those chemists in particular who have devoted their lives for truth's sake. What familiar substances are chloroform and chloral, and how much gratitude ought to be experienced by us towards the eminent discover of these bodies—the late illustrious Liebig.

While nearly all of us have escaped from pain by the application of the one, or enjoyed sleep by the use of the other, of these substances, there are many who are ignorant alike of their discoverer and the processes by which they are obtained, caring still less to learn how these wonderful bodies excite their benign influences. These influences are doubtless the result of reactions on brain and nerve-matters, but what the reactions are, are questions from the solution of which, we are perhaps as far removed as from any ultimatum in science. But we shall know hereafter.

Meanwhile science is struggling hard to obtain an insight into these profound processes, and perhaps this is the right place to briefly notice those recent researches of Messrs. J. G. M'Kendrick and Dewar, on the physiological action of certain bases of the so-called chinoline and pyridine series. These observers administered these bases which are derived from quinine and allied bodies by distillation with potash, and which constitute two homologous series, by subcutaneous injection. Now M'Kendrick and Dewar found that the physiological action of these bases, which consist of carbon, hydrogen and nitrogen, in varying atomic proportions, is entirely upon the various parts of nerve and brain matter; but further they have encountered some striking facts which seem to show that the intensity and sort of action is related in each case to the chemical composition and constitution of these bases. Here, I shall only quote one conclusion they infer from their observations. (See Proc. Roy. Soc. vol. xxiii, p. 297). It is as follows: "On comparing the action of such bases as C_9H_7N (chinoline) with $C_9H_{13}N$ (parvoline), or $C_8H_{11}N$ (collidine) with $C_8H_{15}N$ (conia from hemlock), or $C_{10}H_{10}N_2$ (dipyridine) with $C_{10}H_{14}N_2$ (nicotine from tobacco), it is to be observed that, apart from difference in chemical structure, the physiological activity of the substance is greater in those bases, containing the larger amount of hydrogen." Here the conclusion drawn is only the fact observed, expressed in another way; but, of course, much more work is necessary, before this can constitute or prove to be a law. This work must endeavour to ascertain what becomes of the substances subcutaneously injected, and how they act on the centres of the brain organization. Let us consider that one grain of some of these bases per pound of weight (for a rabbit) is sufficient to cause death, and we can readily conceive the difficulty encountered in endeavouring to trace the substance itself through the system, although we know it must act by way of the blood. Beyond this, human efforts have not yet extended, and in these particular cases the effects have been witnessed, while the causes are almost entirely hid.

It is not necessary for me to dwell long on the importance of acquiring knowledge relative to the brain in particular, for seeing it is the "seat of powers, essential to the production of those phenomena which we term intelligence and will" (Huxley); seeing that from it spring those nerves through the functions of which we enjoy the uses of our senses; seeing, indeed, that the whole body of man is in a sort of subordination to his brain and nerves, is it necessary for us, who are the beings concerned, to ask what importance is to be attached to research, be it chemical, physiological, or otherwise, conducted upon these matters? We should rather take up the maxim of the old alchemists, of "those mistaken but often grandly energetic men, who said to the disciples of their art," as Mr. Rodwell has told us (in his 'Birth of Chemistry')—" Ora! Lege, Lege, Lege, Relege, Labora et Invenies."

Our slight knowledge of the constitution of bodies occurring in the human system, and of the processes by which they are built up from food and transformed into ultimate products after fulfilling the vital functions, only shows how much yet remains to be learnt. We soon perceive that we stand but on the threshold of knowledge, and many must be the thinkers and workers, and generations upon generations will pass away before the processes of life shall stand forth entirely revealed; before it shall be known how, from a few simple matters tolerably well known themselves, and administered as food, is built up man with his marvellous and beautiful structure, with his power of thought, feeling and action. That such a time will come scientific men have no doubt; we shall know more to-morrow of the sun that shines to-day!

Let us pause for one moment and consider the value of knowledge which must prove so powerful in preventing or curing those diseases which now so often fritter away men's lives in misery and suffering. All knowledge leads to happiness of mankind; the discovery of a new dye gives rise to a new industry, and places in the hands of man that which by pleasing his taste increases his happiness; and so, to quote from Bacon, all those "industrious observations, grounded conclusions and profitable inventions and discoveries" (see Macaulay's Essay) are securities for the health and comfort of man.

The processes of life are involved in such darkness at present as to make one very cautious in expressing or accepting statements made regarding them, but when there is scientific evidence, as there is in the cases we have considered, and when expressed views explain well what occurs, those views are entitled to respect. For although I have said there is darkness around the vital phenomena, that darkness exists only because science as yet has not attacked nature sufficiently in these directions.

But a continuation of work will dispel doubts, will abolish untruth and mystery often amounting to superstition, and will substitute a rational explanation of life and the chemical processes which sustain it.

There will always exist men who will doubt the possibilities of science, who will call in question matters which have been established as truth, just as men, even to Bacon, rejected the doctrines of Galileo, and as Leibnitz spurned the philosophy of Newton on gravitation. But in spite of all the sun of science will dispel the morning clouds of ignorance and prejudice and will unfold to us the laws of nature unbiassed by the poetry of man's mind and free from the superstitions of churches.

The lecture was illustrated with diagrams, physiological and chemical experiments, and very rare chemical preparations derived from the various organs, etc., of the human body were exhibited.

Dr. Nevins spoke in eulogistic terms of the lecture, and stated that some years ago he had occasion to make some investigation owing to the case of poisoning by arsenic and antimony, and whilst he could trace these poisons in other portions of the body, he failed to detect any traces in the brain. He would be glad if Mr. Kingzett could account for this.

Mr. Martin Murphy, F.C.S., suggested whether the various specimens referred to and exhibited as normal constituents of the brain, were not in some degree generated by the action of the reagents; for instance, copper might be introduced by the Bunsen burner. He contended that copper was an accumulative poison. Lead, copper, etc., were known to paralyse the body, whilst the brain showed no symptoms of ill effects. He thought perhaps the oxen which Mr. Kingzett had experimented upon must have been fed in the neighbourhood of Swansea, where so much copper existed as to almost impregnate everything. He was quite at a loss to understand how the majority of investigators had been unable to find the copper in the brain. He knew none, excepting Odling and Dupré, and the learned lecturer, who believed in its presence.

Dr. Nicholson stated that during his residence in India he had conducted several pathological inquiries, and he remembered on one occasion being much struck with the decreased quantity of phosphoric acid which was given off in the excreta from patients suffering from typhoid fever. He would like to know if Mr. Kingzett had any experience of this, or if patients labouring under disease did lose those elements necessary to sustain life, in this way.

Mr. E. Davies, F.C.S., called attention to some investigations he had lately been making respecting some cattle which had died, and he found small traces of copper in the stomach. This had been disputed by several eminent chemists, but when he explained his method of procedure the case was decided in his favour, and his opinion was that the cattle had died from poisoning by copper.

The President said the lecture they had had the pleasure of hearing was one which required much thought, before they could come to any definite discussion upon it. Could Mr. Kingzett account for the deficiency of brain power caused by excess of mental exertion. He understood phosphorus was being largely administered to supply this deficiency. Was it likely to be effective? Mr. Kingzett had told them that he had examined human brains and the brains of animals. As he did not state that there was any difference, but that these chemical products were obtained from each, how did he account for the superior intellect in man?

Mr. Kingzett having been called upon to reply said he would proceed to answer the questions in the order they were asked. Dr. Nevins had failed to detect antimony in the brains of animals which had died through the administration of antimony. This was somewhat surprising but might be explained, perhaps, by the method of procedure. The antimony would be in combination with the phosphorized principles, and in destroying these matters by ignition, etc., care would have to be taken to prevent the simultaneous loss of the antimony. Anyhow, Scolosuboff had not only detected the arsenic in brain-matter in his experiments, by the ordinary qualitative tests but had even estimated its amount. Mr. Murphy has suggested that the principles that had been isolated from brain-matter, and described as individuals, may be either mixtures or may be produced by the operations involved in their isolation. These views were absolutely untenable, seeing that no matter how the processes of extraction were varied, the same results were invariably obtained, and moreover, the materials employed in the extraction were matters incapable of acting chemically. Mr. Murphy had particularly singled out kephalin, the body which was one of the best studied. This was unfortunate for Mr. Murphy, seeing its decomposition products had been particularly examined. When split up by baryta, kephalin yielded neurine, glycerophosphoric acid, and at least two fatty acids, and these, when added together, give a total formula similar to that derived from a computation of the results furnished by the direct analysis of kephalin. He (Mr. Kingzett) would further state that kephalin had been isolated and purified in many and various ways and dozens of analyses had been made before its formula had been fixed, and he would once more remark that of the individuality of kephalin there was no more doubt than of that of each of themselves. Mr. Murphy had referred to the presence of copper in brain matter, and had suggested that the copper had got in by accident, as from the instruments employed. Scientific men who cared for their reputation were careful to avoid such sources of error, and in the researches on which he had lectured, platinum vessels had been employed, and so much material operated upon as readily to admit of the quantitative determination of the copper present. In fact copper was never absent, and it no doubt found its way into the system by the use of copper coins, and other things containing copper. He (Mr. Kingzett) had seen a statement made by Mr. Murphy to the effect that he had, with a view of confirming Dr. Thudichum's researches, sought for copper in a sheep's brain and failed to detect it. Well, if Mr. Murphy really wished to confirm a research which had extended over four years and employed more than 2000 ox brains, the least he could have done would be to have employed similar materials to those Thudichum had worked upon—not a sheep's brain. If he might be allowed to express his opinion, he should state his conviction that copper was present even in sheep's brains, and all that was required to detect it, was the use of a sufficient quantity, and a reliable process; and here his observations agreed with to what had been said by Mr. Davies. Particular knowledge was required to work on a particular subject. Thus in searching for copper in brain-matter, it was necessary not only to burn it until a charcoal was left, but that charcoal must be entirely burnt by the use of nitre, otherwise acids would not extract the copper present. Now Mr. Murphy had related some cases of lead poisoning, in which, according to him, the functions of certain organs were destroyed, while the brain and nerves remained unaffected. The explanation would have been wiser, had Mr. Murphy stated that through an action on the nerves, the organs he alluded to had lost their uses. Liebig had failed to detect carbonates in the blood, and Mr. Murphy had argued how impossible it was for a man like Liebig to fail in so simple (!) a matter. Mr. Murphy's statement constituted its own refutation, and had he paid attention to that part of his (Mr. Kingzett's) lecture, the statement would not have been made. Dr. Nicholson had observed that in cases of ague which had come under his notice, the amount of phosphorus excreted was less than that excreted in health. This was an interesting pathological observation and deserved attention. No doubt it had some definite connection with the brain and nerves, but what that relation was, could not yet be stated. Phosphorus not only exists largely in vegetable foods as phosphates, but elsewhere, as for example in eggs, it exists in organic combination, as lecithine, etc. He (Mr. Kingzett) had always employed the method stated by Dr. Nicholson, for the estimation of phosphorus, namely, evaporation of a paste of the substance with pure caustic soda and nitre plus some sodic carbonate, to dryness, and fusion of the residue in which the phosphorus was afterwards determined by the ordinary processes. Whether nerves contained more phosphorus than brain matter, and what was the relative amount of phosphorus in the brain to other constituents, were questions for the future. It was first necessary to study the constitution of brain-matter, before its quantitative analysis could be made. The President had asked a question which he (Mr. Kingzett) should be only too glad to answer if he could. It would be an important thing to accomplish if it could be shown that loss of phosphorus ensued from hard intellectual labour. No doubt all the principles of the brain shared in mental labour, and, moreover, it must always be borne in mind that the brain was like a steam engine, that is, a machine for doing work, but if it were attempted to get more work from it than were possible, it would surely break down.

Dr. Nevins moved a vote of thanks to Mr. Kingzett for his very able lecture, Mr. Martin Murphy, F.C.S., seconded the motion, which was supported by the President, and carried with acclamation.

WOLVERHAMPTON CHEMISTS' ASSOCIATION.

A well-attended meeting of the above Society was held in the Agricultural Hall Committee Room on Thursday evening, February 17th, Mr. W. Y. Brevitt presiding. The Chairman read letters of apology for their absence from the President and the Rev. J. M. Davenport. The latter gentleman enclosed a donation of half a guinea in his note as one of the prizes to be competed for at the end of the session by their students. The Association had also received from Mr. A. Vacher a copy of Fresenius's 'Qualitative Analysis,' and a number of Scotch and Irish prescriptions from Mr. Stephen Sibthorpe, as additions to the library. Mr. W. Coleman said that it would afford him much pleasure to offer a prize of a guinea to the student who collected during the summer months the best herbarium. Mr. Brevitt said, in conjunction with his brother secretary, he would be also glad to present another guinea, to be called "The Honorary Secretaries' Prize."

The audited balance-sheet of the Association was then presented by the treasurer, and was received and adopted. It showed a balance of £23 to the good.

A letter was next read from the vice-president, Mr. Councillor R. H. Lowe, praying that he might (on account of increasing duties) be allowed to retire. After some discussion, Mr. R. H. Kearns, of Bilston, was unanimously elected to fill the vacant office.

The Chairman then briefly introduced the lecturer of the evening, Mr. J. E. Morris, F.C.S., who would address them "On Starch, and the Polyglucosic Alcohols."

The lecturer divided his subject into four divisions—1st. The chemical composition and its various reactions. 2nd. The botanical aspect, treating on its occurrence, use, and formation in nature. 3rd. Microscopical investigation. 4th. Its commercial value and manufacture. Under the first division, the molecular, empirical, and graphic formulæ were described, and the reason starch should be considered as the oxygen ether, or anhydride, of the polyglucosic alcohol, glucose, or grape sugar. In reference to the latter, Mr. Morris described its artificial manufacture from starch, and the method nature adopted to obtain the same result by the action of diastase, which he exemplified by reference to the preparation of malt from barley, in which, as in the former case, the starch is first converted into dextrine and then into grape sugar. After this the characteristic reactions starch undergoes with various chemicals were described and experimentally shown. The second division consisted of a treatise on the occurrence of starch in nature, a description of the cells in which it is found, and on the use plants make of it in the after-growing, how at different periods of the year the percentage of starch varies, and the bearing of agricultural chemistry, the value of which is to supply azotized manures to increase the gluten in ratio to the starch. The third division was devoted to microscopical investigation, and the various starches exhibited under polarized light were extremely interesting. The fourth division commenced by describing the use of starch in the arts—in the manufacture of glucose and British gum, and a reference was made to the fact of its being used as an adulterant of quinine, cocoa, etc. Then followed an exhaustive account of the various starch producers—the sagos, potatoes, and arrowroots. The lecture closed with a graphic account of a visit Mr. Morris had paid to one of the largest starch industries in Great Britain, Messrs. Orlando Jones, of Battersea, where many tons of starch are annually prepared from the *Oryza sativa*, the common rice. The lecture throughout was fully illustrated by diagrams, experiments, and microscopy, in the exhibition of which Mr. Morris was ably assisted by Dr. McMunn.

At its close the Chairman said he had listened with great pleasure to the interesting lecture just delivered. He thought the members (and especially the younger ones) ought to be exceedingly grateful to Mr. Morris for the pains he had taken and the trouble he must have been put to in preparing such elaborate experiments and diagrams as those they had just witnessed. The chemistry of starch was a most important pharmaceutical study, and they would doubtless be asked many questions upon the subject brought forward that evening at their examinations. He was exceedingly pleased at seeing so many of their scientific and medical friends, and in the name of the Association he had much pleasure in cordially welcoming Dr. McMunn and Mr. W. Shoolbred. He concluded by proposing a very hearty vote of thanks to Mr. Morris. Mr. E. W. T. Jones, F.C.S., briefly seconded the vote of thanks, which having been acknowledged,

Mr. W. B. Cooley was briefly introduced by the Chairman, who stated that he was glad to find one of their younger members had opened the list of what he trusted would be a valuable series of pharmaceutical notes. Mr. Cooley then read a short note on "Vaseline and Cosmoline," which he said resulted from a discussion that had taken place a few nights previously at the Pharmaceutical Society, and he thought it might prove of considerable interest to some of the pharmaceutists of the town, because these two substances were likely to become of great pharmaceutical value. Mr. Cooley concluded by exhibiting some very elegant pharmaceutical preparations he had made from these substances, describing the mode of manufacture he had adopted, and pointing out certain advantages to be gained by its substitution for the ordinary medium employed.

Mr. F. J. Barrett, F.C.S., proposed a hearty vote of thanks to Mr. Cooley for his paper, but in doing so took exception to one or two points. He thought that some stronger arguments should be brought forward than the similarity of their melting points to show that vaseline and cosmoline were merely modifications of each other, and that probably they were but diluted paraffin wax. The preparations exhibited were undoubtedly extremely elegant; but he questioned whether they possessed all the advantages they were said to possess. For instance, the pomade shown was really very nice, and the name "vaseline" a rather pretty one, but he thought that ladies knowing its source would scarcely feel inclined to use it, and he could not see why it was to be preferred to the ordinary pomade compounds—especially as its price was very great, and consequently the preparations themselves could not be sold at a cheap rate. The suppositories were elegant in appearance, and if they melted at the proper temperature (which he doubted) might come into use. Some of them were coloured—this for several reasons would be objectionable. The other preparations were all good and very well made. But until more was known of these two substances he scarcely thought that they ought to be unreservedly recommended. But this did not prevent him from saying that Mr. Cooley was certainly to be commended for bringing forward his subject in such a painstaking manner. He hoped that other associates would work up some useful branch of their business, and follow the example set by the reader of the paper.

Mr. E. W. T. Jones, F.C.S. (Borough Analyst), in seconding the vote of thanks, warmly defended Mr. Cooley's remarks at some length, and disputed several of the points raised by Mr. Barrett in the discussion. He was much pleased to have listened to the very able paper which had just been read.

Mr. Cooley having answered the objections raised, the vote of thanks was very cordially passed.

The remainder of the evening was spent in the examination of the microscopes and other specimens with which the table was literally covered, Mr. E. J. Morris and other gentlemen giving the necessary explanations. The next meeting was announced to take place on the 16th proximo, when a lecture will be delivered by Mr. T. H. Davies on "Disinfectants," illustrated by experiments.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The third meeting of the session was held at the rooms of the Association, Britannia Chambers, Pelham Street, on Friday, February 25th, the President, Mr. J. H. Atherton in the chair. After the minutes of the last meeting had been read and confirmed, the Hon. Secretary (Mr. R. Jackson) announced some donations, and proposed the election of two new members and three associates.

The President next exhibited and explained a new patent printing machine, called the papyrograph, and showed by actual working, the ease and expedition by which any person could print any number of circulars or price lists.

Mr. C. A. Bolton then read a paper upon "The Position of the Pharmacist." After a few preliminary remarks, he went on to show that in the histories of scientific societies banded together for the avowed purpose of research, they have always been met by anger on the one hand and ridicule upon the other—anger from those who were disappointed because their airy castles had not become realities, and ridicule by others who hate innovation or attempts at progress of whatever kind; taking for example the early years of the Royal Society. From this he went on to point out how that a few years ago the bright hopes and imaginations of some gilded the picture of what the Pharmacy Act was to accomplish, and that already there are great numbers asking in ironical tones, what is the benefit pharmacists derive from it now they have had an opportunity of proving it. It might be asked, however, quite as readily, how can it be expected in such a short time to receive ripe fruit from labours of so many years? Was it not quite as foolish as the child who one morning taking an acorn and setting it in the ground, goes the next morning to potter among the soil to see whether it has not already begun to grow. It was not a whit less foolish, then, to expect the position of pharmacists to have advanced to perfection in an educational or commercial point of view in seven short years. And he thought pharmacists ought not to be disappointed, knowing that the trade will advance more rapidly in the future than it has done in the past. The speaker then pointed out the great pleasure and profit to be derived from the consideration of a manufacture or trade rising gradually from its first mean position by the successive labours of innumerable minds; he illustrated this by means of a number of examples in the history of past ages, showing that the great pioneers of the past have always been men ever alive to the commonest incidents passing under their notice, and who were never daunted by whatever obstacles might stare them in the face. If the history of the past were considered, it would be found that it was by the diligent labours of such men that the trade of a chemist and druggist has been developed into its present position. Beginning with the alchemists, the speaker pointed out several who were one in a desire to lay a foundation whereon to raise a solid superstructure of alchemy and chemistry. Passing on to the sixteenth century, he detailed the first union of chemistry with the medical profession, and the great benefit that it derived by thus associating itself with the most philosophical of the three learned professions. Pharmacy proper, viz., the preparing and compounding of medicines, was traceable back to the very earliest medical records, Hippocrates for example. The medicines he used were explained, and his efforts to free the science of medicine from the useless subtleties thrown around it by the philosophical sect of his period were glanced at. It was also shown that we are indebted to the Arabians for the first complicated processes of pharmacy. The answer to the question, what the alchemist and his early workers had to do in connection with the modern chemist and pharmacist, lay in this,—that they had handed down to the present day very much valuable information which has tended to promote the calling to its present position. To the apprentices and students then present were pointed the immense advantages they now possessed and the improved commercial position they would be able to occupy, and they were therefore urged to use their golden opportunities wisely and well. The position of pharmacists in this country was then compared with that of pharmacists of Germany and France, both in an educational and commercial point of view. The laws which regulated them and us were referred to, and especially the law in England as affecting the sale of poisons; the speaker also alluded to the need there is for having included all poisonous patent medicines. In conclusion he asked his hearers to throw their thoughts back to April 15th, 1841, to the meeting of that little company of men, with William Allen for its chairman. It met for the first time at the Crown and Anchor in the Strand, to sketch out a scheme of an association. The resulting Society's efforts and successes were touched upon, and its noble desire to further the interest of the pharmacist. Mr. Bolton appealed to his hearers to follow such an example and show their gratitude to the great pioneers of pharmacy, by each supporting and strengthening such associations as their own.

At the conclusion a discussion on the salient points was opened by the President (Mr. Atherton), and carried on by Mr. Fitz Hugh, Mr. Jackson and other gentlemen, and a hearty vote of thanks was awarded to Mr. Bolton for his interesting paper.

An animated discussion, in which all the members present took part, on the following subjects, "Recent Interference with Counter Prescribing" "Prosecution under Patent Medicine Act," "Dispensers of Medicine and Public Analysts," brought the meeting to a close.

LEEDS CHEMISTS' ASSOCIATION.

The ninth general meeting of this Association for the present session was held in the Library, on Wednesday evening, February 28th, the President, Mr. Yewdall in the chair, when a paper was read by Mr. E. O. Brown on "Solution; or Water as a Solvent of Solids, Liquids, and Gases," of which the following is an abstract.

Solution may be regarded as the complete intermingling of the molecules of the substance, dissolved with those of the solvent.

Solids may be mixed with, suspended, or dissolved in water, and water may enter into molecular combination with solids as water of crystallization, and into atomic combination as water of hydration.

We may have three classes of solution:—

1st, Solids in liquids.
2nd, One liquid in another.
3rd, Gases in liquids: termed absorption.

The solvent always brings the substance dissolved to the same physical state as itself.

When a solid is brought to the liquid condition, heat becomes latent, hence cold is produced by the solution of solids. This heat is given off, or becomes sensible, when substances dissolved crystallize from their solutions.

One substance in solution affects the solubility of another in the same fluid, sometimes giving rise to an increase in solubility, as in the case of iodine in solution of iodide of potassium, and hydrate of calcium in solution of sugar; sometimes to diminish the solubility, as in the purification of common pearlash, which is treated with a small quantity of water, when a saturated solution of carbonate of potash is formed, in which the impurities as silicate, sulphate, and chloride of potassium are almost insoluble. The presence of certain gases in solution has a similar effect, as is the case in many hard waters where carbonates of lime and magnesia are dissolved by means of carbonic acid, also in chalybeate waters, where ferrous carbonate is dissolved by the same agent. This property is utilized in the preparation of fluid magnesia.

The Solution of Liquids in Liquids.—When one solid is added to another nothing more than a mixture can be obtained, no matter how finely the substances may be divided. When one liquid is added to another solution may or may not take place, but when two gases are placed in contact diffusion always takes place; thus liquids take a medium position in this as in other respects. When two liquids, dissolved the one is the other, are added to a third in which one of them in more soluble than the other, we have the least soluble separating; this principle is applied when ether is washed with water to free it from alcohol, and also in the estimation of nitrous ether in spirit of nitre.

Solution of Gases in Liquids.—The capacity of gases for heat is greater than that of liquids, thus when gases are absorbed by liquids heat is given off.

The degrees of solubility of gases in water were then given, and the influence of temperature and pressure explained.

The lecture was illustrated by diagrams and experiments, and at its close a vote of thanks to Mr. Brown was passed unanimously.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The fifth scientific meeting of the session of the society was held in Anderson's University, on the evening of Wednesday, 23rd February. Mr. William Greig, President, in the chair. There was a good attendance.

The Chairman briefly introduced John Ferguson, Esq., M.A., Professor of Chemistry, University of Glasgow, who delivered a most interesting lecture on "Glauber: His Life and Labours." Professor Ferguson was frequently applauded in the course of his lecture, which was listened to with marked attention, and at the close a hearty vote of thanks was passed to the lecturer. We hope to be able to print this lecture in an early number.

After the consideration of some matters of local interest the meeting adjourned.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, March 2, 1876, Professor Abel, F.R.S., President, in the chair.

This meeting was entirely occupied with the discussion of the various points in connection with water analysis raised by Dr. Frankland's lecture delivered at the previous meeting. The debate, which lasted until a late hour, turned chiefly on the respective merits of Messrs. Frankland and Armstrong's "Combustion Method," and of the "Albumenoid Ammonia Process" of Messrs. Wanklyn, Chapman and Smith for determining the amount of impurity in potable waters. The meeting was finally adjourned until Thursday, March 16, for which the following papers are announced:—1. "Experiments with Crystallized Glycerine," by Dr. van Roos. 2. "Notes on the Fatty Acids and on a Suggested Application of Photography," by Mr. W. H. Hatcher. 3. "On Stibine," by Mr. F. Jones. 4. "On the Use of Platinum in the Ultimate Analysis of Carbon Compounds," by Mr. F. Kopfer. 5. "Preliminary Notice on the Action of Sulphuric Acid on Naphthalene," by Dr. J. Stenhouse and Mr. C. E. Groves. 6. "On the Action of Organic Acids and their Anhydrides on the Natural Alkaloids," Part V., by Mr. G. H. Beckett and Dr. C. R. A. Wright.

Parliamentary and Law Proceedings.

Bill to Prevent the Administration of Poisonous Drugs to Horses and other Animals.

On Monday the Bill bearing the above title, which has been introduced by Sir J. D. Astley, was read a second time in the House of Commons and set down for Committee on Wednesday. The text of the Bill is as follows:—

"Whereas it is expedient to make provision against the practice of administering poisonous drugs to horses and other animals by disqualified persons, and without the knowlege and consent of the owners of such horses and animals:

"Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

"1. If any person wilfully and unlawfully administers to or causes to be administered to or taken by any horse, cattle, or domestic animal any poisonous or injurious drug or substance he shall (unless some reasonable cause or excuse is shown on his behalf) be liable, on summary conviction, to a penalty not exceeding £5, or, at the discretion of the court, to imprisonment, with or without hard labour for any term not exceeding one month in the case of a first offence, or three months in the case of a second or any subsequent offence.

"2. Nothing in this Act shall extend to any duly qualified or certified medical or surgical practitioner or veterinary surgeon, or to any person being owner or acting by authority of the owner of the horse, cattle, or other animal to which any drug or substance is administered.

"3. Nothing in this Act shall exempt a person from liability to any greater or other punishment under any other Act or law, so that he be not more than once punished for the same offence.

"4. Any offence against this Act may be prosecuted in the manner provided by the Summary Jurisdiction Acts before two justices of the peace.

"5. This Act shall not extend to Scotland or to Ireland.

"6. This Act may be cited as the 'Drugging of Animals Act, 1876.'"

Public Analysts.

In the House of Commons, on Friday, the 3rd inst., Mr. Sclater-Booth, in answer to Mr. W. Williams, said that, so far as he knew, there were 34 analysts appointed in the counties, and 42 in boroughs; but he had no means of knowing in how many cases arrangements had been made by which analysts could be supplied from adjoining districts as provided by the Act. He was not aware that no practical result had followed from the Act owing to the absence of any provision for the payment of a salary to the analyst; no doubt practical results had not followed in all cases, but that was principally from the impossibility of employing the police previous to the Food and Drugs Act of last session; but he hoped that this evil would be remedied. He should be glad if the case was made out, to put in force the powers for the compulsory appointment of analysts, but he had no information to induce him to think that the time had arrived for the exercise of such powers.

Overdose of Opium.

On Saturday last an inquiry was held before Dr. Hardwicke, relative to the death of the infant daughter of the Rev. Mr. Canney, curate of St. Luke's. The child, who was only seven weeks old, had been suffering from bronchitis; and her father instructed the nurse to go to a chemist in Lisson Grove for a simple mixture. She went in error to the shop of a Mr. Eves, and returned with a draught which had the effect of making the infant drowsy, and the next day it died.

Dr. Stuart pronounced bronchitis, accelerated by an overdose of opium, to have been the cause of its death.

The jury returned a verdict in accordance with this evidence, and they considered that more care should have been taken in preparing the mixture.—*Standard.*

Poisoning by Chloral Hydrate.

An inquest was held on the 3rd inst., in Cork, touch-the death of Mr. Charles Jones. Deceased had been last seen alive on the previous Wednesday evening and had been found dead in his bed on Thursday morning.

In the course of the evidence Mr. Timothy Scannell, apothecary, Grand Parade, deposed that he had known the deceased for some years. Deceased had consulted him twice about some trivial ailments, for which he only prescribed external applications. On Thursday morning he was called to see him, and found him dead, as described by a previous witness. Should imagine he was then eight or ten hours dead. All the appearances were those of a person who had died from poison. Found the empty bottle and two glasses on the table. From the label it appeared to have contained a patent medicine called "Hunter's solution of chloral." The bottle when full would contain about 16 teaspoonfuls, and if a person drank the whole of that quantity it would produce a sleep from which he would never awake. Half the contents of the bottle would be equally effectual. The bottle had a graduated scale on it, marking the number of doses. Witness noticed a smell of the drug about the deceased. Deceased might have taken an overdose by mistake.

After some discussion a verdict was returned that "death was caused by reason of having taken an over draught of Hunter's solution of chloral."—*Cork Examiner.*

BOOKS, PAMPHLETS, ETC., RECEIVED.

On Fermentation. By P. Schutzenberger. London: H. S. King and Co. 1876. From the Publishers.

Principes de la Classification des Substances Organiques. Par A. E. Bourgoin. Paris: J. B. Baillière et Fils. 1876. From Dr. C. Méhu.

Notes and Queries.

[498]. VOICE SYRUP.—Can any one give me a good recipe for Voice Syrup.—L. T.

[499]. LIQUID DENTIFRICE.—"Alpha" asks for a good form for a Liquid Dentifrice that will lather well when used.

[496]. BOW'S LINIMENT.—The formula used by many chemists in Edinburgh twenty years ago for Bow's Liniment was :—

Tinct. Saponis c. Opio	℥j
Aqua Ammoniæ	℥ss

N. J. Lewis, M.P.S., etc.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

"Duly Qualified."

Sir,—On reading the report of the inquest on the occasion of the melancholy poisoning by aconite, in your Journal of February 19, p. 677, I was struck by the inapplicability of your foot note appended thereto. In your last issue you again revert to the subject, and your remarks convince me that you are under some misconception in the matter. You have confounded the "assistant" who prescribed, with the "dispenser" who prepared the mixture which caused the mischief. If you refer to the report you will at once see that the two are separate individuals. As a personal friend of the medical man, and intimately acquainted with the facts of the case, I may tell you that qualified assistants are engaged in his establishment for attending and prescribing for patients, and that it is neither the duty nor the practice of the dispenser to do either. Your remarks convey a very unjust charge against the gentleman in whose surgery this lamentable mistake occurred, and I trust you will not delay removing the injury you have thus inflicted. When a man employs a legally qualified dispenser of mature experience, it is difficult to see what more he can do to ensure the safety of his patients.

Archbell J. Nutt.

47, *Piccadilly, March* 7, 1876.

[*** We willingly give insertion to the foregoing in explanation of the case reported at page 677, and we regret having been misled by the obscurity of the report in the *Daily News*, which was our only source of information.—Ed. Pharm. Journ.]

Tablespoonfuls, etc.

Sir,—I am glad to observe that Mr. Proctor has, in the letter which he lately wrote to you on the subject of "Spoonfuls," struck a note which is well and widely responded to. It is very evident that there is a strong and general feeling that something should be done, and I trust that the feeling may not subside until some effort has been made to amend the present most dangerous,—and I will say scandalous, state of things,—for what can be more absurdly inconsistent than the minute exactness of modern pharmacy in respect of the preparation, strength, etc., of the various items of a prescription, and the slatternly vagueness of the directions as to the quantity to be taken for a dose. As matters stand, it is a pure chance whether the quantity the doctor prescribes as the dose is actually taken, or twice the quantity, or half the quantity. If the medicine is a strong one, and a full dose is prescribed, say in tablespoonfuls, with the idea attached of the tablespoonful being half an ounce, or say half an ounce is prescribed, and the dispenser takes the generally unwarrantable liberty of translating it into tablespoonfuls, in either case the patient is in imminent danger of getting an overdose amounting to the double of what was intended by the writer of the prescription, and it is scarcely going too far to suppose that even fatal results may sometimes follow such increase.

The same holds true of teaspoonfuls. Only the other day my son had a prescription compounded in London by a most respectable pharmaceutical firm. The medicine contained ext. belladonnæ ¼ grain in each drachm, and 1 drachm was written in the prescription as the quantity to be taken every night. But on the label of the bottle containing the medicine the "one drachm" was metamorphosed into "one teaspoonful," and the teaspoon in which I saw the medicine about to be measured held quite two drachms. It is certain that but for my interference, the quantity taken, and that in perfect conformity with the directions, would have been the double of that intended, and plainly written by the physician; a difference of dose, one must suppose, in the case of a child, not unimportant in its results. No doubt the dispenser could cite precedent upon precedent for his, to my thinking, very wrong change of phrase in writing the "drachm" of the prescription as a "teaspoonful" on the label.

The fact is indisputable that there is disgraceful confusion and looseness in this most important matter of doses, and the question—What is to be done?—urgently presses. First of all I think the Council of the Pharmaceutical Society should consider the subject, and after it has considered, I think it should confer, and endeavour to arrive at some arrangement, with the Medical Council.

The root of the matter is of course, the physician. It is a first condition of success in mending matters that there should be an agreement amongst physicians on this subject, and after that, an understanding with the pharmaceutical body with respect to the phrases most desirable to be used in the writing of prescriptions and directions, to indicate quantity of dose. When unanimity between the medical and pharmaceutical bodies has been obtained, and is officially published, then the dispenser's course is clear with regard to the patient, and the whole onus of accuracy or error in the measurement of the dose will rest with him.

For myself I incline to the belief that a full examination of the subject will lead to the conclusion that it is better to abandon altogether, in the writing of prescriptions, the use of the spoon and wineglass as measures, and to substitute for them, or rather to make uniform and general, the expression—to a limited extent adopted already—of the quantity to be taken in minims for very small doses, and in ounces or parts of an ounce for larger doses, not drachms at all; instead of one teaspoonful as ordinarily (mis)understood, ⅛ oz would be written, instead of one tablespoonful as ordinarily (mis)understood, ½ oz would be written. Were this practice adopted the dispenser would render the measures quite literally in the direction, and help to the comprehension of the quantity intended by various contrivances, each after his own method; one, not of the worst, would be that suggested by one of your correspondents of sending with the medicine a measure, of the proper size to contain one dose, and of such simple and inexpensive kind that it might be wrapped up with the bottle of medicine as a regular thing, and that without enhancing the cost appreciably.

I have discussed this point with my friend, Mr. Proctor, and I think we agree that a white earthenware cup with the capacity, ⅛ oz. or ½ oz. as the case may be, printed in black on the bottom of the measure, inside, and with a thin black line, where the cylinder meets the bevil of the brim, to indicate the point to which the measure is to filled would go far to meet this difficulty. Such measures, stamped out of stiff clay, as gallipots now commonly are, could be made perfectly uniform in size, and at an extremely small cost, probably the cost would be less than a penny each. A simple direction might, perhaps, with advantage, be printed on the outside, as to filling to the line. This would be one means, and probably a very effective means, of ensuring accuracy in the measurement of the dose. There could be no great harm in some cases, where, from the nature of the case and of the medicine it is evident that some considerable latitude is permissible, in attaching an explanatory label to the bottle, saying that ⅛ oz. is about as much as a small teaspoon will hold, and ½ oz. about as much as a small tablespoon holds.

In the meanwhile, and until something more effectual is done, through the Medical Council, I think it will at least be well in writing directions, not to change the phraseology of the prescription, where, as in the case I have cited, it is not necessary to change it, and then in the more general case, where the teaspoon or tablespoon is named as the measure of the dose, I think, a label such as this I annex, may, with advantage, be stuck upon the bottle.

"CAUTION.

"The dose here ordered is intended to be measured in a small-sized old-fashioned spoon, or properly graduated medicine glass. This is important to be observed, as most modern spoons hold double the proper quantity."

JOSEPH W. SWAN.

Newcastle-on-Tyne.
Feb. 23, 1876.

Sir,—Mr. Proctor is entitled to our warmest thanks for attempting to reduce to order the indefinite and confusing instructions which are written upon prescriptions and which are such fertile causes of anxiety to every one engaged in dispensing.

I have carefully read the letters which have appeared in response to Mr. Proctor's, and I cannot but think that there is a good deal of groping in the dark, and under xisting circumstances I fear it is likely to continue.

The difficulty does not originate with dispensers but with prescribers, and with the latter the reformation must commence. Until prescribers become unanimous and express heir instructions in a definite and practicable manner it is putting the cart before the horse to discuss the subject in your Journal. It should first be discussed in the medical ournals by medical men themselves, and when they can agree upon the best form of expressing their instructions I have do doubt that dispensers will readily adapt them to he requirements of the medicine-taking public.

To medical men the present system is definite enough, and when they write coch. mag. or ℥ss, in ninety-nine cases out of a hundred it is intended to be translated "a tablepoonful" and not "half-an-ounce." I consider it the duty of the dispenser to write the directions accordingly, although in the interest of his customer and of his own reputation he will give further instructions if the nature of the medicine requires them; it is of no use directing medicine to be taken by the half-ounce as the public have no practical acquaintance with weights and measures.

The adoption of Mr. Proctor's suggestion to direct small and large tablespoonfuls would be entering upon a wide ield of uncertainty and confusion in which it would be difficult for dispensers to be unanimous, and still more difficult for the public correctly to understand the directions. To those who use a spoon such directions might appear clear enough, but if they had but one sized tablespoon they might not know whether the dispenser would consider it a large or a small one and might easily take a wrong quantity.

Many families regularly use a medicine glass which is not always graduated to ounces as well as spoonfuls, and such a direction upon a bottle might induce them to take only two and a half or three drachms instead of a measured tablespoonful.

Mr. A. W. Smith's suggestion clears the way of all difficulties, but for my own part I would not adopt it; I don't believe in keeping a shop and giving my goods away, it is a wrong principle upon which to conduct business, and if an article is of sufficient importance to be bought it ought to realize a price at the least as much as it cost. No one has greater respect for Maw, Son and Thompson than myself, but I don't believe in putting money into the pockets of those estimable gentlemen that I may indulge in an unnecessary and unsolicited liberality.

There is also a difficulty about the dispenser suggesting the desirability of purchasing a shilling medicine glass; some would readily fall in with the suggestion, but others would look upon it as savouring rather of the sharp counterman and would stand aloof from purchasing.

Until prescribers become unanimous and give their instructions so that the dispenser can translate them to the public in definite and practicable language, dispensers will remain in uncertainty and confusion, and must continue to use their own individual judgment.

As the reformation must commence with medical men I would suggest that they should order for adults six and eight ounce mixtures only in doses of fourth, sixth, or eighth parts. The best manufactured bottles are divided with sufficient accuracy for most medicines, and there is such a clearly defined space between the bars that there is no difficulty in pouring out uniform doses; if the above instructions are deviated from, and in the case of children where teaspoonfuls are ordered, I would suggest that they should be ordered by "medicine glass," and I have no doubt that our enterprising friends would supply us with suitable glasses at a price within the means of every one capable of paying for a bottle of medicine; such instructions are desirable for the safety of the patient and would relieve the dispenser from having to "suggest," the purchase of a medicine glass.

I would suggest that drop doses should be discarded entirely as being unsafe, uncertain, and unmanageable in inexperienced hands.

The graduation of bottles is being carried to a foolish extreme, and exhibits the ingenuity of the workman more than it conduces to the convenience of the public.

I strongly disapprove of 1½ oz., 2 oz., 6 oz., and 8 oz. bottles being divided into twelve and sixteen parts; owing to the inequalities in the bottles the divisions vary in capacity, and what with the small space between the bars and capillary attraction, it is very difficult to pour out a correct dose; when to these divisions are added on the same bottle divisions of six or eight parts they are very perplexing to those who have to use them. I may say that I have had considerable experience with this class of bottles and I have never been able to get the medicine taken according to the divisions.

If medical men would adopt the above simple system it could not be said to incur extra detail upon themselves, and would prevent confusion to the patient by receiving from the prescriber instructions at variance with those from the dispenser as in the case quoted by Mr. Proctor; it would also conduce to the safety of their patients, and would relieve dispensers from much doubt and anxiety.

Whatever instructions may be adopted, difficulties will still arise with the very poor and the very ignorant, but they may be safely entrusted to the judgment and common sense of the dispenser.

JAS. SWENDEN.

Darlington.

Sir,—I am glad to see that the question of what is meant by the signs "representing doses" in physicians' prescriptions is being discussed, and I hope some satisfactory result may be arrived at, as I am aware of the great difference of opinion, on this subject, existing in different parts of the country, a variety of such having come under my own observation.

I have not, however, time now to go into the question, but beg leave to place before your readers an idea arising out of it on which I should be glad to have their opinion. I would suggest that a "slip label" be placed on each bottle of medicine sent out (on the reverse side to the usual direction label if you like), cautioning the public against using as measures, spoons, etc., of indefinite size and scating where properly accurate measures may be obtained in order to ensure the correct dose being administered. By this means the patient would receive the necessary caution and it would do away in some degree with the necessity for explanatory notes on the direction label, which I hold should be worded in as plain and concise a manner as possible. Another reason for some such provision appears to me to be the fact that the "chemist" is already sufficiently hampered with restrictions on every side, and I am quite of opinion that we ought to endeavour (of course using due care) as far as possible to mitigate the difficulties now affecting the modern pharmacist or chemist and druggist.

I need hardly remind you, sir, how shortly after the passing of the Pharmacy Act a point of some difficulty was cleverly overcome by, I think, the Messrs. Silverlock, who issued a slip label which met the case and became of great service generally. I allude to the label known as the "conformity label."

E. R. Learoyd.

Sheffield, March 2, 1876.

Sir,—Mr. Greenish's spoonful by measure is very good, at the same time very vague, as most patients would simply make use of household spoons instead of guessing. The most orthodox term appears to me to be medicinal spoonful, and the one I always make use of, as it can only convey to the patient's mind one kind of measure.

Tom C. Beach.

134, *Westgate Street, Gloucester,*
Feb. 29, 1876.

Sir,—As the fault hitherto of the propositions of the numerous correspondents on the above question seems to be lack of simplicity and practicability, allow me to suggest an easy method of overcoming the difficulty—viz., the use of a white glazed earthenware duplex measure, similar to the well known seidlitz powder measure, the smaller end of which should hold a teaspoonful, the larger a tablespoonful, with the words teaspoonful and tablespoonful on the outside.

Such an article could easily be made to retail at 2*d*. The dessertspoon is unnecessary, for when it is ordered the label could be written two teaspoonfuls.

E. H.

Chichester, Feb. 28, 1876.

The Sale of Patent Medicines.

Sir,—The patent medicine question is surrounded with many difficulties, but there is one phase of the matter about which, I think, there cannot be two opinions. If I am compelled to label every sale of tinct. opii, morphia, etc., "poison," so ought every compounder of a patent medicine containing such "poisons" to be compelled to label his "syrup, cordial, or cough mixture" in the same manner, and the same restriction as to sale ought to be imposed upon the retail dealers, as I submit, too. Whether any, and what further legislation may be required with respect to so-called patent medicines, I am not prepared to say; still, I do think it is one of those questions which you wisely invite the trade to express their opinions upon.

James Slipper.

London, March 8, 1876.

Elegant *v.* Correct Dispensing.

Sir,—I did not intend to be so rude to the London firm as one or two of your correspondents would make me appear. They cannot instruct me beyond what I know as to the integrity and ability which distinguishes many London houses. With all the care they may exercise, they are dependent in some degree upon their dispensers; and it was to them my letter was more particualrly addressed.

You see, "everyone is wise after the event;" so Mr. Greenish can, probably after some experiments, now make a clear mixture from the prescription I quoted in my last. But in the face of all that he and the other correspondents have written, I maintain that any careful dispenser, knowing what is known of the miscibility of sp. chloroformi with tincture and water, would have dispensed it as I did. Further, I am of opinion that any of your correspondents would have similarly dispensed it.

It is in mere ignorance of country chemists' circumstances to argue, as Mr. Greenish and the rest have done, that in a case of this kind it depends upon the chemist's qualifications alone to satisfy his customer that he is right. The prejudice in favour of old London firms exists, and is easily accounted for; and, as I said, we are at a great disadvantage in a comparison with them.

I have again had to dispense the prescription for my customer, and can confirm Mr. Willmot's observations. If the caning hurt him no more than it did me, it is well. I cannot but feel indebted to him for taking his share of it.

To guide any future correspondents, and save your space, let them understand that I have been qualified to fill, and did fill, the best situations that London and the country could offer, that my stock is purchased regardless of prices, and my preparations and chemicals are of P. B. proof. I write this because all the insinuations and advice respecting these particulars are as useful and applicable to me as to Mr. Greenish, for example. But all this only serves to show the true Londoner's ideal of a country chemist.

Your Londoner, as soon as settled on the banks of the Thames, begins to inspire the fiction that I thought had been "banished to the limbo of forgotten vanities," of his own superiority to your mere country chemist. The latter is to him as "Mr. Greenish," your "Weymouth Correspondent," and "Ph. Chemist," have him. He is ignorant, incompetent, his drugs are bad, he is innocent of distilled water, makes his tinctures with any strength of spirit; prescriptions are infrequent with him, he is unskilful in manipulation. Such seem "suckled in a creed outworn" to

A Country M. P. S.

"*Student.*"—We cannot undertake to recommend works on the practice of medicine.

"*Registered Student.*"—Roscoe's 'Lessons in Elementary Chemistry,' published by Macmillan, or Attfield's 'Chemistry,' published by Van Voorst.

"*Ferrum.*"—Mr. Wood's paper on Syrup of Hypophosphite of Iron is too long to reproduce here; but perhaps the formula is all that you require. It is—

Granulated Sulphate of Iron . . .	480 grains.
Hypophosphite of Lime	326 "
Dilute Phosphoric Acid	1 fl. oz.
Water	1½ oz.
Syrup	q. s.

Dissolve, without heat, the sulphate of iron in the phosphoric acid previously mixed with the water. Rub the hypophosphite to a fine powder and pour on it the solution of the sulphate of iron. Triturate together for two or three minutes, then pour the mixture on a piece of damped calico, and squeeze out the liquid, as far as possible, with the hands. Filter the solution so obtained into a measure-glass, and add to it seven times its volume of strong syrup. The resulting syrup contains two grains of hypophosphite of iron in each fluid drachm.

W. H. Smith.—We think the label sent would render the article subject to stamp duty; but the only persons who can decide the question are the Inland Revenue Authorities.

M. P. S.—The prescription is an incompatible one, which it is not possible to dispense satisfactorily.

D. Evans.—We know of no more active remedy than those mentioned which would be safe to apply.

"*W. J.*"—The first is correct, "aquam" being the direct object of the verb.

Mr. Felix Stevens and *W. J. B.* are thanked for their communications.

"*Student.*"—(1) We are not acquainted with any such published formula. (2) Several papers upon Salicylic Acid have recently appeared in this Journal. See vol. v. pp. 421, 865, and 990; the present volume, pp. 322 and 343.

Communications, Letters, etc., have been received from Dr. W. F. Koppeschaar, Dr. De Vrij, Mr. Napier, Mr Fisher, Mr. Wilson, Mr. Thresh, Mr. Willson, Mr. Tocher, Mr. Pocklington, Mr. Willmott, Mr. Stiles, Alpha, Over-Legislated for-Druggist, Jupiter Pluvius.

THE STAINING OF WOOD SECTIONS.

BY M. H. STILES.

At the last evening meeting some stained sections of the stem of *Chondodendron tomentosum*, were exhibited in illustration of Mr. Moss's paper on its structure and development.

Considerable interest was shown in these by several gentlemen present, and inquiries were made respecting the process by which they had been prepared. The details of this process I have embodied in a paper published in the *Monthly Microscopical Journal* for March. The following abstract may be useful to pharmacists engaged in the study of vegetable histology.

Sections of wood usually require bleaching before staining. A weak solution of chloride of lime—¼ oz. to a pint—forms an excellent bleaching liquid; after removal from this the sections are soaked in a solution of hyposulphite of sodium—ʒj to ℥iv—for an hour, and then washed with water for several hours, changing frequently; previous to being stained they must be placed in rectified spirit for a short time.

Aniline red and aniline blue are the colours employed. The red staining fluid consists of a spirituous solution of magenta (rosaniline acetate), ½ grain to the ounce; the blue dye is prepared by dissolving ½ grain of pure soluble blue in one drachm of distilled water, then adding ten minims of dilute nitric acid and sufficient spirit to measure two ounces. The time required to stain different tissues varies; from 20 to 40 minutes' immersion in the dye is usually sufficient, but in all cases the sections should be frequently examined to avoid over-staining. After removing the dye, wash the sections several times with spirit, drain them, and then soak them in oil of cajuput; in an hour pour off the oil, drain, and add turpentine, changing the latter before mounting.

Wood sections presenting varieties of tissue can be stained in two colours by first treating with magenta, washing with spirit, then soaking in the blue dye for a few minutes, again washing with spirit and afterwards with oil of cajuput and turpentine as previously directed.

In a transverse section of a stem double-stained in his manner, the vessels, wood cells, and liber tissue will be more or less red; the pith, medullary rays, and cellular tissue of the bark blue or violet.

The use of oil of cajuput for this purpose is believed o be entirely new.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 664.)

The polariscope appearances of a few other starches are shown in Figs. 23 and 24, as viewed by a in. objective between crossed Nicols, and it will be seen that they are sufficiently characteristic to enable us to use the micro-polariscope with advantage in the examination of substances suspected to contain an admixture with starches. At the same time care hould be taken when examining certain substances, such, for instance, as butter, lest we mistake other doubly refractive substances for starch. We should, n fact, in all cases where there is the slightest chance for errors of interpretation to creep in, fall back upon the scientific man's golden rule, never to trust one method of examination alone when a second or a third is available. Minute fragments of animal fibres, membranes, nerve ganglions, fat or jelly globules in compression, have all been mistaken for starch granules by young amateur micro-polariscopists.

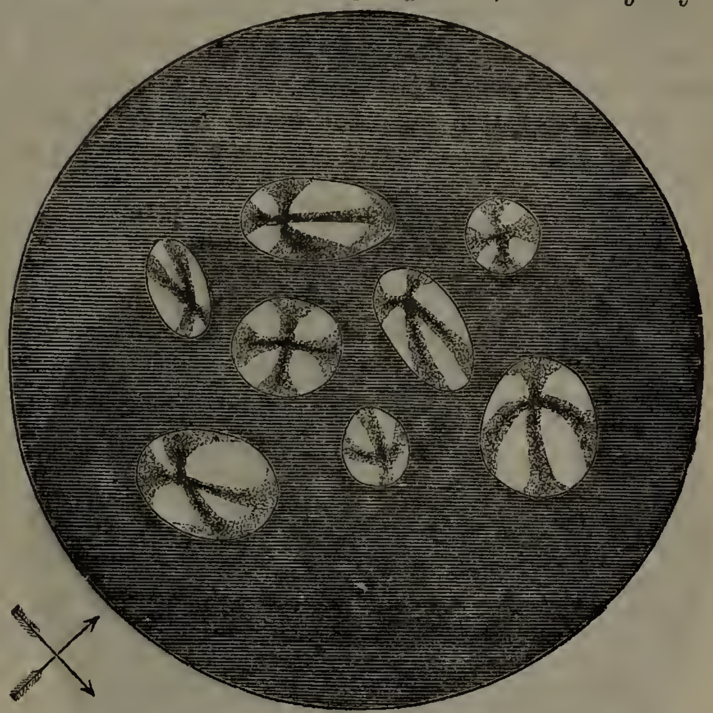

Fig. 23.—Starch of Natal Arrowroot.

An interesting line of investigation was pointed out by me (but has been left where I left it) in the paper already referred to, and lies in the direction of determining as far as possible the relative bi-refractive powers of different starches. A rough estimation of this is not difficult, but the full prosecution of the inquiry requires delicate apparatus and the expenditure of considerable time, both of which have been beyond my reach since the date of my former paper, and I only refer to the subject here in the hope that some one will take it up and carry it to completion.

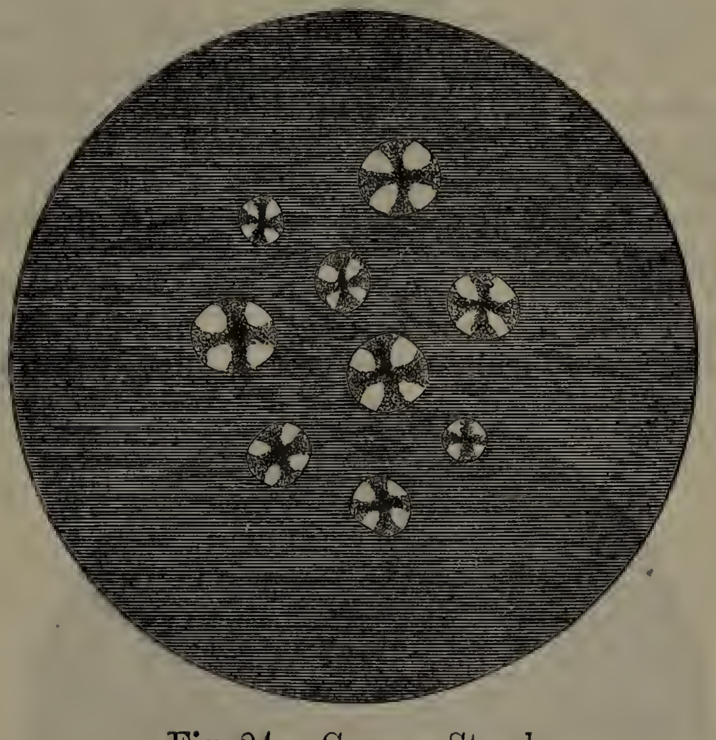

Fig. 24.—Cassava Starch.

The use of the polariscope in the examination of fats, bees'-wax, and the like, has been referred to at more or less length in these pages already by myself and others, and it will suffice for the purpose of these papers to indicate briefly the course to be taken in using the apparatus in such examinations. The first point is to take care to melt the fat at as low a temperature as possible, and to allow a very thin layer to slowly solidify under the thin cover on the slip.

This layer cannot be too thin, since, under the most advantageous circumstances, it is difficult to individualize the various forms in which the fatty acids crystallize, and care must be taken to familiarize one's self with the almost indefinite variety of form assumed by crystalline and sub-crystalline bodies when crystallizing under different conditions. This method of investigation is the most useful in cases like that of butter, where we deal with a substance which when examined in its normal condition does not show us any well-defined crystals under the polariscope, and which is examined in its normal condition without the employment of a higher temperature than is necessary to enable us to procure a thin layer.

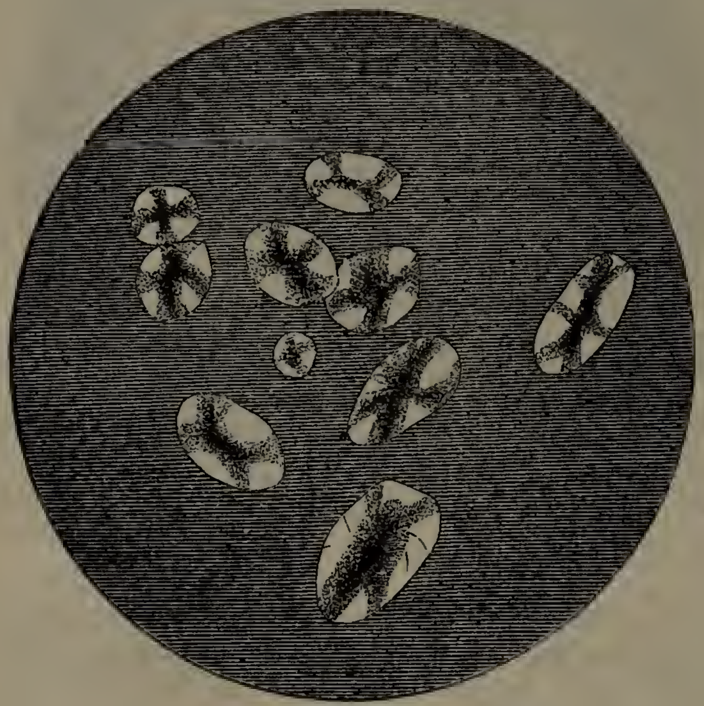

Fig. 25.—Pea Starch.

In the examination of textile fabrics the polariscope is of great service, since, as Mr. Suffolk has shown,* cotton shows more or less colour when thus examined, "but no very marked structural peculiarities." Flax, on the other hand, not only is very intensely doubly refractive, but shows a great amount of structure, "the transverse markings seen by reflected light will become more conspicuous, and other markings of a more or less special nature will, with proper management of the selenites, be rendered visible. These consist of thickening of the cell wall, or secondary deposit, and are easily seen by polarized light, owing to their doubly refractive power differing from that of the thinner portion of the tissue; while by ordinary transmitted light they would have been nearly invisible owing to their transparency. It is much easier to distinguish the fibres of cotton and flax in a mixed fabric by the aid of polarized light than by any other means." The only preparation necessary is to tease the fabric out sufficiently to cause isolation of its constituents and to mount it in the usual way with Canada balsam, or, where the investigation has to be rapidly performed, immerse it in oil of anise.

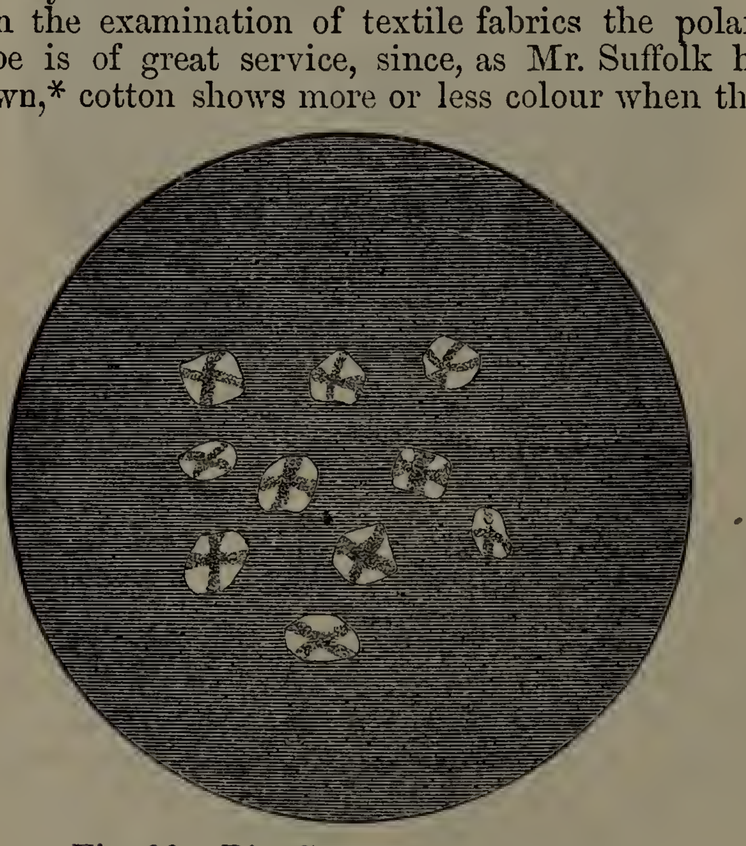

Fig. 26.—Rice Starch. ⅛in. objective.

Polarized light has been of essential service in the hands of Mr. Sorby and others, in the department of microscopical petrology, but this is a department of science into which I must not enter here; it will, however, be evident to all on reflection that if polarized light is likely to be useful in any department of research it will be in this, where nearly every subject under investigation is of a more or less decided crystalline form, or composed in some way of crystalline constituents.

This branch of the subject, incompletely as it has been treated, must not be concluded without a word of caution on two points. First, the student must bear in mind that optical analysis of all kinds is extremely delicate and requires the utmost care in its application. Second, that the use of plane polarized light in investigation depends upon the principle of double refraction, neither more nor less, and that its use is limited by this—if two substances are equally doubly refractive, or, what amounts to the same thing, if there be two plates of different substances which differ in thickness, or in optical position, in the inverse proportion of their bi-refractive powers, the polariscope will not distinguish between them if their bi-refractive properties be of the same kind; and on the other hand, if we have two plates or two crystals of the same substance, but differing in thickness or in optical position, the polariscope will distinguish between them, and thus lay the ground open for the inroad of error. In the careful hands of those possessing the needful knowledge the polariscope will be of essential and valuable service; in other hands, the reverse.

Of the use of the polariscope in botanical research generally, that is in the examination of vegetable tissues, I have not said anything, chiefly because of the prominence given to its use in my articles on the "Microscope in Pharmacy," but also because it has been little used in pure research, chemical reagents having been almost solely relied upon. That this will long continue to be the case is scarcely probable, since it is evident that so subtle an analysis of the structure and varying density of bi-refractive membranes cannot fail to be of use if properly applied. This, however, is not the place for the discussion of such a subject.

(*To be continued.*)

TACAMAHAC AND ANIME RESINS.

In the twenty-fourth volume of Buchner's *Repertorium* there is an article on the resins in commerce under the names of Tacamahac and Anime, from the pen of Mr. J. B. Batka. The writer says, "although these resins no longer possess any important medicinal value, so much confusion exists respecting their identity, both in the trade and in books, that they deserve a fresh critical investigation." The following notes are extracted from the article in question:—A number of spurious anime and elemi resins are found in collections under the name of tacamahac. Most of these resins may be divided into two groups, differing in their alcoholic solutions, which Batka designates as the alpha and beta groups. The former group has the property of forming a pure resinous solution, which in evaporation leaves the solid resin as a transparent varnish, whilst the latter possesses the peculiarity of taking up water from spirit of wine or the air, and forms a cloudy hydrate or soft resin. This group of soft resins exhibits a singular deposition when a spirit of wine solution is evaporated. At the bottom a cake is formed, and upon this a number of points or round drops and plant-like elevations. The alpha resin, in the evaporation of a spirit of wine solution, forms the extreme rim first, and spreads out in a glass-like transparent layer. The colophon, or residue of this group of resins after dry distillation or sublimation, possesses the curious property in cooling of instantaneously, as if by magic, forming elegant figures, exhibiting great regularity in their ramifications and polarizing light in the most beautiful manner.

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* 'Microscopical Manipulation' (15th ed.), p. 207.

The following resins are described under the tacamahac group:—

1. The genuine East Indian tacamahac, from *Calophyllum*, which is, on the authority of Petit Thouars, from whom the writer possesses an authentic specimen, yielded in Bourbon and Madagascar by *C. inophyllum.* It is a dark green balsamic resin, which, in reflected light appears green, and with the light shining through it, brown. Its specific gravity is 1·032, and it melts at 75° C.

2. Yellow Tacamahac, "Tacamahaque vierge" of Des Marchais, in the collection of the Jardin des Plantes, and "Amyris-Tacamahac" of Batka, because this plant is believed to yield it. In the older collections it is usually labelled as the true tacamahac. In Pereira's collection it is called African incense, and in Guibourt's, "Bdellium d'Afrique." It resembles these resins in outward appearance, with a reddish, rather than a yellow tinge, contains fragments of birch-like bast run down with it, and has a lustrous fracture similar to that of the balsam of tolu. When melted it exhales a most agreeable odour. It melts at 100° C. into a glass-like mass, which, treated with dilute and absolute alcohol, is only slightly soluble, but with boiling alcohol it furnishes a partial solution leaving behind numerous insoluble yellow crystals, which may be called tacamahacin. These crystals present the following peculiarities:—1. Spread out on litmus paper they are clustered prisms, slightly reddening the paper, wasting under exposure and changing to a yellowish-white. 2. Insoluble in ether and dilute alcohol. 3. Also insoluble in pure alcohol when cold, and only partially soluble when boiling. 4. Insoluble in ammonia. 5. Insoluble in alkaline solution. 6. Unaltered by treatment with nitric acid. 7. Treated with sulphuric acid a dark-violet solution is formed.

Amyris-Tacamahac is almost universally called Anime in recent collections, and in the trade it is commonly mixed with the next.

3. Resin of *Icica heptaphylla*, received from L'Herminier, under the name of *Encens de Cayenne*, from Guadeloupe.

This the writer calls Anime-Tacamahac to distinguish it from the preceding. It comes from Jamaica, under the name of birch resin, and in German collections it usually bears the name of anime, and it is also very well described under this name in most of the manuals.

4. Mauritius Tacamahac. This resin is outwardly of a dirty greenish-white, mixed up with pieces of wood and many other impurities. It occurs in masses of several superimposed layers, containing here and there perfectly formed crystals. It is probably the product of *Bursera obtusifolia.* In some of the French and Dutch collections it is indifferently referred to *Calophyllum* and *Icica*, and frequently bears the name of galda resin.

5. Bitter Tacamahac, of Nees. This is regarded as a spurious tacamahac, the product of a coniferous tree, *Pinus maritima.* In Italy it was found under the name of anime, and in Germany as tacamahac. It is a crumbling, reddish-yellow resin, of a bitter turpentine-like taste, often containing scales of coniferous cones.

Only 1, 2, and 3, are considered as true tacamahac resins. Their principal chemical characteristic is that in alcoholic solutions they do not deposit a soft flaky resin.

Anime.—There is a German, French, and Italian *Gummi Anime*, and also an English, but the latter differs essentially from the others in being a copal. Doubtless the original gummi anime was the resin of *Hymenœa Courbaril*, the West Indian copal. In several of the collections examined in London no other was found under the appellation of West Indian gummi anime.

The following is Paoli's enumeration of the different kinds of anime in the Jardin des Plantes:—

1. Resin of *Bursera gummifera* obtained from a spontaneous exudation.

2. The same from incisions (in a decayed state as tacamahac).

3. The same of a more red colour, and of a bitter taste from age.

All these three varieties are employed in the Antilles as *Resin de bois de cochon* and *Bois de Chandelle.*

4. Resin of *Hymenœa Courbaril* from Minas, Brazil.

5. The same in a fossil state, flaked and crumbly, from the Amazon.

6. The same from St. Domingo, similar to the Eastern copal.

7. The same from Madagascar and Zanzibar, the genuine oriental copal of the English, from *Hymenœa verrucosa* (*Trachylobium*).

Probably Paoli did not know the resins of *Icica heptaphylla* and *Amyris Tacamahaca*, nor the substitution of galipot (*Pinus maritima*) resin, or he would not have taken nos. 1—3 for mere *Bursera* resins. Nos. 4, 5, 6 and 7 are copal resins and correctly described.

Batka himself received the resin of *Pinus maritima* recently from Trieste as the true anime. What Dumas describes in his 'Chimie appliquée aux Arts' as anime is *Bursera gummifera.*

THE DECOMPOSITION OF WHITE PRECIPITATE BY IODINE.*

BY F. A. FLUCKIGER.

In speaking of white precipitate, it will not be easy to omit mention of the remarkable decomposition, which, as pointed out by Schwarzenbach,* it undergoes with iodine, bromine, and chlorine. I wish to call attention to the fact that the incorporation of iodine with the molecule of precipitate can proceed entirely without the interposition of a solution. If, for instance, three molecules of precipitate are mixed with four molecules of iodine and rubbed together vigorously, scarcely any change takes place; but if the powder be allowed to stand quietly it puffs up after a short time; that is, within a quarter of an hour or longer, according to the quantity of the mixture, the form of the vessel, treatment, and temperature. Without doubt this puffing, which is not particularly vigorous—at any rate it is not attended by an explosion—is due to the formation and breaking up of iodide of nitrogen or iodamine. It is remarkable that this decomposition takes place suddenly, without any exterior cause, and without danger, especially when the experiment is made with only a few grams. Besides nitrogen (which, however, I have not examined), a large quantity of iodine vapour is also given off, and the development of heat is so considerable, that the residue appears to be pretty closely melted together. It is coloured by the yellow iodide of mercury, which upon rubbing passes into the red form. I find further that the decomposition of white precipitate by iodine can be very conveniently carried out by regulating it through the addition of water; I in no way affirm, however, that with water the order of the reaction is exactly the same. But it probably results from the facts mentioned in this notice that the iodine alone acts upon the precipitate, and that this is also the case when both substances moistened with water are brought together; accordingly, it is not surprising that alcohol acts similarly to water, though much more energetically.

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* Read before the Berlin Chemical Society (*Berichte*, vol. viii., p. 1619).

If white precipitate and iodine be mixed together in the before-mentioned proportions and the powder moistened with water, the decomposition begins at once, and manifests itself by incessant crackling which lasts for hours. For instance, if 2·26 grams of white precipitate be mixed with 1·52 grams of iodine and 6·5 grams of water in a small flask, a gas delivery tube fixed, and the action promoted by occasional vigorous shaking of the flask, about 40 c.c. of nitrogen gas can be collected in the course of half a day. Each of the weak, though from their regularity, clearly distinguishable crackling explosions, corresponds to a single bubble of nitrogen, so that the experiment is eminently suited for a demonstration. The remaining decomposition products are sal ammoniac, ammonia, mercuric chloride, and mercuric iodide.

The following equation may possibly represent the course of this remarkable phenomenon:—

$$9\,NH_2HgCl+12\,I= 4\,N+3\,NH_4Cl+2\,NH_3+3\,HgCl_2+6\,HgI_2.$$

But though this equation shows the final products it has no pretence to be a representation of the whole of the products of the reaction. It is highly probable also that the products of the reaction are dependent upon the proportions of the iodine and precipitate brought together.

The so-called "fusible" white precipitate is also decomposed by iodine; the principal part of the reaction may probably be represented in the following manner:—

$$3\,(NH_3)_2HgCl_2+2\,I= N+3\,NH_4Cl+2\,NH_3+HgCl_2+HgCl+HgI_2.$$

On the other hand iodine acts very slightly upon the yellow compound that remains after the washing of white precipitate.* In this complex molecule—$NH_2(HgOHg)Cl$—the amide appears to be in close combination. By rubbing it together with iodine, at first mercurous iodide is formed quite quietly; after some time, or more rapidly when heated with water, mercuric iodide is produced.

White precipitate is not decomposed by hydrobromic acid or solutions of its alkaline salts, with such vigorous crackling as by iodine in the presence of water.

PLEASANT AND ACTIVE PREPARATIONS OF SENNA.†

BY C. L. DIEHL.

Senna, although one of the oldest and most reliable purgative remedies, seems gradually to grow into disfavour, and is now but seldom prescribed in regular practice. This is partly owing to its pronounced, and, to some persons, nauseous taste, but principally to its tendency to produce severe griping. To overcome this latter objection it has been usual to combine the senna with aromatics and some saline aperients—such as Epsom or Rochelle salts, cream of tartar, etc.—with but partly satisfactory results, however. Besides, the nauseous taste of the medicine is an objectionable feature, and cannot be very readily overcome by these expedients. Yet the means to overcome these objections very completely have been known for many years, and have been applied, somewhat grudgingly, it is true, in some of the European pharmacopœias and by individuals here and there in the United States. This consists in exhausting senna leaves, free from foreign admixture, with stronger alcohol, thereby removing their odorous and resinous components, while their active constituent, cathartic acid, being insoluble in alcohol, remains undissolved. The leaves so treated may then be dried, and used either in substance or in any of the usual forms of preparation; such, possessing the purgative qualities of the drug unimpaired, are nearly without odour or taste, and are utterly devoid of griping qualities. It is quite possible that this method has not been more generally applied because of apprehension that some of the activity of the drug would be thereby sacrificed. Professor R. Buchheim's investigations, made in 1873, seem, however, to have settled this question very completely, his results being emphatically those above stated.

With a view to establishing this to my own satisfaction, I suggested to my assistant, Mr. A. I. Schoettlin, then a student of the Louisville College of Pharmacy, that he should select "senna" as the subject for his thesis, and his results were in complete accord with those of Professor Buchheim. Mr. Schoettlin found that an extract of Tinnevelly senna, made with stronger alcohol, possessed the odour and taste of the drug in a marked degree, but when taken in doses corresponding to four or five times the usual dose of the leaves it was entirely without laxative action; producing, however, considerable uneasiness in the stomach, and even griping. The aqueous extract of the leaves, which had been previously exhausted with stronger alcohol, on the contrary, possessed promptly and fully the activity of corresponding quantities of the ordinary leaves, was nearly odourless and tasteless, and did not produce the least griping. It should be observed, however, that this applies only to senna leaves free from foreign admixture, such as the Tinnevelly or the better varieties of India senna; and that Alexandria senna, which is usually preferred in the United States is not suitable for this purpose, since this variety contains a considerable admixture of "arguel leaves."

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* Kopp and Wills' Jahresbericht (1862), p. 219; and see before, p. 724.

* 'Oxydimercuriammoniumchloride,' Gmelin, Handbook Chem., iii., 837.

† Reprinted from the New York *Druggists' Circular*, February, 1876.

On the basis of Mr. Schoettlin's results I have prepared a fluid extract which, diluted with simple elixir to the strength of syrup of senna (U. S. P. 1850), has met with decided favour with some of our physicians. The following is the process I have adopted for the preparation of this fluid extract, which, for the sake of distinction, I will name *deodorized fluid extract of senna* : Take of Tinnevelly senna sixteen troy ounces ; stronger alcohol, glycerin, and water, of each a sufficiency ; macerate the leaves in four pints of stronger alcohol for two days, and express ; add to the expressed leaves two pints more of stronger alcohol, and again express ; then dry and reduce them to a fine powder. According to the general directions for preparing the officinal fluid extract, percolate this powder first with a mixture of six fluid ounces of stronger alcohol, two fluid ounces of glycerin, and eight fluid ounces of water, then with a sufficiency of six measures of stronger alcohol and ten measures of water, till thirty-two fluid ounces of percolate are obtained. Of this the first twelve fluid ounces are set aside, the remainder of the percolate is evaporated to three fluid ounces, and, together with one fluid ounce of stronger alcohol, added to the reserved portion ; after standing several days decant the clear liquid, or filter. The result is a dark brown clear thin syrupy fluid extract, which possesses very little odour or taste, and in these scarcely reminds of senna. When it is mixed with three times its volume of the simple elixir adopted by the Louisville College of Pharmacy a very pleasant elixir is formed, which corresponds in its strength to the syrup of senna formerly officinal in the United States' Pharmacopœia, and has proved an active and efficient preparation.

It has been suggested to combine with this preparation a small quantity of taraxacum, and I have therefore for some time dispensed a *compound elixir of senna* (or compound laxative elixir), for which the following is the formula : Take of deodorized fluid extract of senna, four fluid ounces ; fluid extract of taraxacum, one fluid ounce ; comp. tinct. of cardamom, half a fluid ounce ; simple elixir, sufficient to make a pint. The result is a very pleasant combination of the senna and taraxacum, which probably possesses some advantages over the simple elixir of senna.

In conclusion I would remark that in the above I have aimed to re-establish in popular favour an old and well-tried remedial agent ; to draw the attention of medical men to the possibility of removing the most serious drawback to its application.

A NEW CRYSTALLINE HYDRATE OF HYDROCHLORIC ACID.*

BY I. PIERRE AND E. PUCHOT.

If commercial concentrated hydrochloric acid be submitted to a very low temperature no portion of it separates in the crystalline form, even though a temperature between – 25° and – 30° C. is maintained during a considerable time. But if a continuous current of nearly dry hydrochloric acid gas be passed into it a different effect is produced. When the temperature has descended to – 21° or – 22° C., and has remained stationary a few moments after supersaturation it rises spontaneously to – 18° C., although the freezing mixture is kept below – 22° C. From this point an abundant crystallization is formed, supported by the current of gas, and the temperature remains, without sensible variation, at – 18° C. The authors have observed that before the deposit of the crystals the temperature of the liquid is lowered three or four degrees.

A synthetic operation, made with distilled water, has shown that when the weight of crystals formed equals nearly one and a half times that of the water employed, the real acid absorbed represents nearly the weight of the water, which indicates for the crystals and the mother liquor, a mean composition near to $HCl, 2\,H_2O$, which is confirmed by analysis.

These crystals of hydrated hydrochloric acid are not very stable, and give off thick white fumes in decomposing. In water they dissolve very rapidly. Left in a flask furnished with a thermometer and arranged so as to give a passage to the gas set at liberty, the crystals melt slowly if the surrounding temperature is near to zero, the thermometer remaining stationary at – 18° C. An hour and a quarter was found sufficient for the complete fusion of 115 grams of crystals, the thermometer remaining stationary at – 18° C. to the end.

The crystals appear to be more dense than the mother liquor, as they always fall to the bottom. During their melting there is an abundant disengagement of gas, from which it is inferred that they are richer in real acid than the mother liquor. The crystalline form has not been determined, but it appears to approach that of sodium carbonate.

The facility with which these crystals decompose in the air renders a direct analysis difficult. A weighed quantity of drained crystals was therefore added to a weighed quantity of distilled water, and an estimation of the chlorine only was made, there being no doubt as to the constituent elements of the compound. All the experiments gave a little more than two equivalents of water for one equivalent of real hydrochloric acid. But the difficulty of draining such instable crystals caused the retention of a considerable quantity of mother liquor poorer in real acid than the crystals, and even in the short time occupied in draining them they commenced to decompose with loss of hydrochloric acid.

These circumstances led the authors to conclude that their results gave a little less hydrochloric acid or a little more water than the reality and to adopt as a formula representing the composition of the crystals $HCl, 2\,H_2O$. This they consider to be the richest and best defined hydrate of hydrochloric acid yet observed.

THE CARNAUBA TREE.

In a report by Mr. Consul Morgan on the trade and commerce of Brazil, recently laid before Parliament, occur the following remarks respecting the Carnauba tree :—

"Amongst the most useful trees in Brazil, and which deserves special mention, is the Carnauba (*Copernicia cerifera*), a palm tree which, without any culture, develops itself in Ceara, Rio Grande do Norte, Bahia, etc. Perhaps in no country is a plant applied to so many and varied purposes. It resists the most prolonged drought, and preserves itself constantly luxuriant and green. Its roots possess the same medicinal effects as the Salsaparilha. From the trunk are obtained strong fibres which acquire the prettiest lustre, as well as corner pieces of timber, and excellent palisades for enclosures.

"The Palmetto top, when young, serves as an appreciable and nutritious food ; and therefrom also wine, vinegar, and a saccharine matter are extracted, as well as a kind of gum similar in its taste and properties to sago. This plant has often served during the period of excessive droughts as the means of support to the populations of the two first named provinces.

"From the wood and trunk of the tree musical instruments are made, as also tubes and pumps for water. The delicate fibrous substances of the pith of the stalk and its leaves make a good substitute for cork. The pulp of the fruit is of an agreeable taste, and the nut, oily and emulsive, is, after being roasted and reduced to powder, used as coffee by many persons in the interior. From the trunk of the tree a species of flour similar to maizena is extracted, as well as a liquid resembling that of the

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* *Comptes Rendus*, vol. lxxxii, p. 45.

Bahia cocoa-nut. From its dried straw, mats, hats, baskets, and brooms are made, and of this straw large quantities are exported to Europe, where it is employed in the manufacture of fine hats, the whole value of which exportation and of such as is utilized by national industry, amounts now to about 1000 contos, or £117,500 per annum.

"Finally, from its leaves is produced the wax used in the manufacture of candles, which has an extensive consumption in the northern provinces, especially at Ceara, where it has become an important branch of industry. The annual exportation of this wax is calculated at 871,400 kilos., exceeding in value reis 1,500,000 or £162,500."

CHEMICAL ANALYSIS OF AN INTESTINAL CALCULUS FROM A HORSE.

Professor R. F. Tuson, has recently had an opportunity of making a chemical analysis of a large concretion removed *post mortem* from the single colon of a horse. The following is the substance of his report :—

"The calculus weighed 3lbs. 12oz. ; it had a brown colour throughout, was nodulated, and generally resembled in its external appearance the so-called "mulberry calculus" of man.

"It is composed partly of organic and partly of mineral matters. These surround a nucleus consisting of a somewhat angular pebble about the size of a pea, and the mucus and other animal substances present unite the whole of the ingredients together into a globular mass.

"The subjoined table shows the result of the quantitative analysis of the calculus :—

Water (moisture)	51·93
Organic matter (hair, oat-husk, mucus, etc.)	10·72
Ammonium-magnesium phosphate. . .	29·00
Sand	5·53
Salts soluble in water (sulphates and chlorides of sodium, potassium, calcium, and magnesium)	2·82
	100·00

AN EXPERIMENT ON ANTISEPTICS.*

BY M. S. BIDWELL.

November 15th, 1875, a number of wide-mouth 8 oz. bottles were prepared, each containing 4 ozs. of water and ½ oz. raw, lean beef. One of these was left without any addition, 20 of them were arranged in sets of four, and to each bottle was added 1, 2, 3 and 4 grs. respectively, of each of the antiseptics under trial, which were carbolic acid (or phenol), salicylic acid, chloral hydrate and benzoic acid. Four sets of bottles were thus occupied. The recent statement, that the alkaline salicylates have no antiseptic power, coupled with the well-known fact, that putrefaction is usually accompanied by an alkaline reaction, suggested the fifth series, containing the same quantities of salicylic acid as in the other series, with the addition of half a drachm of dilute hydrochloric acid to each bottle. Finally, to the 22nd bottle was added the same amount of hydrochloric acid alone, for comparison. The whole were loosely covered to exclude dust, and set away at the usual temperature of the store, varying from perhaps 55° to 70°. From pressure of business, but little attention was paid to them, and no record was kept of their progressive changes ; but seven weeks later (Jan. 3rd, 1876), they were all examined. The following were found more or less putrid, with an offensive ammoniacal odour, much like that of stale urine, viz.: The phenol, 1, 2 and 3 grs., salicylic acid the same, benzoic acid 1 gr., and all those containing chloral. In the three containing salicylic acid, the liquid was covered with a thick coating of mould, which was not the case with any of the others, illustrating the fact, which had been previously noticed, that a very small amount of this acid not only does not prevent, but even seems to favour the growth of mould. The bottle containing no antiseptic was, of course, quite offensive, but was not mouldy. The following were free from odour, and apparently unchanged, viz.: All that contained salicylic and hydrochloric acids combined, the 2, 3 and 4 gr. benzoic acid, the 4 gr. phenol, which still preserved, as at first, its slightly carbolic or tarry smell. In all these the water remained clear, or nearly so, the meat having a whitish colour and a soaked look. In the sample to which hydrochloric acid alone had been added the water was clear and inodorous, but had a white, translucent substance, something like coagulated albumen, floating in it. No microscopic examination was made.

From the results of this experiment may be fairly deduced the following conclusions, subject, of course, to correction by further observations :

1. Of the four antiseptics mentioned, benzoic acid is effective in the smallest quantity, phenol and salicylic acids coming next, and being about equal, while chloral-hydrate, at least in the ratio of one part in 500, has little or no permanent value.

2. Salicylic and hydrochloric acids combined are more effective than either of the four mentioned. How much of this effect may be due to each, and how much to the combination, could only be determined by further trial, as also how small a quantity of hydrochloric acid would be required. In this experiment, it will be noticed that this was used in about four times the largest quantity of the other agents, as it was not expected to act as an antiseptic, but only to aid the salicylic acid, preventing its extinction by the alkaline products of putrefaction. Yet, if so small a proportion (less than 1 per cent.) of this acid could so effectively retard decomposition, the fact might sometimes be used with advantage, as it would in many cases be convenient and unobjectionable.

One such experiment, of course, settles nothing ; but these results are given for what they are worth, with the hope that others may extend and verify or correct them. The effect of the hydrochloric acid in this case was certainly unexpected by the experimenter, and would seem to suggest further investigation. It will be noticed that the failure of the chloral in this experiment does not at all conflict with the results reported by Mr. T. Roberts Baker to the American Pharmaceutical Association at the last meeting, as the weakest solution that he found efficient was 5 grs. to the fluid ounce, or 25 times the strength of any used in this case, while he found that a 2 gr. solution only retarded decomposition without permanently preventing it.

"GREEN TEA."

The following remarks respecting the prospects of the green tea trade in England are taken from the columns of the *Shanghai Commonwealth.* It may interest some of our readers to see what, in the opinion of well qualified judges, is likely to be the effect of the Sale of Food and Drugs Act on the China tea market.

"Every one who knows anything of the history of the trade is fully aware that for many years past there has been practically no green tea shipped from China which has not been more or less artificially coloured. That this practice of colouring or facing was in the first instance resorted to by the Chinese for the purpose of making an imitation of tea *naturally* green, cannot be denied, but we do not think that at this stage of the trade and in view of its past history, this fact can be properly adduced as being a reason for summarily and wantonly throwing aside as unfit for consumption, and as no proper article of commerce, the green tea of the present day. Coloured green tea has admittedly never done the consumers any harm. In the use that the people of England have made of it, they have declared conclusively that in their case the article was not only harmless but supplied a real want; and the purchase and shipment of the article, as produced by the Chinese, was consequently a perfectly legitimate trade for merchants to engage in. There was therefore in our opinion no good ground for the interference of legislation with this matter, as any real abuse would have speedily worked its own cure without the wanton sacrifice of the interests of merchants which the present legal restraints are resulting in.

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* From the *American Journal of Pharmacy,* March 1876.

"Who then are to blame for raising this stupid agitation which has culminated in the intervention of the law? Has it been induced solely by meddling politicians, by analytical chemists intent upon professional distinction, by dealers with, for the time, their own private ends to serve, or by certain persons who in every country seem to make it their business to discover mares' nests? Not altogether in any of these ways, we are sorry to think. If Malloo mixture from Shanghai and iron filings from Canton had never found their way to London, we doubt very much if any of those troublesome people which we have just mentioned could have ever made out any case against green tea! We know very well that so far as Shanghai is concerned the shipment of anything like spurious tea has been very exceptional, and further, that the one or two individuals who so far forgot themselves as to do such business ultimately had their error demonstrated to them in the most impressive manner. But, presuming that the conclusions which we have drawn have some foundation, we may be allowed to point out that there is in trade a law as fixed and unfailing as the law of gravitation, namely, that from operations in spurious and improper articles of trade there will certainly be sooner or later a retributive recoil upon the very source from which they originated; and the worst of this evil is, that the innocent should be made to suffer with the guilty, as has been very notably the unfortunate lot of shippers of green tea to London for some time past. We may mention here that American consumers appear to be in an indirect way somewhat to blame for the present condition of things in London, for if their constant cry had not been for 'bright and attractive goods,' the Chinese would never have got into the habit of facing and colouring tea to the extent which they have done.

"What then is likely to be the future of green tea as regards England? What will be the result of the examining system, which is to be inaugurated this day? It is difficult to answer these questions, but one thing is certain, matters can hardly be made worse than they are at present. If the examiners, from want of technical knowledge or proper discrimination, sometimes arbitrarily stop parcels of tea of paler colour than others which they may pass, buyers here will be at their wits' end to know what to select for London, with safety. It will therefore be well for the importer if the examiners should pursue some well-defined course, and either interfere with such tea only as might be fairly regarded as faced, in the very extreme sense, or place such stringent restrictions upon importations as to effectually stop the consumption of green tea in England. The result of the first of these two courses would be, we think, that the trade would go on more satisfactorily than it has done of late, but possibly still hampered occasionally by mistakes or capricious action on the part of the examiners. The ultimate result of the other course would be that the Chinese would discontinue making green tea to a corresponding extent, and make black instead; and whatever will bring about this will perhaps in the end be the best thing that could happen for all concerned. We think, however, that the policy of the Government will be to interfere only with tea which may appear to be notoriously faced; and it is very unlikely now that any tea of this character will ever be shipped to England."

THE BASICITY OF THE PHOSPHORUS ACIDS.*

BY R. ROTHER.

Phosphorus, sulphur, arsenic and antimony are possessed of certain common characteristics which indicate a very close relationship between them, and although various anomalies spring from each particular member of the series, it is nevertheless plain that they virtually effect the transition from metals to metalloids, and from metalloids to the limitless sphere of the nitrogen and carbon compounds. Phosphorus joins hands, as it were, with the organic and protorganic worlds, constituting a sort of connecting link, forming them into a continuous series.

The acids of phosphorus mark the transition from the mineral to the carbon acids. Their basicity, for this reason, is peculiar, showing the properties of both, and being entirely like neither. Organic or carbon acids are compounds of oxygenated hydrocarbon radicals with hydroxyl. The phosphorus acids are, to a certain extent, analogous to these, hence thay may be described as compounds of oxygenated hydrophosphorus radicals with hydroxyl. The definition, however, is not capable of general application, by virtue of the fact that the combined hydrogen is wholly and completely typic in one member of the group, namely, metaphosphoric acid. This acid, however, is the link adjacent to the mineral acids, in which proximity the hydrogen has become wholly typic, and hence the definition is not appropriately applicable in this case.

Assuming that the acids of phosphorus are formed from trihydric phosphide (PH_3) by the interpolation of oxygen, and we have—

Hypophosphorous acid, $PO_2H_3=PO_2H_2,H=POH_2(OH)$.

Phosphorous acid, $PO_3H_3=PO_3H,H_2=POH(OH)_2$.

Orthophosphoric acid, $PO_4H_3=PO_4,H_3=PO(OH)_3$.

But comprehending all the acids, and we have more fully, thus—

Hypophosphorous acid, $P_2O_4H_6=P_2O_4H_4,H_2=(PO)_2H_4(OH)_2$.

Phosphorous acid, $P_2O_6H_6=P_2O_6H_2,H_4=(PO)_2H_2(OH)_4$.

Orthophosphoric acid, $P_2O_8H_6=P_2O_8,H_6=(P_2O_4)H_2(OH)_4$.

Pyrophosphoric acid, $P_2O_7H_4=P_2O_7,H_4=(P_2O_4)H(OH)_3$.

Metaphosphoric acid, $P_2O_6H_2=P_2O_6,H_2=(P_2O_4)(OH)_2$.

This arrangement reveals a number of very important facts. It shows the regular gradation and development of the series in a most lucid and comprehensive manner, and the gradual evolution from the hydrophosphorus, PH_3, becomes evident in every member. The relation to the carbon acids is most apparent in the two lowest derivatives, in which the accumulation of oxygen has not entirely overcome the direct contact of phosphorus and hydrogen. In the hypophosphorous acid, only one-third of the combined hydrogen is typic, and in the phosphorus acid two-thirds. The evolution of phosphorus hydrides from either of these two acids by means of heat shows that the whole of their hydrogen is not replaceable, and that only that portion is typic which is liberated, by means of heat, in combination with oxygen. In the orthophosphoric acid, the accretion of oxygen has so far progressed that the direct contact between phosphorus and hydrogen is no longer maintained, since the balance of affinity now leans strongly towards the oxygen. Heat now expels hydrogen only in combination with oxygen, but no amount of heat can expel more than two-thirds of all the hydrogen combined. The remaining third, constituting the typic hydrogen of metaphosphoric acid is absolutely beyond the direct influence of phosphorous, and the powerful affinity of phosphorus for oxygen, on the one side, and oxygen for hydrogen on the other, retains the compactness of the union beyond the ordinary effects of molecular vibration.

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* From the *American Journal of Pharmacy* for March.

By this arrangement we also discover the appalling inconsistency of the new notation in its treatment of the phosphoric acids. The misconception of the tetrabasicity of pyrophosphoric acid, and the erroneous theory of the trivalent radical phosphoryl $(PO)'''$, together with the entire new notation of the phosphoric acids, are thereby wholly refuted. Trivalent phosphoryl is utterly inapplicable in the case of pyrophosphoric and metaphosphoric acids, as no satisfactory expression can be obtained by its use. It is also plain that a trivalent radical cannot be common to a monobasic, a tribasic and a tetrabasic acid. Furthermore, the inconsistency of the notation must refute itself which represents the three acids thus—

Metaphosphoric acid, $PO_3H = PO_2(OH)$.
Orthophosphoric acid, $PO_4H_3 = PO(OH)_3$.
Pyrophosphoric acid, $P_2O_7H_4 = P_2O_3(OH)_4$.

Which indicates that there are as many independent radicals as acids, and that while $(PO_2)'$ is univalent, $(PO)'''$ is trivalent and $(P_2O_3)^{iv}$ quadrivalent. There is neither sense or reason in such an assumption in view of the fact that the three acids differ from one another by two equivalents of hydroxyl less for every equivalent of oxygen in excess of the radical, P_2O, as is shown by the fellowing:—

Metaphosphoric acid, $P_2O_4(OH)_2 = P_2O_2(OH)_2O_2$.
Pyrophosphoric acid, $P_2O_3(OH)_4 = P_2O_2(OH)_4O$.
Orthophosphoric acid, $P_2O_2(OH)_6 = P_2O_2(OH)_6$.

According to the new notation of the phosphoric acids, metaphosphoric acid, (PO_3H), is first, orthophosphoric acid (PO_4H_3) second, and pyrophosphoric acid $(P_2O_7H_4)$ third in the series. But, as the first and second members differ by one equivalent of hydroxyl (OH) the second and third would vary by the same difference, and hence pyrophosphoric acid under this law should be written PO_5H_4. This does not, however, agree with facts, as was exhibited by the comparison just preceding.

By the new arrangement as above proposed, which in reality is the natural and true system of notation for the phosphorus acids, being in perfect consonance with the typal theory, all the phosphoric acids contain the bivalent radical phosphoryl $(P_2O_4)''$, in two cases in combination with partially affected or typoid hydrogen and hydroxyl, and in one wholly in union with hydroxyl. The affected or typoid hydrogen, being yet distantly influenced by the phosphorous of the radical, does not assume the function of hydroxyl, and therefore, particularly in the case of orthophosphoric acid, it ordinarily possesses no salifying power; consequently this affected hydrogen does not virtually represent basicity. It is, however, replaceable by bases, under extraordinary conditions; but in such instances the highly basic character of the compound barely admits of classification as a true salt.

Ignoring the indifferent hydrogen, it will then be seen that metaphosphoric acid is dibasic, pyrophosphoric acid tribasic, and orthophosphoric acid tetrabasic. But, admitting the full value of the hydrogen, then metaphosphoric acid remains dibasic, pyrophosphoric acid becomes tetrabasic, and orthophosphoric hexabasic.

For convenience sake, they may be represented as monobasic, dibasic and tribasic. It is, however, atomically correct that they be designated as bibasic, tetrabasic and hexabasic, in which case the tetrabasicity of pyrophosphoric acid, as at present held, would be correct, but in every other instance it would be, typically considered, utterly wrong.

But absolute typic value is the perfect index of basicity, therefore typoid hydrogen is not admissible in a determination of that quality, and as various indications point favourably that way, it appears that the correct basic value of the phosphoric acids is shown by the new arrangement, in which they are respectively dibasic, tribasic and tetrabasic, regardless of typoid hydrogen.

Although fused sodium pyrophosphate is correctly represented by $Na_4(P_2O_7)$, it appears highly probable that the aqueous solution contains it as $Na_3H(P_2O_7)(NaOH)$. This expression, in a measure, explains the fact why the sodio-ferric pyrophosphate precipitated by alcohol should yield only $2(Na_2P_2O_7)(Fe_43(P_2O_7)$ instead of $3(Na_4P_2O_7)(Fe_43(P_2O_7)$, as which it exists in solution. For if we represent the sodium salt in solution by $3(Na_3H(P_2O_7)NaOH)$, the first effect of the alcohol will be a tearing away of the exposed alkali; the immediate result of this is the formation of a corresponding amount of acid salt, which also dissolves, while in the meantime the remnant precipitates in the anhydrous condition. The decomposition is clearly illustrated by the following:—

$3(Na_5P_2O_7) + 3(OH_2) = 3(Na_3H(P_2O_7)NaOH)$.
$Na_9H_3(P_2O_7)_3(NaOH)_3 = 2(Na_4P_2O_7) + NaH_4(P_2O_7) + 3(NaOH)$.
$NaH_3(P_2O_7) + 3(NaOH) = Na_4P_2O_7 + 3(OH_2)$, or, $Na_3H(P_2O_7)(NaOH) + 2(OH_2)$.

THE CHUFA, OR EARTH ALMOND.

The Chufa is a perennial, indigenous in the south of Europe, growing in the form of a rush to the height of about 3 ft., producing small tubers about the size of an ordinary bean, called by the French, Souchet Comestible (Rush Nut). In taste the tubers resemble a delicious chestnut or cocoa-nut, and may be eaten raw or cooked. After soaking in water twelve hours, they may be eaten as a sauce. Dr. C. T. Jackson, in the *Journal of the American Department of Agriculture*, states:—"When these tubers are beaten to a paste and mixed with water, a remarkable emulsion is formed, which, after straining, resembles milk in appearance. The fat at length rises to the surface and looks like cream, whilst most of the starch subsides to the bottom of the vessel; but enough still remains suspended to give the emulsion the appearance of thin or skim milk. Thus mingled with water, the most nutritive ingredients of this plant may be taken as a drink. It is much used in this manner by the Spaniards, and I have no doubt will be so employed in this country. This emulsion may be sweetened and flavoured so as to make it very agreeable so the taste." The tubers are chiefly used in Spain and other hot European climates for making an orgeat (orchata de Chufas), a delightful and refreshing drink.—*Garden.*

COPY OF EXETER MEMORIAL RESPECTING PATENT MEDICINES.

"Exeter, Jan. 24, 1876.

"We, the undersigned pharmaceutical chemists and chemists and druggists of the city and county of Exeter, desire to invite the attention of Arthur Mills, Esq., M.P., and J. G. Johnson, Esq., M.P., to the present unsatisfactory working of the Patent Medicine Act, whereby it is possible to sell or vend any poison without any further restriction than that of the Patent Medicine Stamp. We are of opinion that the sale of poisons under the Patent Medicine Act should be in some way assimilated to their sale under the Poison Act, 31 and 32 Vict., cap. 121, and point out the expediency of this being brought under the notice of the Government during the coming session."

Here follow the signatures of thirty registered men.

Mr. Mills and Mr. Johnson are members for Exeter, and were in Exeter at the time the memorial was prepared; it was presented by Mr. Pasmore and Mr. Delves to them, and they advised as a prior step communication with the Pharmaceutical Society.

The Pharmaceutical Journal.

SATURDAY, MARCH 18, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

MEDICINE MEASURES.

THE letters which have been published in the Journal during the past few weeks have sufficiently demonstrated the fact that in regard to weights and measures we are in a state of nature vastly incompatible with our advanced civilization in many other respects. And though it cannot be said that any of the suggestions which have been offered in regard to the mode of defining and measuring the dose of liquid medicines are altogether free from objection, the discussion of the subject may at least be expected to effect some good, by drawing the attention of medical men to the fact that there is such a wide difference between the domestic spoons and glasses of the present day and those which are often intended to be understood.

The variability of drops has long been sufficiently well known to make the inapplicability of this plan for measuring medicine apparent, but it is doubtful whether the same fact is generally appreciated as regards spoons and wineglasses, although very slight consideration of this point so soon as it is mooted will convince any one of the possible risk attending the use of such indefinite measures when potent remedies are administered.

Dr. FARQUHARSON has shown in his paper that the tablespoonful may vary from five drachms to eight drachms while the intention of the prescriber in most instances would be that only four drachms should be taken. This alone seems to warrant his opinion that however convenient the measurement by spoons may be, medical men can no longer adopt it without at least furnishing some caution against the possibility of two doses being taken in place of one. But Dr. FARQUHARSON'S suggestion, that graduated measures should invariably be used as a matter of routine for measuring medicine, would not fully do away with the difficulties dispensers sometimes encounter in rendering the directions of prescribers, and it would be necessary for that purpose to ensure uniformity of action on the part of medical men in their prescribing. Pharmacists may contribute something to the attainment of this result by making known, as several of our correspondents have done, the perplexity they have experienced in writing directions conformably with the prescriber's meaning; but beyond that it is only through the general concurrence of medical men in some uniform plan of indicating doses that the desired object can be brought about. Probably the Medical Council might be induced to take action with this object, and it might not be out of place if some steps were taken by the Pharmaceutical Society to bring this matter under the consideration of that body.

Besides the actual questions raised by the correspondence on the domestic measurement of doses, it serves incidentally to illustrate the care and regard for accuracy bestowed by pharmacists upon the preparation of medicine in accordance with the directions of the prescriber. In this respect the letters of our correspondents go far to refute the insinuations and statements which have recently been made to the effect that there is room for doubting the trustworthiness of pharmacists. Similar evidence is furnished by Dr. FARQUHARSON at the commencement of his paper, and his recognition of the scrupulous accuracy with which prescriptions are made up by the highly educated dispensers who are now entrusted with this duty is, we believe, no less consistent with the general opinion of medical men than it is with actual fact. There may be, in some respects, room for improvement in the mode of administering medicines, and the prevailing discrepancy in the measures by which doses are apportioned is a case in point. So long as this source of inaccuracy remains the deviation from the intent of the prescriber may be very serious if not actually dangerous to the patients, and we trust that the prominence lately given to this subject will not be without some good influence in effecting the reform that is needed.

ENDOWMENT OF RESEARCH.

ON Thursday the 3rd, instant, a deputation from the Council of the British Association had an interview with the LORD PRESIDENT OF THE COUNCIL (the Duke of Richmond and Gordon), on the subject of giving practical effect to the reports of the Royal Commission on Scientific Instruction and the Advancement of Science. The principal topics discussed were the application of a larger amount of the funds of the Universities in the teaching of science, the increase and permanent establishment of the annual grant of £1000 distributed by the Royal Society, and the establishment of State laboratories. The LORD PRESIDENT said that the Government was well aware of the importance of scientific education and that it was even now dealing with the question in respect to the Universities of Oxford and Cambridge. As to the proposition to liberally endow professorships combining the duty of original research with a moderate amount of teaching he did not himself think the plan had proved satisfactory when it had been tried. The Royal Society grant he looked upon as a provision for apparatus and not an endowment for research. The work connected with astronomical physics which Mr. NORMAN LOCKYER is now carrying on at South Kensington, he considered sufficient to show that the Government is acting in accordance with the recommendation of the Commission; but with regard to State chemical and physical laboratories he thought it unadvisable to move further until the Commission appointed to inquire into the Universities scheme proposed by Lord Salisbury had made its report.

CONSUMPTION OF ANTHELMINTICS IN THE FRENCH HOSPITALS.

At the desire of the Medical Society M. Regnauld has compiled some statistics as to the consumption of anthelmintics in the Paris hospitals from 1864 to 1874 inclusive. The only kinds used are the flowering heads of kousso, pumpkin seeds (*Cucurbita maxima* and *C. Pepo*), pomegranate root bark and the rhizome of male fern. The figures show a continual increase in the consumption during the eleven years, which has become much more considerable since 1870, the quantity of kousso and male fern being more than double that used previously. This result M. Regnauld attributes to the exceptional quality of food available during the siege of Paris.

THE NAME JABORANDI.

It is now pretty well understood that the name "Jaborandi," or "Yaborandi," is in Brazil applied to a group of diaphoretic medicaments mostly yielded by plants belonging to the Piper family, and it has been thought probable that one of these drugs was referred to by the Hon. Robert Boyle, about a century ago, in quoting a statement that Jaborand was an antidote for poisonous mushrooms. But Herr Scheleng, writing to the Journal of the Austrian Pharmaceutical Society, says that in the 'Nucleus totius Medicinæ" of A. Conrad Ernsting, written about 1770, under Jaborandi or Yaborandi, there is "s. Mandragora, of which the Arabic name is Yabora." That Ernsting does not refer to the drug or drugs now known by the name is clear from the fact that he says that the plant grows in Spain, Crete and France, and associates it with the mandrakes mentioned in Genesis xxx., 14—16. An illustrated article on Jaborandi, by Herr Scheleng, appeared in the *Archiv f. Pharmacie* for November, but contained nothing material beyond what had already appeared in this Journal.

FRAUDULENT WEIGHTS AND MEASURES.

Publicans' "glasses" have been a frequent source of complaint from the public, in respect of the short measure they contain, and it appears that specimens of goblets with the glass considerably thicker at the lower part so as to diminish the capacity without being apparent to the eye when filled with liquor, have been forwarded to the Warden of the Standards. But that Official reports that he is powerless to move in the matter, as the provision that publicans should sell by imperial measure only was virtually repealed by the Licensing Act of 1872 with respect to quantities less than half-a-pint. "What is a bottle?" is a question too that has often been asked, and which the Legislature attempted to answer a few years since by legalizing a standard "bottle" equal to one-sixth of a gallon and a "half-bottle" equal to one-twelfth. But the Warden of the Standards reports that these new measures do not appear to be much used by the public, and very few of them have been verified during the last four years for the use of local inspectors of weights and measures.

An interesting collection of fraudulent weights, measures, etc., that have been seized, has been deposited in the upper floor of the Old Norman Jewel Tower, at the back of the Standards Office, Old Palace Yard, and inspectors of weights and measures are recommended to avail themselves of the opportunity of becoming acquainted with these various forms of fraud. One handsome looking balance is said to enable a seller or buyer to give or obtain 14 to 18 ounces to the pound according to the portion of the enamelled platform upon which the goods are placed.

SUBJECTS FOR DISCUSSION.

At a recent meeting of the Bordeaux Society of Pharmacy, M. Perrens, referred to the number of new preparations which are being continually introduced into therapeutics and the uncertainty that sometimes exists respecting their formulæ, mode of administration or dose, and proposed that the Society should take some of them as subjects for discussion at its meetings. The proposition met with general assent, and a syrup of protochloride of iron having been mentioned, concerning which information was wanted, it was determined to set down the preparation of protochloride of iron as one of two subjects for the next meeting, the other being the preparation of hydrated persulphide of iron.

MR. CYRUS BUOTT.

An appeal that is made by Mr. Hampson in another column on behalf of Mr. Cyrus Buott, is one that we hope will meet with a generous response. Mr. Buott for some years took a lively interest in matters affecting the welfare of the body of chemists and druggists, though himself not registered as one of their number, and we doubt not that many of those who shared his views as well as of those who did not will be found ready to help him in the distress which has overtaken him in his old age.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, March 23, at eight o'clock, when a paper on "Pharmaceutical Zoology" will be read by Mr. Charles Shapley.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

March 15th, 1876.

Present.—Mr. Bottle, Vice-President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Taylor and Umney.

Dr. Greenhow was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Three candidates were examined. *All* failed.

MINOR EXAMINATION.

Seventeen candidates were examined. *Eleven* failed. The following *six* passed and were declared qualified to be registered as Chemists and Druggists:—

Brooks, John	Poplar.
Johnson, Walter Edmund	London.
Nicholson, Walter Joseph	York.
Sheppard, Ebenezer	Birmingham.
Stephenson, George Herbert	Hull
Thompson, Wm. Fk. Gamwell	Goole.

MODIFIED EXAMINATION.

Six candidates were examined. *Three* failed. The following *three* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bingham, William	Grimsby.
Powers, Thomas	Birmingham.
Widdowson, Richard	Nottingham.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's examination:—

Certificate of the College of Preceptors.

Rowland, Langshaw	Wrexham.
Woolliscroft, Henry	Wrexham.

Certificate of the University of Durham.

Simpson, William Bulmer	Darlington.

Certificate of the University of Oxford.

Baker, Walter Robert	London.

BENEVOLENT FUND.

SUBSCRIPTIONS RECEIVED DURING FEBRUARY, 1876.

	£	*s.*	*d.*
Abernethy, John, 7, Corn Market, Belfast	0	2	6
Abraham, John, 87, Bold Street, Liverpool	1	1	0
Adcock, I. D., Alcester	0	10	0
Alexander, John, 81, Athol Street, Liverpool	0	10	6
Allchin, Alfred, England House, Primrose Hill Road, N.W	0	10	6
Allen, John, Southlands View, Hyde	0	2	6
Arnold, Spencer, 42, Mount Ephraim, Tunbridge Wells	0	10	6
Askew, H. de Bosco, 17, Market Place, Cockermouth	0	2	6
Atkinson, James, 221, Union Street, Southwark	0	2	6
Austin, H. F., 126, Bermondsey Street, S.E.	1	1	0
Baigent. W. H., Shefford, Beds	0	10	6
Baildon ,H. B., 73, Princess Street, Edinburgh	2	2	0
Baker, Charles P., High Street, Chelmsford	0	10	6
Baker, Garrad, High Street, Chelmsford	0	10	6
Ball, Geo. V., 23, Parson's Street, Banbury	0	10	6
Barlow, Fredk., Stafford Street, Longton	0	10	6
Bartlett, H., 37, Crawford Street, W.	0	5	0
Bassett, Charles, Pontypridd	1	1	0
Batchelor, Alfred E., Fareham	0	5	0
Batchelor, C., Fareham	0	5	0
Bateman, John M., Palace of Abdeen, Cairo	0	10	6
Bates, Thomas W., High Street, Colchester	0	5	0
Baxter, Wm. W., Bromley, Kent	0	10	6
Bayley, J. T., Brownhills, near Walsall	0	2	6
Beard, Thos. W., 8, Strand, Walmer	0	5	0
Beeby, John, Booth Place, Falkirk	0	2	6
Bell, Wm., 14, King Street, Great Yarmouth	0	5	0
Bennett, John W., Leigh	0	5	0
Bessant, Frederick R., 105, High Street, Oxford	0	10	6
Betts, Wm. E., 134, St. James's Street, Liverpool	0	5	0
Bevan, C. F., Harwich	0	10	0
Biggleston, Edwin R., Canterbury	0	5	0
Bindloss, Geo. F., 97, Leighton Road, Kentish Town	0	10	6
Bingley, F. B., 12, High Street, Guildford	0	10	6
Blade, Edward, Halifax	0	5	0
Blanchflower, T. C., Great Yarmouth	0	2	6
Blyth, Utton, 172, New Bond Street, W.	0	5	0
Borchert, H. T. G., Royal Victoria Hospital, Netley	1	1	0
Borland, J., 7, King Street, Kilmarnock	0	10	6
Bostock, Wm., Sylvester House, Ashton-under-Lyne	0	10	6
Bower, Jno., Macclesfield	0	5	0
Bowerbank, J., 17, Market Place, Cockermouth	1	1	0
Bowker, W., 259, North Road, Preston	0	5	0
Bremner, Jas., Buchie, Banffshire	0	2	6
Brewster, Wm., Market Place, Kingston-on-Thames	0	10	6
Bright, Richard, Peterborough	0	10	6
Brook, Robert, 11, Silver Street, Halifax	0	10	6
Butler, E. D. Barry, Forest Hill	0	10	6
Butler, Robert Jas., 91, Woodhouse Lane, Leeds	0	2	6
Carr, Wm. G., Berwick	0	10	6
Carr, Robert, Berwick	0	5	0
Carteighe, Michael, 172, New Bond Street, W.	1	1	0
Chater, E. M., High Street, Watford	1	1	0
Chater, M. T., Watford	1	1	0
Chave, Wm. F., Broad Street, Hereford	0	10	6
Chemists' Ball, The Committee of	15	0	0
Chubb, James C., 29, Old Street, E.C.	1	1	0
Clark, W. W., Dorking	0	10	6
Clarke, Isabella S., 14, Sevington Street, Sutherland Gardens	0	5	0
Clarke, Jos. A., 132, London Street, Glasgow	0	10	6
Clayton, Francis C., 18, Wheeley's Lane, Birmingham	1	1	0
Clift, Joseph, Dorking	0	10	0
Cole, Fred. A., Botolph Street, Colchester	0	5	0
Colling, R., 18, Westbourne Terrace, Stockton-on-Tees	1	1	0
Connor, T. H., Alresford	0	5	0
Constance, Edward, 37, Leadenhall Street, E.C.	0	10	6
Cooke, J., Hoxton	0	10	6
Cooke, Wm., 17, St. Giles's Street, Norwich	0	5	0
Cooper, Fredk. A., 17, Market Place, Cockermouth	0	2	6
Cooper, Wm. John, Cockermouth	0	5	0
Corbyn and Co., 300, High Holborn W.C.,	1	1	0
Corner, T. B., 1, Baxtergate, Whitby	0	10	6
Cossey, Jas. D., 19, Market Place, Great Yarmouth	0	5	0
Cottle, A. J., St. Alban's Road, Watford	0	5	0
Cottrill, John W., 24, Park Terrace, Regent's Park, N.W	0	10	6
Coulson and Jacombs, 52, Ludgate Hill, Birmingham	0	10	6
Coupland, Henry, 29, South Castle Street, Liverpool	1	1	0
Cripps, Johnson, Reepham, Norwich	0	5	0
Croyden, Chas., 45, Wigmore Street, W.	0	10	6
Cutler, G. C., Rickmansworth	0	5	0
Darby and Gosden, 140, Leadenhall Street, E.C.	2	2	0
David, S. S., Lougharne	0	5	0
Davies, R. M., jun., Llandyssil	0	5	0
Davis, David F., 2, High Street, Leominster	1	1	0
Davis, R. S., 374, Old Kent Road, S.E.	0	10	6
Deacon, Fanny E., Fleckney, near Market Harborough	0	5	0
Deane, H. and Co., Clapham Common, S.W.	1	1	0
Dinneford and Co., 172, New Bond Street, W.	2	2	0
Dixon, James, North Kelsey	0	3	0
Dixon, Wm., Ash, next Sandwich	0	5	0
Dobinson, Thos., 125, Newgate Street, Bishop Auckland	0	5	0
Duncalf, Thos. H., Macclesfield	0	10	6
Dunn, F. E., Sudbury	0	5	0
Edisbury, James, F., 3, High Street, Wrexham	0	10	6
Edwards, W. S., 14, Etham Place, Old Kent Road	0	5	0
Elliot, Robert J., 62, Church Street, Liverpool	0	10	6
Elliott, Thomas, Newbold Moor, Chesterfield	0	10	6
Ellis, Wm., High Street, Burnham	0	5	0
Endle, Fredk., 5, Town Hall Buildings, Bournemouth	0	5	0
Farmer, Jno., Putney	0	10	0
Faull, Eldred, High Street, Beeston, Notts	0	5	0
Field, Jas. John, 22, Upper Gifford Street, Caledonian Rd.	1	1	0
Fingland, Jas., 28, High Street, Wavertree, Liverpool	0	10	0
Firman, Mr., Yarmouth	0	2	6
Fleming, Mrs., 107, Prescot Street, Liverpool	0	5	0
Fletcher, Jesse, 23, King Street, Dudley	0	10	6
Fletcher, Thos., Smallthorne	0	10	6
Flowerdew, W. C., York Glass Co.	0	2	6
Fox, Chas. Jas., Witney	0	5	0
Fox, William, 109, Bethnal Green Road, E.	1	1	0
Fox, Wm. and Sons, 109, Bethnal Green Road	2	2	0
Freestone, T. M., Bedminster Parade, Bristol	0	10	6
Gillespie, James, Irvine, N.B.	0	5	0
Gilmour, Wm., 11, Elm Row, Edinburgh	1	1	0
Glover, Geo., 19, Goodge Street, W.	1	1	0
Goddard, H. E., Great Yarmouth	0	2	6
Gordelier, Wm. G., 39, High Street, Sittingbourne	1	1	0
Gostling, Jno. Hy., Halesworth	0	5	0
Gostling, T. P., Diss	0	10	6
Graham, John, "Chemist," Lanark	0	2	6
Green, Richard, Croft Cottage, Ashton-under-Lyne	0	2	6
Greenall, Alfred, 303, Breck Road, Liverpool	0	10	6
Gregson, H., High Street, Walsall	0	5	0
Grove, H. W., Walsall	0	2	6
Gudgen, Fred. Geo., Turnham Green, W.	0	2	6
Haddock, B., Greetes Green, West Bromwich	0	10	6
Hall, E., Luton	0	2	6
Hammerton, Edward, High Street, Colchester	0	5	0
Harding, Jos., Harwich	0	5	0
Hardy, G., Wheelgate, Malton	0	5	0
Hargreaves, M., 108, Fylde Road, Preston	0	5	

	£	s.	d.
Harris, Wm., Infirmary, Tunbridge Wells	0	10	6
Harrison, James, St. Helen's	0	5	0
Harrison, W. B., Bridge Street, Sunderland	0	10	6
Harvey, J. W., Selhurst Road, South Norwood, S.E.	0	5	0
Harvey, Wm. S., Margate	0	10	6
Harvie, John, Stirling Street, Airdrie	0	5	0
Haugh, Thos., Buck Street, Brampton	0	5	0
Haworth, Wm., 162, Union Road, Busk, Oswaldtwistle	0	5	0
Hayland, W. C., 20, High Ousegate, York	0	5	0
Hayton, Peter B., Lingdale, Guisborough	0	5	0
Hazard, Jas. D., Highbridge	1	1	0
Hearn, John, 5, Coleman Street, E.C.	0	5	0
Highway, H., Walsall	0	5	0
Highway, M. H., Walsall	0	2	6
Hill, Arthur S., Atkins' Road, Clapham Park	2	2	0
Hinton, John, Stourport	1	1	0
Hodgkinson, Chas., 127, Aldersgate Street, E.C.	0	10	6
Hodgkinson, Geo. A., 254, Goswell Road, E.C.	0	5	0
Hogwood, Edward, 12, Commercial Place, Plough Road, Rotherhithe	1	1	0
Holmes, Walter M., 338, Oxford Street, W.	0	5	0
Holt, Richard W., Victoria Road, Seacombe	0	5	0
Hope, William, Uppingham	0	10	6
Horncastle, John, 17, Craven Road, W.	0	10	6
Howden, Robert, 78, Gracechurch Street, E.C.	1	1	0
Howell, M., 61, High Street, Peckham	0	10	6
Humpage, Benj., 6, Albert Place, Turnham Green	0	10	6
Hunt, Chas., 29, Chapel Street, Belgrave Square	0	10	6
Hunt, Thos., Workhouse, Brownlow Hill, Liverpool	0	10	6
Ingolby, Wm., Barton-on-Humber	0	2	6
Ison, Francis, Sunnyside, Ashby-de-la-Zouch	0	5	0
Ive, Wm., 115, Gloucester Road, South Kensington	1	1	0
Jackson, Christopher, Church Road, Acton	0	10	6
Jackson, Fredrick J., Bawtry, per T. Crowther	0	5	0
Jackson, John, High Street, Wetherby	0	5	0
Jackson, Joseph, 15, Talbot Road, Blackpool	0	5	0
Jackson, W. G., Hartlepool	1	1	0
James, A. W., Sketty, near Swansea	0	2	6
James, K., Beverley	0	10	6
Jeffries, H., 22, High Street, Guildford	1	1	0
Jenkins, H., 73, Red Lion Street, Holborn	1	1	0
Jennings Reginald, High Town, Hereford	0	10	6
Jones, Chas., Bromyard	0	5	0
Jones, Chas. W., 1, Bath Street, Ashby-de-la-Zouch	0	5	0
Jones, David W., 1, Commercial Place, Aberdare	0	5	0
Jones, Geo. W., Worksop	0	5	0
Jones, John, 2, Commercial Place, Aberdare	0	10	0
Jones, Owen, Colwyn	0	10	0
Jones, Rees T., Bute Street, Treherbert	0	5	0
Jones, Robt., 15, Derby Road, Kirkdale, Liverpool	0	2	6
Jones, Wm., 172, New Bond Street, W.	0	5	0
Kear, Henry F., 11, Lawrence Hill, Bristol	0	10	6
Kemp, Robt., 205, Holloway Road	0	10	6
Kershaw, E., Snaith, Yorks	0	5	0
Kidd, Wm. C., Newbury	0	2	6
Kimber, B. T., 80, St. Mary Street, Weymouth	0	5	0
King, H., 1, Churton Street, Vauxhall Bridge Road, S.W.	1	1	0
King, Wm., 4, Market Place, Huddersfield	0	10	6
Kingerlee, Geo., Buckingham	0	10	6
Knott, Samuel, 15, Norton Folgate	0	5	0
Knowles, Richard, Liverpool Road, Great Crosby	0	5	0
Lake, John H., 41, High Street Exeter	0	5	0
Lake, Richard, 63, Lupus Street, Pimlico	1	1	0
Law, Alfred, 290, Pentonville Road, N	0	2	6
Lawrance, Edmund, Welwyn, Herts	0	11	0
Laws, John, 111, Church Street, Marylebone	1	1	0
Lee, Chas. H., Dacre Hill, Rock Ferry	0	5	0
Lee Wm., Castle Northwich	0	5	0
Lenfestey, W. G., Faversham	0	10	6
Lester, Henry, 1, Bridge Street, Nuneaton	0	5	0
Lewin, Edward C., Boston	0	5	0
Litchfield, John, Longton, Staffs.	0	10	6
Littlewood, Samuel, Sutton-in-Ashfield	0	5	0
Livsey, John Ward, Middleton, near Manchester	0	2	6
Lloyd, G. H., 30, Church Street, Bilston	0	2	6
Lloyd, J. W., 30, Mount Pleasant, Liverpool	0	10	6
Lomas, C. B., 25, King Street, Leicester	0	5	0
Lomas, Joseph, Nottingham	0	5	0
Long, Henry, 2, Western Place, Brighton	0	10	6
Long, Henry, Croydon	0	10	6
Long, H., 48, High Street, Notting Hill	1	1	0
Long, John T., 257, Hotwell Road, Bristol	0	10	0
Longley, Jno. W., Leeds	0	10	6
Loten, Thos., Hornsea	0	2	6
Loverock, Henry, 1, Enville Street, Stourbridge	0	5	0
Lowe, Walter, 21, Rosamond Street, Manchester	0	10	6
McCheyne, J., Berwick	0	5	0
Mace, James, 3, St. James Street, Bacup	0	10	6
Mac George, Wm., 346, Essex Road, N.	0	10	0
Machin, Fredk. J., Huyton Road, Liverpool	0	10	6
Macintosh, A., 21, Montague Street, Rothesay	0	5	0
McIntosh, John, 7 and 9, Corn Market, Belfast	0	2	6
McIntyre, R. S., Tweedmouth	0	7	6
Mackay, John, 119, George Street, Edinburgh	1	1	0
Mackinlay, F. J., 31, St. James's Street, Liverpool	0	10	6
Maclean, James, 121, High Street, Kirkcaldy	0	2	6
Mac Ritchie, David, 41, High Street, Inverness	0	5	0

	£	s.	d.
Maiden, W. H., 20, Haymarket Street, Bury	0	5	0
Maitland, John, 10, Chester Place, Hyde Park, W.	1	1	0
Malden and Co., 195, Brompton Road, S.W.	1	1	0
Mantell, Chas., 20, Cregoe Street, Birmingham	0	10	6
Manthorp, F. W., High Street, Colchester	0	5	0
Maries, H. D., Watford	0	10	0
Marlor, Jabez, 88, High Street, Lees	0	5	0
Marsden, T. B., 12, Fern Acre, Cheetham, Manchester	0	10	6
Marshall, James A. Waltham Abbey	0	10	6
Marshall, R., Market Place, Boston	0	10	0
Marten, Frederic, 2, Plough Court, Lombard Street	0	5	0
Martin, Edw. W., 68, High Street, Guildford	0	10	6
Martin, Wm., Market Harboro'	0	5	0
Martindale, Wm., 10, New Cavendish Street, W	1	1	0
Maskery, Samuel, West Derby, Liverpool	1	1	0
Mason, Philip H., 25, High Street, Gosport	0	5	0
Mather, Ellen, Haddington	0	5	0
Mathias. Thomas, Saundersfoot, Pembrokeshire	0	10	6
Matland, Collier, 2, Osborne Street, Whitechapel, E	0	10	0
Maughan, Samuel, Binbrook	0	10	6
Maunder, Robert, 714, Rochdale Road, Manchester	0	10	6
Meldrum, E. D., 22, St. Leonard's Street, Edinburgh	0	2	6
Mellin, Chas. J., Eltham, Kent	0	5	0
Mercer, Allan, Bury New Road, Prestwich	0	10	0
Metcalfe, Wilson, High Street, Chelmsford	1	1	0
Middleton, John, 6, Bird Street, Lambeth	0	5	0
Miller, C. B., Osborne Place, Blackheath	0	10	6
Miller, Chas. S., Shanklin, Isle of Wight	0	2	6
Millidge, W. H., Newport, Isle of Wight	0	5	0
Mills, R. M., Bourne, Lincs.	0	10	0
Milne, William, 9, Welswood Place, Torquay	0	2	6
Milton, Thomas, South Parade, Chew Magna	0	5	0
Mitchell, J., 151, Oxford Street, Manchester	0	10	6
Monkhouse, Henry, All Saints, Derby	0	5	0
Moore, F. S., Castle Cary	0	5	0
Moore, Richard, Post Office, Ossett	0	2	6
Morgan, David, 25, Brecknock Road, N	0	10	6
Morley, George, Wainfleet	0	5	0
Mornement, H. J., 157, King Street, Great Yarmouth	0	5	0
Morrell, Thomas, 1, South Street, New North Road, N	0	5	0
Morris, John, Friar Street, Worcester	1	1	0
Morris, J. O., Walsall	0	2	6
Moss, John, 300, Holborn, W.C.	1	1	0
Moverly, Robert, 82, High Street, Lowestoft	0	10	6
Mumford, Alfred, Albion Place, Southampton	0	10	6
Muskett, C., Diss	0	5	0
Myers, G. H., Market Hall, Welton, near Brough, Yorks.	0	5	0
Neale, Henry, Riddings, Alfreton	0	5	0
Neve, F. C., St. Leonards	0	10	6
Newbigin, James L., Alnwick	0	10	6
Newcome, John, 70, High Street, Grantham	1	0	0
Nickson, James, Ludlow	0	5	0
Noad, Joseph, 69, Broad Street, Reading	0	5	0
Oldfield, Henry, 48, Market Street, Hyde	0	10	6
Oldham, John, Mansfield	0	10	6
Oldham, Wm., 38, Waterloo Road, Burslem	0	10	6
Ordish, Thomas, Ingleby	0	5	0
Orpe, T. M., 329, Old Kent Road, S.E.	0	10	6
Orton, Wm. B., St. Petersgate, Stockport	0	5	0
Osborne, G. C., Northampton	0	5	0
Owles, G. F., Halesworth	0	5	0
Paffard, Frank, 36, Town Hall Street, Blackburn	0	5	0
Page, John, 47, Blackfriars Road, S.E.	0	10	6
Paget, John, Loughborough	0	5	0
Parker, H. J., Blaydon-on-Tyne	0	5	0
Parker, R. H., 15, Alexandra Place, Barnstaple	0	5	0
Parkes, J. P., Leyton House, Albion Road, Stoke Newington	1	0	0
Parkin, William, Gomersal, near Leeds	0	2	6
Parkinson, Richard, 1, William Henry Street, Liverpool	0	10	6
Parry, Wm., 345, Scotland Road, Liverpool	0	5	0
Patterson, Douglas J., Mansfield	0	10	6
Peacock, George, 4, Napier Road, Kensington	[illegible]	[illegible]	0
Peacock, John R., 7 and 9, Corn Market, Belfast	0	2	6
Peake, Arthur, Earlstown, Newton-le-Willows	0	5	0
Pearce, Joseph, Crewkerne	0	5	0
Pearse, J., Cambridge	0	5	0
Pearson, Edward, 9, Market Street, Nottingham	1	1	0
Pearson, F. M., 301, Park Road, Liverpool	0	10	0
Peat, Walter, Trinity Lodge, Fareham	0	10	6
Picken, T. Wm., Newport, Salop	0	10	6
Pickup, Robert L., 89, Piccadilly, Manchester	0	5	0
Pidd, Arthur J., 221, Chester Road, Hulme, Manchester	0	10	6
Pike, Christopher, Bovey Tracey, Newton Abbot	0	10	0
Pinkerton, John S., 248, London Road, Glasgow	0	10	6
Plaister and Hillen, 13, Gledhow Terrace, South Kensington	1	1	0
Plant, Frank Geo., Sylvester House, Ashton-under-Lyne	0	2	6
Plimmer, Wm. T., Fort, Bombay	0	7	6
Plomley, James F., High Street, Rye	0	5	0
Poad, John, Looe, Cornwall	0	5	0
Poll, Wm. S., Yarmouth	0	2	6
Potts, Chas., Ilkeston	0	2	6
Potts, Robt. Alfred, 26, South Audley Street, W.	1	1	0
Potts, Richard S., Ilkeston	0	10	6
Pratt, Edward J., 183, King Street, Great Yarmouth	0	5	0
Prichard, E., 10, Vigo Street, W	1	1	0

	£	s.	d.
Priest, Edward R., Cromer	0	10	6
Proctor, B. S., 11, Grey Street, Newcastle-on-Tyne	1	1	0
Prosser, Evan T., Head Street, Colchester	0	5	0
Prust, R., 17, Metror Street, Splotland, Cardiff	0	5	0
Pullan, Thomas, 74, Lamb Lane, Bradford	0	10	6
Purdue, Thomas, Witney	0	5	0
Pryer, William S., Axminster	0	5	0
Queenborough, J., Boston	0	5	0
Quinlan, J., 457, New Cross Road, S.E.	0	10	6
Radermacher, Chas. J., 17, Albion Road, Islington	1	1	0
Ragg, Wm., Edmonton Green	1	1	0
Ragg, Wm. W., Edmonton Green, N.	0	5	0
Ralph, P., Hereford	0	10	6
Rankin, W., 7, King Street, Kilmarnock	1	1	0
Ratheram, W., Hampton-in-Arden	0	5	0
Reeve, J. J., Newhaven	0	5	0
Rendell, W. J., 202, Gray's Inn Road W.C.	0	5	0
Richardson, Hy., Chesterfield	0	5	0
Richford, E. M., St. Laurence, Thanet	0	5	0
Ritson, John, 160, City Road, Manchester	0	5	0
Roach, H. W., 8, St. James's Street, S.W.	0	10	6
Roach, Pope, 8, St. James's Street, S.W.	1	1	0
Roberts, J. C., Dolgelly	0	2	6
Roberts, M., High Street, Bangor	1	1	0
Roberts, Peter, Suffolk Lane, E.C.	0	10	6
Roberts, R. B., Llanfairfechan	0	2	6
Roberts, Robert J., Towyn	0	5	0
Roberts, W. C., Llansilin	0	2	6
Robinson, Chas. J., Streatham, S.W.	0	10	6
Robinson, Jas., 2, Orford Hill, Norwich	0	5	0
Robinson, John T., Compstall	0	2	6
Robinson, Joseph S., Alfreton	0	10	6
Robinson, Wm., Main Street, Cockermouth	0	5	0
Robson, John, 26, Scotch Street, Carlisle	0	5	0
Robson, J. B., Filey	0	5	0
Roebuck, Alfred, 30, Vernon Street, High Town, Manchester	0	5	0
Rose, Alfred, 441, Edgware Road, W.	0	10	6
Rossiter, John, R. N. Hospital, Chatham	1	1	0
Rubie, Jas. T., 19, Bernard Street, Southampton	0	10	6
Ryder, Jno. L., 24, Deepdale Terrace, Preston	0	5	0
Ryder, W. H., 57, Newhall Street, Birmingham	0	5	0
Sadler, Wm., 15, Norton Folgate	0	10	6
Sanderson, R., Watford	0	2	6
Sandford, G. W., 47, Piccadilly, W.	2	2	0
Sandy, Fredk. William, 390, Walworth Road, S.E.	0	10	6
Saunders, C. J. H., Bromley	0	2	6
Savage and Son, 4, Park Road East, Brighton	1	1	0
Schweitzer, J., 76, Pavilion Road, Sloane Street	2	2	0
Scruton, P. D., Collingham	0	5	0
Selleck, Edward, Apothecaries' Hall, E.C.	0	10	6
Seward, Wm., High Town, Hereford	0	10	0
Shaw, A., Riddings, Derby	0	5	0
Shenstone, Jas. B. B., High Street, Colchester	0	5	0
Shepherd, Geo. P., 33, High Street, Guildford	1	1	0
Shepherd, Jas., 144, Huddersfield Road, Oldham	0	10	0
Short, E. C., Bushey Heath	0	10	6
Sibary, George, Market Street, Longton	0	10	6
Sidley, Thos. J., 9, Brunswick Terrace, Stafford	0	10	6
Silvers, Francis T., 19, Church Street, Camberwell	0	10	6
Silvers, Robert, 55, Gaol Street, Great Yarmouth	0	2	6
Simcock, Jas. S., 2, Copenhagen Street, Islington	0	5	0
Simpson, A., 9, Melbourne Street, Stalybridge	0	5	0
Simpson, John, 52, North Bridge, Edinburgh	2	2	0
Simpson, W., Beverley	0	5	0
Sims, Joseph, Hirwain	0	10	6
Sims, W., Aberaman	0	5	0
Sirett, G., Buckingham	0	10	6
Sirett, Geo. B., Buckingham	0	10	6
Skoulding, Geo. S. F., Church Plain, Great Yarmouth	0	10	6
Skoulding, Wm., Wymondham	0	5	0
Slade, John, Tenbury	0	5	0
Slater, Arthur, Auburn Street, New Whittington	0	5	0
Slater, Thos., Stone	0	10	6
Slipper, James, 86, Leather Lane	0	10	6
Sloggett, Thos. C., 5, Drake Street, Plymouth	0	5	0
Smart, Chas. F., Littlehampton	0	5	0
Smith, Albert, 35, High Street, Crediton	0	2	6
Smith, Alfred W., 93, High Street, Rye	0	10	6
Smith, C. S., 9, East Street, Middlesborough	0	5	0
Smith, David, 54, High Street, Stroud	0	5	0
Smith, Edgar R., Eccleshall	0	5	0
Smith, Wm., High Street, Egham	0	10	6
Smith, Wm., Sutton Coldfield	0	10	6
Smith, Wm. F., 280, Walworth Road	1	1	0
Snape, Edward, Birmingham	0	10	6
Snoxell, Samuel, 33, High Street, Guildford	0	10	0
Solomon, W. H., 40, Market Street, Falmouth	0	5	0
Soutter, Jas. S., Hedon, Hull	0	10	6
Speechly, Geo., Bishop Stortford	0	10	6
Spencer, Chas., Gravesend	1	1	0
Spencer, W. H., Burnham Market	0	5	0
Stagg, Jas. H., Broad Row, Great Yarmouth	0	2	6
Stainer, Robert W., 84, St. James's Road, Southsea	0	5	0
Stanley, Thos., 5, Vicarage Terrace, Lewisham	0	2	6
Stannard, F. J., 15, Broad Green, Croydon	0	5	6
Stead, Walter, Westgate, Heckmondwike	0	5	0

	£	s.	d.
Stedman, Richard B., West Malling	0	5	0
Stedman, Wm., Ashford, Kent	0	10	6
Steed, Robert O., 189, Wandsworth Road	0	10	6
Steele, S., 97, Union Street, Plymouth	0	10	6
Steer, Philip R., Wood Street, Walthamstow	0	10	6
Stevens, John, High Street, Broseley	0	10	6
Stevenson, John, Baxtergate, Whitby	0	10	6
Stevenson, J. C., Strand, Todmorden	0	10	6
Steward, Alfred, Market Place, Great Yarmouth	0	5	0
Stewart, John, 6, Regent Place, Birkenhead	0	10	6
Stone, F. W., Exeter	0	10	0
Stone, John, Exeter	0	5	0
Stott, Wm., Sowerby Bridge	0	10	6
Straughton and Brown, 54, Main Street, Cockermouth	1	1	0
Street, George, 265, Whitechapel Road, E.	0	10	6
Strickett, John, 161, St. George's Road, Peckham	0	10	6
Stuart, Hy. James, Ingatestone	0	5	0
Sugden, Edward S., Cleckheaton, via Normanton	0	5	0
Sumners, M. C., Heckington, Sleaford	0	5	0
Symington, Thos., 4, Dundas Street, Edinburgh	0	5	0
Tait, William, 139, Princes Street, Edinburgh	1	1	0
Tanner, Alfred E., 134, Prescot Road, Fairfield, Liverpool	1	1	0
Taylor, Frank, Pateley Bridge, Yorks.	1	1	0
Taylor Fredk. J., Newport, Pagnell	1	1	0
Taylor, G. S., 13, Queen's Terrace, St. John's Wood, N.W.	1	1	0
Taylor, Horatio, 39, Ledbury Road, Bayswater	0	5	0
Taylor, J., Walsall	0	2	6
Taylor, Sam, 70, St. George Street, Leeds	1	1	0
Taylor, Thomas, 81, High Street, Peckham, S.E.	0	10	6
Taylor, Wm. Reay, Linthorpe Road, Middlesborough	0	5	0
Teasdale, Thos., Youlgreave	0	5	0
Teat, Thos., Waltham, Melton Mowbray	0	10	6
Tempest, Joseph, Sheriff Hutton, Yorks	0	2	6
Thacker, William, 4, Foxton Terrace, Richmond	0	10	6
Thomas, Hy., 7, Upper St. Martin's Lane, W.C.	1	1	0
Thomas, Henry, 8, London Street, Bath	0	5	0
Thomas, Horace, 14, South Colonnade, St. Leonards	1	1	0
Thomas, John, Cowbridge	0	5	0
Thomas, M., Corris, Merioneth	0	5	0
Thomas, Rees, 143, High Street, Merthyr	0	10	6
Thomas, Samuel C., Yaxley	1	1	0
Thompson, Andrew, 33, English Street, Carlisle	0	10	6
Thompson, Henry A., 22, Worship Street, Finsbury, E.C.	1	1	0
Thompson, Thomas, 23, High Street, Guildford	0	5	0
Thrower, Edward A., Diss	0	10	6
Thurlby, George, Gorleston	0	5	0
Tomlinson, James, Tindall Street, Chelmsford	1	1	0
Tottenham, Mary A., Brill	0	5	0
Towle, Alexander P., 144, Stockport Road, Manchester	1	0	0
Townley, Thomas William, Keswick	0	10	6
Townsend, Charles, 40, Aldersgate Street, E.C.	0	10	6
Trotman, Alfred C., 16, Cambridge Street, Hyde Park Square, W.	0	10	6
Turner, Benjamin, Tanworth, Hockley Heath, Birmingham	0	2	6
Turner, James, Stacksteads, Lancs.	0	5	0
Turner, Thomas, Market Street, Longton	0	5	0
Uppleby, Henry, Leamington	0	10	6
Usher, John, 114, Westgate Road, Newcastle	0	10	6
Viney, David, Isleworth	0	5	0
Wakeham, C., Helston	0	5	0
Walker, George, 64, Great Portland Street, W.	0	5	0
Walker, George, 57, Myrtle Street, Liverpool	0	2	6
Walker, Henry, 94, Brompton Rood, S.W.	0	5	0
Walker, Robert, Maidenhead	0	10	6
Walker, William, Barrhead	0	2	6
Wall, Harriet, Shaw, near Oldham	0	5	0
Wallace, William, 71, St. Vincent Street, Glasgow	0	5	0
Wallis, George, 13, Victoria Gardens, Notting Hill	0	5	0
Walsh, Edward, Cheetham Hill Road, Manchester	0	10	6
Walton, George C., Sandgate	0	10	6
Walton, Ralph, Maidenhead	0	10	6
Wand, Stephen, 18, Haymarket, Leicester	0	5	0
Ward, David, Ongar, Essex	0	10	6
Ward, William, Berwick	0	5	0
Warrior, Charles, Northallerton	0	5	0
Warrior, Henry, Northallerton	0	5	0
Warrior, William, Northallerton	0	10	6
Waterhouse, Jabez, Stamford Street, Ashton-under-Lyne	0	10	6
Waters, H. G., Emsworth	0	10	6
Waters, W. A., High Street, Rye	0	5	0
Watson, James B., Chipping, near Preston	0	5	0
Watson, Mason, 3, Summerhill Street, Newcastle-on-Tyne	0	10	6
Watson, T. E., Clayton Street, Newcastle-on-Tyne	0	10	6
Wealthall, Alfred, 156, Great Jackson Street, Manchester	0	10	6
Wearing, John, Market Place, St. Just	0	2	6
Weatherley, R. J., 3, Fore Street, Torpoint	0	2	6
Weaver, A. C., Dudley Road, Wolverhampton	0	5	0
Welborn, G., Finkin Street, Grantham	0	2	6
Wellington, Fred. G. N., South Petherton	0	5	0
West, D., High Street, Keighley	0	5	0
Wharton, Frederick, 110, Lees Road, Oldham	0	10	0
Wheeler, F., 129, High Street, Guildford	0	5	0
White, J. W., 52, Royal York Crescent, Clifton, Bristol	0	10	6
Whittaker, Ellis, Regent Road, Salford	0	10	6
Whittaker, William, Runcorn	0	10	6
Whitworth, John, 80, Goldsmith Street, Nottingham	0	10	6
Wilkes, D. T., Upton-on-Severn	0	2	6

	£	s.	d.
Wilkinson, Samuel, 35, Watson Street, Birkenhead	0	5	0
Williams, W. and H., Bridge Street, Hereford	0	10	6
Williams, James, Dorking	0	5	0
Williams, Richard P., 79, Spencer Street, Everton, Liverpool	0	2	6
Williams, Thomas, 11, Bute Street, Cardiff	0	10	6
Williams, Thomas H., 44, Seven Sisters Road, N.	0	5	0
Williams, William, 47, Richmond Row, Liverpool	0	5	0
Williams, W. R., Maesteg, Bridgend	0	2	6
Williamson, James, 11, Union Street, North Shields	0	5	0
Wilson, R., 72, Hessle Road, Hull	0	2	6
Wilson, Thomas, Walsham-le-Willows	0	5	0
Wilson, Thomas, Thornton-in-Craven, near Skipton	1	1	0
Wilson, Wm., 55, Albert Road, Morice Town, Devonport	0	5	0
Winter, William, 4, York Grove North, Peckham	0	5	0
Wise, Walter, 43, Duke Street, Manchester Square	0	10	6
Wood, Jacob, 186, Highbury New Road, N.	1	1	0
Woods, William, 27, High Street, Worcester	0	10	6
Woods, William, 45, Bedford Street, Plymouth	0	10	0
Woodward, John L. L., Bridgewater	0	5	0
Woodyatt, Richard, Macclesfield	0	5	0
Wooldridge, J., 190, Euston Road	0	10	6
Worts, A., Harwich	0	5	0
Wright, A., Market Place, Olney	0	5	0
Wright, Joseph, 165, King Street, Great Yarmouth	0	5	0
Wright, William O., 55, Scotland Road, Liverpool	0	5	0
Wrighton, T. H. G., Cannock	1	1	0
Wyatt, Francis J., 43, Norland Road, Notting Hill	0	5	0
Wynne, Edward P., 3, Pier Street, Aberystwith	0	10	6
Yarde, Giles, 60, Lamb's Conduit Street, W.C.	1	1	0

DONATIONS.

	£	s.	d.
Churchill, Walter J., 46, New Street, Birmingham	1	1	0
Cross, The Misses, 4, Nelson Place, Sheffield	0	10	6
Foster, Joseph, Collumpton	1	1	0
Kearnes, Robert W., Swan Bank, Bilston	0	5	0
Lacey, Samuel, 62, Vassal Road, North Brixton	1	1	0
Matthews, William, 12, Wigmore Street, W.	5	5	0
Negus, Samuel, Northampton	0	10	0
Sussum, Frank, 6, Market Place, Cambridge	5	5	0
Tombs, Matthew, Leominster	5	5	0
Veitch, Thomas D., Shildon, Darlington	0	10	6

Provincial Transactions.

LEEDS CHEMISTS' ASSOCIATION.

The tenth general meeting of this Association for the present session was held on Tuesday evening, March 7, under the presidency of Mr. David Hellowell, when Mr. Geo. Ward, F.C.S., delivered his fifth lecture on practical pharmacy, entitled "Crystallization.—Water of Crystallization in different Salts." The following is an abridged report:—

Crystallization.—What is a crystal? It is a solid body bounded by plain surfaces of symmetry which are disposed according to some regular law, and having an essential relation to the chemical composition and properties of the body. Crystallization presents us with some of the most interesting and beautiful phenomena in nature; witness the beauty of a snowflake or the appearance of hoar frost under the microscope. Crystals are formed with undeviating certainty, every crystalline substance having its own specific form or forms. The process may be defined as the passage of a body from the liquid or vaporous condition into that of a solid, accompanied by a regular systematical formation and arrangement of its particles. Some substances, however, do not conform to this general definition, as arsenic, sugar, plastic sulphur, and even the iron axles of railway carriages, all of which assume the crystalline form whilst in a solid condition. Crystallization from solutions takes place most rapidly at the point of contact with a cold surface, as in the case of a solution of tartar, called cream of tartar from the old method of preparing it by skimming off the crystals as they formed on the surface of the solution. Crystals are generally produced from the liquid state; which may have been brought about by application of heat alone, as in bismuth, but more frequently, by solution, as with alum, etc. The largest crystals are obtained by a slow process of formation, and this not only in the case of crystals formed from solutions, but in that of metals. When large crystals are required, the solution from which they are to be formed should not be quite saturated and should be allowed to cool slowly and quietly; much depends upon the nature of the article as to whether any special means are used to obtain fine crystals. The lecturer here showed specimens of prussiate of potash and of sugar of milk crystallized upon pieces of string which had been suspended in their solutions, as illustrative of his remarks. Trifling circumstances often greatly affect and facilitate crystallization, as in making glacial acetic acid; the solution may be in a perfectly suitable condition for crystallization taking place, but yet it refuses to do so, when on dropping a small particle of solid matter into it, the whole at once assumes the crystalline form. The liquid left behind after the first crop of crystals has been obtained from a solution is termed the mother liquor; from this a second crop of crystals may be obtained by further evaporation, but they are never so pure as the first. This mother liquor is often held in the insterstices of crystals, causing them to decrepitate when heated. The liquor held in this manner in the crystals is called water of decrepitation, which, however, is quite a different thing from water of crystallization. In a solution containing two salts, it is possible to crystallize one before the other; a fact taken advantage of in the preparation of nitrate of potash from nitrate of soda and chloride of potassium. Some salts have the capacity of crystallizing in more forms than one; if in two, they are called dimorphous, if in three, trimorphous. Substances of different chemical composition but crystallizing in the same form are said to be isomorphous; as for instance the different alums, all of which crystallize in the same form. From a solution containing isomorphous and non-isomorphous salts, the latter may be crystallized separately.

Water of Crystallization.—The form of crystals is modified by the quantity of water they contain, and some substances may be made to crystallize with different quantities of water; hence the difference in form of crystals of common soda, of Glauber's salt, and of sulphate of iron. The colour of salts is also frequently affected by the same cause. When a salt loses water of crystallization on exposure to the air it is said to effloresce; but it is often difficult to drive off the last molecule of water held by some crystals, except by the application of great heat; though there are other modes of removing water of crystallization besides heat, as by exposing crystals to the influence of bodies having a strong affinity for water. Deliquescence takes place when a salt loses its crystalline form by absorbing moisture from the surrounding atmosphere, as in the well-known instances of carbonate of potash and chloride of calcium.

Proceedings of Scientific Societies.

PARIS SOCIÉTÉ DE PHARMACIE.

A meeting of this Society was held on Wednesday, February 2, under the presidency of M. Coulier. M. Planchon gave an account of the researches of Lichtenstein upon the transformations of the larvæ of cantharides.

Action of Ether on Vegetable Principles.—M. Legrip presented a note upon a process for the extraction of vegetable juices, which he terms diactheralyse. In the course of the discussion, M. Limousin said that ether would dissolve certain of the vegetable principles. M. Legrip replied that he was persuaded that the action was a mechanical and not a solvent one; the ether held only the chlorophyll and fatty matter, and the aqueous layer contained all the active principles. M. Gobley also thought that ether did not dissolve the active principles of plants as they were found in the state of salts and not of alkaloids.

Dragon's Blood.—Some observations by M. Bretet upon dragon's blood and its adulterations were then read. The author had examined various specimens for the presence of iron, which has recently been stated to be absent from true dragon's blood. It was found that all the samples, whether true or false, contained some iron. The quantity in the genuine drug was usually very small; but some of the false specimens contained so much as to have induced the conjecture that they were formed entirely of a mixture of colcothar and resin, had not the purple red colour of the alcoholic solution indicated the presence of a small quantity of the genuine substance. The true dragon's blood examined always gave off red vapour when heated, a result that never followed the heating of the imitation. All the false specimens that appeared to have been recently manufactured gave a more or less rose-coloured adherent powder, having a resinous odour.

Vegetable Extracts.—M. Guichard made some remarks upon the subject of extracts in which he said that the figures given in the different pharmacopœias as representing the yield of vegetable extracts all differed from each other, and he proposed that uniformity should be obtained by means of inert substances such as sugar of milk, glycerine, etc, He also referred to the use of fluid extracts in various countries. In England he said the use is very limited; in Germany, on the contrary, a considerable number are met with, whilst in the United States about thirty fluid extracts are in common use. He added that he considered the use of glycerine in fluid extracts, or even in ordinary extracts, to be of great advantage. M. Desnoix said that he had found glycerine of great service in preventing extracts from becoming hard or mouldy. M. Mialhe said that he held a different opinion and that it was not necessary to introduce any foreign body into the extracts.

Pepsine and Pancreatine.—M. Petit gave an account of the differences he had observed in comparing the action of pepsin with that of pancreatin on albuminoid matters. On evaporating the two products obtained it was found that the peptic residue was amorphous, whilst the pancreatic residue was a crystalline mass containing a large proportion of leucine and a smaller proportion of tyrosine. From the same amount of albumen dissolved the peptic liquor had a rotatory power more than double that of the pancreatic liquor.

Formation of Sugar in Plants.—*A propos* of an important discussion that has recently taken place in the Academy of Sciences, on the formation of sugar in plants, M. Petit mentioned that in the vine the sugar, consisting of about two-thirds saccharose and one-third inverted sugar, appeared in the leaves, even before the flowering, in considerable quantities, amounting to 20 or 25 grams per kilogram.

Parliamentary and Law Proceedings.

SUPPOSED POISONING BY ANNATTO.

On Monday, March 6, Mr. A. A. Fletcher, coroner for the borough of Walsall, held an inquest upon the body of Arthur William Brayford, aged 13 weeks, who died on the previous Friday.

Sarah Ann Myring said: I had charge of the deceased for seven weeks, and was nursing him. The mother used to take him home on Saturdays, at dinner time, and bring him back again on Sunday night. The child was very ill when I got him first to nurse, but there was nothing the matter with him on Friday before I gave him the stuff. I had him vaccinated on the Tuesday previous to the Friday; and I used to give him the Godfrey's Cordial to comfort him. I have been in the habit of giving him half a teaspoonful about twice a week for a month preceding his death. On Friday I had none of the cordial, and sent my little boy, who is seven years old, for a pennyworth, to Mr. Jessop, the chemist, in Park Street. I sent the bottle for it. The bottle had two labels on it—one was "Rock Salmon," for a cough, and the other "Godfrey's Cordial." As soon as my boy brought the stuff I poured out half a teaspoonful and gave it to the child. I had to go to the Court, and was in a hurry when I gave the child the mixture, and did not perceive any difference in it to what I had formerly observed as Godfrey's Cordial. It was not of the same colour as the cordial—it was more of a yellowish cast, and thicker; but I, in my hurry, did not perceive the difference till after I had given it to the child. The moment the child took the mixture it began to froth at the mouth, was very ill, and vomited. He appeared to be in great pain, and struggled very much. I called for the child's grandmother, and we took the child to Mr. Jessop's shop immediately, and saw young Coates in the shop, and asked him what he had sent the child, as he had sent the wrong stuff. He told me to hush, as it should not hurt the child. There was a tallish man behind the counter with Coates, and he also said "Hush! hush! it won't hurt the child," and tried to laugh it off. We left, and went down Park Street, and when we got to the Bridge young Coates was behind us, and he took us to Mr. Shore's. As soon as we got into Mr. Shore's surgery Mr. Shore whispered a few words in Coates' ear, and then left his other patients and came to the child and gave it some medicine in a glass. The child had not had the medicine above a second when it began to vomit, and some of the stuff the child had taken came up and fell on the floor. Mr. Shore kept giving the child different sorts of medicine, to see if all the stuff would come up. He then gave it some milk; and I, having to go to the Court, left the child with his grandmother. It was about ten o'clock in the morning when I sent for the cordial, and we were at Mr. Shore's about ten minutes past one. At dinner time I received the child from the grandmother. He was then very bad, and he lingered till about a quarter to six, P.M., when he expired. At dinner time Mr. Shore came up and saw the child, and ordered it brandy and milk, and this was done.

At this stage of the proceedings the bottle containing the remainder of the stuff given to the deceased was produced and the officer was directed by the Coroner to take care of it.

In reply to Mr. Sully (the foreman), the witness said the little boy who was sent for the Godfrey's Cordial had gone for it before. There were two labels on the bottle. No fresh label had been put on the bottle when it came back from Mr. Jessop's shop. The labels were on the bottle when at Mr. Shore's. The child did not appear to suffer anything from vaccination.

Louisa Brayford corroborated Mrs. Myring as to what occurred after the deceased had been given the mixture bought at Mr. Jessop's shop, and said when she saw the child so ill she asked for the bottle containing the mixture, and on picking up the bottle and tasting its contents witness said it was "cheese colouring." It was in a dark bottle, and at a glance might easily have been mistaken for Godfrey's Cordial.

Adolphus Aylmer Coates, an apprentice chemist with Mr. Jessop, after being duly cautioned, said he desired to be sworn and give evidence. After being sworn, he said: I am an apprentice chemist and druggist with Mr. Jessop, Park Street. I have been with Mr. Jessop nearly three years. On Friday morning last a boy came into the shop, but did not ask for cordial: he asked for "colour." It was between half-past eight and nine o'clock. The boy was, I should think, about six years of age. He asked for one pennyworth of "colour." We are frequently asked for "colour," especially on Fridays, as it is chiefly used in Walsall for colouring fried fish. It is also used for colouring butter and cheese. I gave the colouring to the boy. I am confident he did not ask for Godfrey's Cordial, as the first time I asked him if he wanted "colour," and then to make sure I asked him if he wanted "fish colour," and he said "Yes." Witness here produced the bottle out of which he had supplied the "colour," and on the label of which it was stated that it contained no deleterious ingredient. Witness said the colouring was not considered poisonous

In reply to Mr. Sully, witness said children usually came for the colouring.

By a Juryman: I cannot tell whether I supplied any Godfrey's Cordial that morning or not.

By the Coroner: About ten o'clock no one was supplied by me with Godfrey's Cordial.

By Mr. Sanders (one of the jurymen): We are not required to label anything that is harmless. Had it been poisonous we would not supply it to a child at all.

At the request of one of the jury, witness examined the contents of the small bottle, and said he had no doubt it was colouring—"annatto."

In reply to Mr. Sully, witness said when at Mr. Shore's surgery Mr. Shore called his attention to the fact that there was no label on the bottle.

The child who had been sent for the cordial was here called in, and said he asked for "baby's cordial," and that it was not the last witness, but a boy who gave it to him.

This being the whole of the evidence, the Coroner summed up, and pointed out that Godfrey's Cordial was only opium mixed with treacle, and in many cases the children were drugged with it till they died. In some cases, when the parents wanted to go anywhere, they gave the child an extra dose, and the child went to sleep and never awoke again. He condemned in the most severe terms the use of Godfrey's Cordial.

The jury returned a verdict to the effect that the deceased died from a dose of annatto, administered by misadventure—in other words, a verdict of "Accidental poisoning."—*Walsall Free Press.*

POISONING BY "SPIRIT OF SALT."

On Monday an inquest was held by Mr. Humphreys, in the Kingsland Road, on the body of Frederick John Neil, aged 49. It appeared that he had by mistake drunk some spirit of salt. An unqualified assistant to a doctor attended, but it was not until the day of his death, the 9th inst., that a properly qualified medical man saw him, and he was then past recovery. The evidence of Dr. Yewans showed that death was due to the poison mentioned, which deceased used in his business. A verdict of "Death by misadventure" was recorded.—*Echo.*

Review.

FOOD: Its Adulterations, and the Methods for their Detection. By ARTHUR HILL HASSALL, M.D. London: Longmans, Green and Co. 1876.

The legislation of 1872 and 1875, on the subject of adulteration, has naturally induced the publication of much original matter, in the form of chemical and miscroscopical investigations. Processes which had been previously unknown, or known only to a few, have been very extensively tested, and the results published in the various scientific journals, and public analysts have thus been saved from falling into many errors which would have been unavoidable had not the information at their service five years ago been greatly increased.

Dr. Hassall's *Lancet* reports, and 'Food and its Adulterations,' were among the first publications in which adulteration was systematically exposed, and the crusade against it which the author then commenced has been continued more or less ever since.

We were not surprised by the announcement of a new work by Dr. Hassall, his ability as a microscopist being so well known that we might have welcomed even a reprint of the woodcuts with which his first and second works were illustrated.

The scope of the present work is more ambitious than its predecessors, inasmuch as it includes a description of "the Methods for the Detection" of adulteration. The author informs us in a short preface, that it is eighteen years since his work entitled 'Adulterations detected in Food and Medicine' was published, and that although he has "followed somewhat the method adopted in his previous books," yet he has deemed it best to bring the book out under a new title, and not as a fresh edition.

The preface also contains an acknowledgment of assistance received from Mr. Otto Hehner, but no mention of any further indebtedness.

The present volume contains a large amount of matter which was not in the previous works, but much of it, whatever its value, has but a slight connection with adulteration. For instance, the chapters on "Food its Functions and Quantity" and on "Unwholesome and Deseased Meat" have doubtless a value of their own, but would be more appropriate in a work on hygiene.

Water again can scarcely be said to be adulterated because it contains unusual proportions of albumenoid ammonia or organic nitrogen, and yet Dr. Hassall devotes some eighty pages to a description of the rival processes of Dr Frankland and Professor Wanklyn, leaving the matter ultimately in much the same condition as it was left after the recent unfinished discussion at the meeting of the Chemical Society.

Coming to that portion of the work which relates to adulteration properly so called, we note first that the microscopical delineation of the various structures fully maintains the author's reputation as a skilled miscroscopist Most of the plates are reproductions of those which appeared in the original work more than twenty years ago though some of them bear evidence of having been retouched by the engraver, but even in these cases the fidelity of the original drawing has been retained. We may specially mention the excellence of the series relating to coffee, chicory, cocoa, arrowroot and mustard.

Interspersed amongst these are a few full-sized drawings such, for instance, as cassia, cinnamon, and some leaves which Dr. Hassall believes to be used for adulterating tea, and our commendation must extend to these also. The woodcuts are in many cases accompanied by a fairly accurate description of the structure of the object delineated.

When, however, we leave the microscopical and come to the chemical portion of the book we find not only many startling statements, but some which are so irreconcilable one with the other that we are at a loss to comprehend how they come to be printed in the same book. For instance, we read on page 222, "Treacle or molasses contains *but little* cane sugar;" and on page 225, we are informed that "Molasses since it contains *much* crystallizable sugar," etc., and further, on page 232, an analysi is quoted showing molasses to contain about 63 per cent. of cane sugar. We need scarcely point out how much these statements differ alike from each other and fromthe experience of analysts generally.

The directions for the chemical examination of substances suspected of being adulterated are throughout of a feeble and defective character.

We may take another paragraph from the same chapter "Sugar," in illustration.

Dr. Hassall says, page 224, "Potato sugar may be distinguished from pure sugar in the following manner Glucose sugars fuse at 105°C., whereas cane sugar melt only when heated to 137°C., and at this temperature i immediately becomes converted into caramel, wherea glucose is unaltered at a very high temperature." Bu fortunately Dr. Hassall does remark further on, "bu the best test of all is furnished by the copper solution."

It does not appear to us that the estimation of cane sugar by polarization comes properly within the scope of a work on adulteration, but as Dr. Hassall has chosen to introduce it, it is to be regretted that the instructions which he gives are practically obsolete, being taken from publications more than ten years old.

In reference to bread we again find Dr. Hassall' opinion varying as his work proceeds. Thus, on pag 356, referring to the detection of alum in bread. he says "Another fallacious test is the logwood test," while on page 829, we find "We have tested this method, carefully examining the bread both chemically and by means of Mr. Horsley's method, and we have found that the one method corroborates the other."

As to tea, Dr. Hassall continues true to his old opinions, and deprecates even the slightest addition of foreign matter, but we entirely fail to see what argument he can adduce for allowing the presence of 1 per. cent of extraneous sandy matter in pepper.

A dealer certainly could not wash his tea leaves to remove adhering dust; but a careful sifting would, we imagine, be all that is really necessary to clean the peppercorns.

Dr. Hassall quotes some remarkable figures as to the ash and extract of certain samples. Thus we are told that green tea, in one case, gave as little as 5·13 per cent. mineral matter and black tea 5·23 per. cent.

Dr. Hassall has not given full details of these analyses, but they certainly require some explanation before we can be satisfied that he operated upon samples of pure tea.

The chapter on milk is singularly weak, and although it extends to nearly 40 pages, barely half a page is devoted to what is practically the only process now used, namely, the estimation of the "solids not fat," and it is especially to be noted that Dr. Hassall considers 9·4 per cent. "solids not fat" far too low as a standard for genuine milk, and advocates the adoption of 10·4 per cent. instead, a figure which if adopted would compel all milkmen to label their milk as a mixture in order to escape prosecution, or else to relinquish their business altogether.

The chapters on flour and bread contain much valuable information on the microscopical structure of the various kinds of flour. We cannot, however, agree with the author as to "undoubted accuracy" of the old method of estimating alum by precipitation with excess of caustic potash, filtration, neutralization, and reprecipitation with ammonia.

Some portions of the chapter on flour appear to bear a remarkable family resemblance to certain passages in 'Watt's Dictionary;' for instance, the paragraphs on gluten, p. 278, and cerealin, p. 280.

The only really good chemical portion of the work is the chapter on butter, which contains a good description of Messrs. Hehner and Angell's process, which had however already been published.

Many of the old lists of adulterations are reprinted from the author's earlier books.

These really possess historical interest, for we are quite sure that vinegar, lard, and many other substances we could name are not in these days adulterated to such an extent as described, and it is only fair to remember that Dr. Hassall, far more than any one else, has conduced to this result.

Notwithstanding the feebleness of the chemical portion of the work we welcome it as a whole for the sake of the microscopical information it contains, and we only hope that in its second edition we may notice the omission of the blemishes we have pointed out.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Proceedings of the Society of Public Analysts. Vol. I. London: 79, Great Tower Street. 1876.

Receipts and Instructions for the Preparation of Artificial Aerated Waters. By Joseph Goold. London: Barrett and Co. 1876.

A Manual of Qualitative Analysis. By William Dittmar. Edinburgh: Edmonston and Douglas. 1876.

Botany. By J. D. Hooker, C.B., F.R.S. With Illustrations. London: Macmillan and Co. 1876. (Science Primer.)

Obituary.

WILLIAM TAIT.

Many of our readers will regret to hear of the death of Mr. William Tait, senior partner in the well known firm of Duncan, Flockhart and Co., Edinburgh. The sad event took place somewhat unexpectedly on Saturday last, the 11th inst.

Mr. Tait was born in 1818, and served his apprenticeship to the late Messrs. Duncan and Flockhart. During that period he studied medicine, taking a distinguished position in his classes, but especially in botany, in which department he carried off the first prize under Professor Balfour. His love for this particular branch of science continued unabated throughout the remainder of his life. In 1842 he was licensed by the Royal College of Surgeons, but instead of entering upon surgical or medical practice he preferred to continue in the path of pharmacy.

In 1846 he became a partner in Duncan, Flockhart, and Co., and on the firm opening a branch establishment at the west end of Princes Street in that year, he took the superintendence and continued there up to his death.

Mr. Tait passed the Major examination and joined the Pharmaceutical Society early in 1852. Three years afterwards he was elected an examiner in connection with the Scottish Board, and continued to act for many years in that capacity, while at the time of his decease he was acting chairman of the examiners. He was also a member of the Edinburgh Council on several occasions, and was most regular in his attendance at the meetings of that body.

As a pharmacist he was clever and intelligent. With a very wide and extended knowledge, he was ever ready and prepared to take part in discussing any point connected with the advancement of pharmacy. He held a most decided opinion that no mere surface acquaintance with chemistry and similar subjects should entitle a candidate to be placed on the government register, and very faithfully and earnestly did he, as chairman of the examiners, speak to those who not unfrequently presented themselves before the board unprepared for their examination.

Mr. Tait's loss to the Society will be very great indeed. It was generally understood, and he himself had agreed, that the office of President of the North British Branch would be filled by him in May, at the next annual meeting. All who knew his fitness for the office must deeply regret that he has not been spared to occupy a position which he would have so admirably filled with so much credit and satisfaction to the Society and its members.

Highly as he was beloved and esteemed by those with whom he came in contact in a business capacity, he was not less beloved by those who knew him in private life. He had a kind, warm, and affectionate heart, and was a man of sterling honesty and integrity, and no one could be long in his company without feeling how truly amiable and lovable a man he was.

Not long ago he passed through a very severe and trying domestic affliction. After a tedious and painful illness, extending over more than a year, he lost his wife, and those who knew him most intimately allege that he never fully recovered the effects of this sad blow. It appears undoubted that such a sensitive and affectionate nature, coupled with so much unwearied watching by the side of one so much beloved by him, told upon his constitution, which received so great a blow that he never seems to have fully recovered himself.

Not very long since the grave closed over the remains of one of our best pharmaceutical workers, and now death has stepped in and with unsparing grasp claimed, with little warning, another of our earnest and good men. All who were privileged to know him who has just gone can but mourn and regret the great loss they have sustained, and while they grieve, strive in some measure, however remote, to follow the example of one who in all his relations in life has left such a sweet and lasting memory behind

Notice has also been received of the death of the following:—

On the 2nd of March, 1876, Mr. Matthew Husband, Pharmaceutical Chemist, of Exeter. Aged 65 years. Mr. Husband was one of the earlier Members of the Pharmaceutical Society, having joined it in 1842. In 1869, upon the occasion of the British Pharmaceutical Conference meeting in Exeter, Mr. Husband filled the onerous post of Local Secretary.

On the 11th of March, 1876, Mr. George Green, Pharmaceutical Chemist. Aged 22 years. Mr. Green was the son of the Rev. Thomas Green, Wesleyan minister, now of Aberdare. He was educated at Woodhouse Grove School, near Leeds, and Wisbeach Grammar School. In May, 1870, he was apprenticed for three and a-half years to Mr. H. H. Pollard, of Ryde. He brought a high intelligence and a peculiar aptitude for mechanics to bear upon his daily duties, with results that could not fail to gratify. He was not a mere bookworm, though assiduous in his studies. Boating, bathing and walking seemed natural to him. He loved the country, and many a long Sunday evening stroll to some village church enriched his knowledge of botany without impairing his piety. A slight mistake as to the notice required prevented his competing for a Bell Scholarship in 1873; but the following year he was successful. At the end of the session 1874-5 he obtained a silver medal for practical chemistry (five months' course) and two certificates of honour. After a few months spent at Maidenhead, Mr. Green went, at the beginning of the year, to Plough Court, but after about six weeks an affection of the right eye laid him aside. He had the best advice in London, and appeared to be convalescent, so much so that he went on a visit to his first employer in the Isle of Wight, where for a few days he seemed to make progress. But unfavourable symptoms somewhat suddenly, to outward appearance, set in, and he died on March 11. An abscess the size of a hen's egg had formed in the anterior lobe of the right hemisphere, connecting with the orbit through the sphenoidal fissure, and the root of the orbit was carious. Under such circumstances it is matter of surprise that his intellect remained unclouded until within a few hours of his death. Mr. Green was buried in the Ryde Cemetery on Wednesday, the 15th, mourned not only by his relatives, but by his former employer as for a son.

On the 12th of February, 1876, Mr. William Travis, Chemist and Druggist, of Royton, Lancashire. Aged 46 years.

On the 12th of February, 1876, Mr. John Murphy, Chemist and Druggist, of Nile Street, Hoxton. Aged 40 years. Mr. Murphy had been an Associate of the Pharmaceutical Society since 1870.

On the 12th of February, 1876, Mr. Isaac Ritson, Chemist and Druggist, of Wigton. Aged 39 years.

On the 12th of February, 1876, Mr. Samuel Robert Pike, Chemist and Druggist, of Amersham. Aged 38 years.

On the 19th of February, 1876, Mr. George Pullan, Chemist and Druggist, of Knaresborough. Aged 60 years.

On the 20th of February, 1876, Mr. John Rogers, Chemist and Druggist, of Bridge Street, Sheffield. Aged 63 years.

On the 4th of March, 1876, Mr. Stanley Fowler, Pharmaceutical Chemist, of Elgin Crescent, Notting Hill. Aged 37 years. Mr. Fowler had been a Member of the Pharmaceutical Society since 1863.

Notes and Queries.

[500] GILDING IRON LETTERS.—I shall be glad if any correspondent can favour me with a good recipe for gilding iron letters, which will resist the weather.—T. B.

[496]. BOW'S LINIMENT.—The following represents "genuine" Bow's Liniment:—

℞ Gum. Opii.	℥j
Ext. Belladon.	ʒiij
Sapo Castiliensis	℥iss
Lin. Camph. Co.	Oiss

Digest for 14 days, and filter.—T. B.

A NEW MUCILAGE.—The *Pharmacist* quotes from the *Journal de Pharmacie* a statement that if a solution of 30 grains of sulphate of aluminum in ⅝ of an ounce of water, be added to 8½ fluid ounces of a strong solution of gum arabic, a mucilage is formed capable of being used as a cement for wood, porcelain, glass, etc.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Table and Teaspoonful.

Sir,—In the discussion of this subject the old-fashioned but accurate and safe practice of sending out liquid medicines in separate doses by means of draughts in bottles containing only one dose each has been entirely overlooked. As elegant dispensing is the order of the day this is most strange. I recollect the time (especially to patients who could afford the expense) when packets of half dozen draughts were in the proportion of at least three to one of 6 oz. mixtures.

It is obvious that safety to the patients is secured and the dispenser better remunerated. Drops at any rate should be dropped out of the profession. I have often been alarmed at the risk of dispensing half ounce bottles of drops containing highly dangerous ingredients, the dose of which ranges from five to ten drops in water.

Wm. Ashton.

36, Sloane Square, S.W.,
March 11, 1876.

Sir,—While I certainly think that some measure ought to be adopted to amend the present dangerous state of things in reference to the tea and tablespoonful question, I should like to ask the question why the poor chemist should trouble his over-taxed brain by seeking to add yet another source of confusion to a business already fraught with vexatious restrictions. I certainly think with Mr. Swenden that "the reformation should rest with the prescribers and not with the dispensers," that by busying ourselves in the discovery of better means of administering concentrated doses we are only encouraging medical men in a practice rapidly becoming too common, which I think we ought as far as possible to oppose. No plan yet set forth by the numerous writers on the subject can possibly prove more simple or accurate than the use of the graduated bottles, where the divisions represent not less than ℥j from the ℥iv bottle and all larger sizes, and not less than ʒj in the ʒj, ℥iss and ℥ij bottles, which divisions I find in the best make of bottles to be pretty uniform. If, however, medical men choose to order concentrated medicines and thus cut down our profits, which in these days are surely none too large, I maintain that our responsibility should cease when we have urged upon our customers the importance of using a medicine glass; and instead of making them a present of an earthen vessel, as some have suggested, such as is fit only for hospital and dispensary patients who are in the habit of applying for their medicine with wine and ginger beer bottles, we should, I think, rather endeavour to sell a shilling or eighteenpenny medicine glass, and thus seek compensation for the loss of the profit we ought to get on the medicine. In the meantime, let us turn our attention to what is more strictly our business, and try to bring the bottles we use to greater perfection and accuracy.

G. A.

Clapham, March 14, 1876.

SPOONFULS, ETC.

Sir,—Whilst the above subject is on the *tapis*, permit me, through the medium of your columns, to suggest the propriety of calling the attention of parliament to the matter.

For my part, there seems to be little reason why we should not have imperial teaspoons, tablespoons, wine-glasses, etc., and when it is considered how frequently the lives of the public are jeopardized by reason of the latitude at present allowed to makers of such articles; surely it will be granted that the subject is one which calls for imperial legislation.

I hope the suggestion will commend itself to the consideration of your readers.

J. N. B.

March 14, 1876.

TRADE INTERESTS.

Sir,—The time is near when the forthcoming vacancies in the Council will be refilled. The interests of the trade, more especially at the present time, require that not merely savants and theorists, but that a moiety of practical commercial men shall be chosen to protect the interests of our brethren. Why vital matters deeply affecting many of us have not been decided long ago none but our Council or their learned solicitor can tell.

Take the case of poisons. We are under stringent restrictions for their sales, and should an accident occur the unfortunate vendor is at times fined, bullied by an ignorant (in these matters) coroner, and probably suffers considerably in loss of part of his trade. But the charms of a Government stamp and a patent medicine license confer upon any class of shopkeeper the privilege of vending any poison whatever. As a proof of the care of the druggist, and of imprudence of above-mentioned regulation, let any one compare the cases of accidental poisoning caused through druggists' negligence and those from stamped "remedies." *Verb. sap.*

Take, again, the case of arsenic. The Act of 1851 was a most useful and judicious one, and numbers of honest tradesmen carry out its provisions conscientiously. It should be the duty of some one to see that it is observed universally. When preparations consisting of nearly pure arsenic are indiscriminately sold to the danger of the public as "wheat dressings" and "bird fenders" it is evident that some further supervision is necessary.

The constant collisions occurring between the Inland Revenue Office and the trade also call for comment. There must be some definite law extant defining what is required of a druggist in these matters. Most tradesmen have erred through ignorance, and through there being no ready means of ascertaining to what extent they are liable. The statement of Acts of Parliament referring to the trade, published annually to the Society, is certainly an assistance to some extent, but it is evident is not sufficiently explicit. Could not the Council, as representing the trade, and the Board of Inland Revenue confer together so as to compile some easy digest of the law, and thus distinctly define our liability and terminate the causes for these paltry, annoying, and in many cases costly prosecutions?

I commend these few facts to the notice of the trade. Let us endeavour to return those members to the Council who will give some attention and assistance to business and to the welfare of the trade generally, so as not to absorb the whole time of the Council in discussing education and science.

FIDE SED CUI VIDE.

Feb. 19, 1876.

UNREGISTERED CHEMISTS AND DRUGGISTS IN GLASGOW.

Sir,—"J. G." in his letter (p. 640) asks very sarcastically, but with an apparent air of simplicity, "if it is some laxity in the Act or in the working of it which encourages this practice in Glasgow," which he so strongly deprecates, although probably he well knows that the Society is powerless to move in the matter, for every attempt of the Society to make its authority respected has only tended to increase the number of unregistered men. It has been asserted by hundreds of public men, from Walpole to Dan. O'Connell, and even in our own day by Charles Bradlaugh, that there never was an Act passed but they could drive a carriage and six through, and every attempt of the Society to prosecute offenders only shows how appropriately the words of these politicians apply to the Act of 1868.

In proof of what I assert I may be permitted, without being personal, to cite the two cases which occurred in Glasgow two years ago. In each instance a verdict was got for the Society because it was able to prove that the unregistered druggist had paid the taxes of the shop in which the poison was sold; but will the Society ever be able to get a verdict again on the same plea? I should think not; the taxes will in future be paid in the name of a medical man or in that of some registered druggist with whom an arrangement can easily be made, and to my certain knowledge this has been done.

"J. G." knows well that "patient trusting members of the Society" do not send their yearly subscriptions to keep the Society in life, but merely for the sake of getting the Journal. Some few I have no doubt are puerile and vain enough to pay even double the required amount for the privilege of being able to affix M.P.S. or A.P.S. to their names, but to the credit of the trade I am glad to say their number is infinitesimal. In proof of this assertion you have only to turn to the published report of the Registrar, pp. 632 and 633, wherein you will find it stated that the number of pharmaceutical chemists and chemists and druggists on the register in 1875 was 13,276, of which number only 3,235 are subscribers; or to put it plainly, there are 10,000 registered chemists out of the 13,000, who deny the right of the Society to represent them, and who scorn their mushroom and empty titles, preferring to retain the time-honoured designation of chemist and druggist; any one of these 10,000 registered druggists can on application, and by paying the fee, become an M.P.S. Why do they not? Simply because the game is not worth the candle. To the public a pharmaceutical chemist is a myth, but a druggist is a reality, therefore it is infinitely more profitable to be the latter than the former. But there is another and much more weighty reason, namely that the Society by exceeding the powers granted to it by the Act of 1868, have driven more than one-half of the then apprentices and assistants out of the business altogether, and their places have not been filled and cannot be filled by material of the same quality.

This is the cry in Inverness, Elgin, Aberdeen, Dundee, Edinburgh, Glasgow, and every town in Scotland I have visited for the last five years. Had the Society restricted its examinations to poisons only, as was intended by Parliament when it passed the Act, then we should have heard nothing about unregistered men opening shops or of the wholesale desertions from the trade. I have conversed with numbers of those who have left the business, and their answers were nearly always the same. "What right" they ask "has a Society, one half of whose members never passed an examination in their life, to compel us to pass examinations in latin, chemistry, botany, etc., when without any examination we could sell everything used in medicine except those poisons mentioned in the schedules of the Act?" It may be said that if the Council had not the authority of Parliament to conduct and enforce these examinations, it has at least the sanction of the Privy Council; but what can such a body know about the requirements of our business? Absolutely nothing more than the parliamentary committee please to tell them. It is all very fine in theory to prate about the position the trade—or profession—will occupy when it is composed of nothing but scientifically trained men, but it does not do to lose sight of the fact that there is such a thing as improving off the face of the earth.

PH. D.

Glasgow, Feb. 26, 1876.

The Confusion of Medicine and Pharmacy.

Sir,—The recent decision in the case of the Apothecaries' Co. *v.* Nottingham seems to have taken many persons by surprise, and I am glad to see that some of the leading men in the Pharmaceutical Society are giving their attention to the subject. I do not deny the truth of the statement contained in your leader of February 5th, and which I have only read to-day, "that there are many facts which powerfully tend to the maintenance of counter prescribing, and which, in some instances at least, provoke the chemist and druggist to its continuance;" but I cannot see that the mere fact of some medical men keeping retail shops is any justification for chemists and druggists over-stepping their proper calling as dispensers and vendors of drugs. The legally qualified medical practitioner, though under no necessity to go through the same examination as the chemist and druggist, yet is obliged to pass an examination in botany, chemistry and pharmacy, which is a sufficient guarantee that he is qualified to retail and dispense medicines with safety to the public, and I cannot see that he is any freer from the restrictions of the Pharmacy Act than the chemist and druggist. The *Medical Press and Circular* from which you quote, although it acknowledges that the fact of medical men keeping open shops lays the profession open to the retort that they are as much to blame on the one hand as the chemist and druggist on the other, yet goes on to say that, "when, as is often done, the chemist undertakes the whole treatment of a case, either alone or under a cloak of partnership with a medical man, or prescribes strong remedies for a complaint of which he knows nothing, the case is very different, and too strong measures cannot be taken to prevent such practices," and it appears to me that these are the cases which the Medical Defence Association wish to put down.

In the cases complained of at Glasgow by some of your correspondents, where chemists who are not registered keep open shops and sell and compound poisons, under the cloak of a partnership with some medical man, I presume the Pharmaceutical Society will, like the Society of Apothecaries, see its way to proceed in a similar manner.

The object of the Pharmacy and Medical Acts, if I read them aright, is the protection of the public, and I hold that it is the duty of the medical societies on the one hand, and the Pharmaceutical Society on the other, to see that the law is not evaded by incompetent and unregistered persons, and this brings me to the subject of the retailing of drugs and the sale of patent medicines containing poisons by grocers, hucksters, and other unqualified persons. I am not going to bring any "railing accusations" against the Pharmaceutical Society, but it has long been a matter of complaint that these things ought not to be. If the chemist is bound to pass a severe examination in botany, chemistry, pharmacy, and general education, is it unreasonable to ask that he should have some protection from others who are not under the same restrictions? The only advantage at present is, the protection of the title, chemist and druggist, etc , and the sale of poisons which is restricted to the latter, a privilege scarcely worth having, the responsibility being far greater than the profit. In what way, then, is he benefited for his expense and trouble? Can he have no better privileges than these? Might not, at least, the preparations of the Pharmacopœia be restricted to him, or in what other way can he be recompensed for his compulsory education and examination? At an inquest at Shelton, Hanley, Jan. 10, 1876, the jury "entered their protest against the sale of drugs of any kind by unqualified persons."—*Pharmaceutical Journal*, Jan. 22, 1876. I should like to see the opinion of some of your readers on this point, and as you have in your leader of Feb. 5 touched upon the relation of medical men to chemists, I am sure that your views on the subject of the sale of drugs, and patent medicines containing poisons, by others than registered persons, would be read with much interest.

Chemicus.

Mr. Cyrus Buott.

Sir,—Permit me to bring under the notice of the readers of the *Pharmaceutical Journal* the circumstances of Mr. Cyrus Buott, the late editor of the *Chemists and Druggists' Advocate*, and late proprietor of the *Medico-Pharmaceutical Abstract and Review*, who, now aged and infirm, is in such extreme distress that he and his daughter are wanting the bare necessaries of life.

Some members of the trade to whom the extremity of their affliction has recently become known, have given some help, and I have little doubt that this sum for their immediate succour will be considerably augmented by the donations of those who, at one time, were connected with the society of which Mr. Buott was secretary, and also of others, who though opposed to his views on pharmaceutical legislation, etc., could not but note the energy and ability he displayed in the days of the struggle that preceded the passing of the Pharmacy Act of 1868.

I shall be very pleased, on Mr. Buott's and his daughter's behalf, to receive any contribution, and reply to any inquiries.

Contributions Promised.

	£	s.	d.		£	s.	d.
Mr. Thomas Hyde Hills	2	2	0	Mr. John Page	1	1	0
,, John Williams ...	1	1	0	The *Chemist and Druggist*	1	1	0
,, George W. Sandford	2	2	0	Mr. W. S. Brown... ...	1	1	0
,, Elias Bremridge ...	1	1	0	,, Cornelius Hanbury	2	2	0
,, J. Robbins	2	2	0	,, Daniel Frazer ...	1	1	0
,, S. C. Betty	1	1	0	,, George Pattison ...	1	1	0
,, Robert Hampson ...	1	1	0	,, A. C. Wootton	1	1	0
,, Thomas Greenish...	1	1	0	,, F. M. Rimmington	0	10	0
,, John Owen	1	1	0				
,, Gustav Mellin ...	5	5	0				

Robert Hampson.

205, *St. John Street Road, London, E.C.*

Pulv. Antimonialis, B.P.

Sir,—Will you allow me through the medium of your columns to call the attention of pharmacists to the occasional substitution of sulphate of calcium for the phosphate in the preparation of Pulv. antimonialis, B. P.

Two specimens of the preparation recently examined contained not a trace of the phosphate, its place being entirely supplied by the sulphate; the quantity of oxide of antimony present in one of them was also less than it should have been.

These specimens were both supplied some year or two ago by London firms of good standing.

Fredk. Hearne.

13, *Little Chapel Street,*
Westminster, S.W., Feb. 26, 1876.

"Chemicus."—Your advertisement has been forwarded to the publishers, Messrs. J and A Churchill, 11 New Burlington Street, to whom it should have been addressed.

A. N. P.—Dr. Hesse's address is Fuerbach, near Stuttgart, Germany.

"Pix."—Pitch made from any kind of vegetable tar.

F. Bullock.—We know of no work upon the subject. Possibly you might obtain some information by consulting the blue book on the East India plantations issued about five or six years since.

A. P. S.—The vermin killer mentioned contains strychnia; its sale is therefore subject to the regulations applying to poisons in Part 1 of the poison schedule.

"Hercules."—By section 1 of 32 and 33 Vict. c. 117, it is provided that nothing contained in the first fifteen sections of the Pharmacy Act, 1868, shall apply to any registered medical practitioner who, in order to obtain his diploma for registration, has passed an examination in pharmacy, or who was registered before the passing of the Act.

D. A.—The first form is not incorrect, but we think the second preferable.

"Dye."—The leather is dyed black by brushing it with a solution of an iron salt.

G. Granville.—No.

A. M., is referred to the rule respecting anonymous communications.

Communications, Letters, etc., have been received from Mr. Seward, Mr. Heald, Mr. Radley, Mr. Harrison, Mr. Luff, Mr. Wills, Mr. Bulgin, C. W. F., Another Country M.P.S., A Country Chemist.

SYRUPUS FERRI PROTOCHLORIDI.

BY H. WILLIAMS JONES.

As protochloride of iron appears to be coming into general use, it was thought advisable to make a few experiments on the best method of combining it. A syrup appears to be the most likely compound, from the well-known property of sugar to retard oxidation. Although the higher chloride is incompatible with it, a reduction taking place, there is no apparent action with the ferrous salt.

In the first experiment a weighed quantity of the anhydrous protochloride was dissolved in water, filtered, and converted into a syrup. An unsatisfactory compound was, however, the result. The solution could not be filtered perfectly bright, and after the syrup made from it had been kept for a few days, a marked change took place. A red deposit had formed on the bottom and sides of the bottle, the body of the syrup at the same time being coloured and cloudy.

The next trial consisted in the preparation of a solution of ferrous chloride by saturating somewhat diluted hydrochloric acid with metallic iron. This was filtered, and the amount estimated in a measured portion with potassium bichromate, after reduction with zinc and hydrochloric acid, in the usual way. The strong solution was next diluted with a mixture of syrup and orange flower water, so that each fluid drachm contained one grain of the salt. The proportion used being :—

Orange Flower Water (triple) . .	1 part
Syrup	4 parts

After standing for a month the syrup exhibited no change and was as bright as when first made.

Since the anhydrous chloride as met with in commerce is partially decomposed, and as the crystals of hydrated ferrous chloride are deliquescent and rapidly oxidize in the air, the advantage of using a solution of the recently formed salt is obvious.

The orange flavour well masks the iron taste and renders the syrup an agreeable preparation.

CHAULMOGRA OIL.

BY W. DYMOCK.

There has long been a considerable difficulty in distinguishing the genuine oil from the mixtures which are sold by the native druggists. This has led to my making the following experiments with a view to the discovery of some ready test for admixture with other oils.

In the first place I made two standard samples of the oil from the seeds carefully picked: the first cold drawn, the second by boiling the powdered seeds in water. The cold drawn oil was of a pale sherry colour; after standing for a few days it became quite clear and was drawn off from the sediment, which was scanty and black. The oil remained clear for nearly two months and then begun to throw down a granular white fatty deposit, but not a very abundant one. The sp. gr., after shaking and allowing air bubbles to escape, was 0·900. Twenty minims were placed in a watch glass and one minim of strong sulphuric acid, B. P., added; on stirring with a glass rod, a bulky, tenacious, resinous mass, of reddish brown colour, was formed round the drop of acid, and the oil, after having been stirred a few minutes, turned of a rich olive green colour, the resinous portion all the time remaining separate and retaining its colour and transparency.

In preparing the sample of boiled oil it was found that after boiling and expressing the marc, a quantity of oil and oily emulsion rose to the top of the vessel in which the liquid had been allowed to cool. This was skimmed off and heated to expel water; the result was a clear oil of golden sherry colour. During the heating process a quantity of brown resin separated. Twenty minims of this oil treated with one minim of acid turned at first of a burnt sienna colour which changed after a few minutes' stirring into a rich olive green. The tenacious resinous mass was not formed as in the cold drawn oil; its formation therefore appears to depend upon the presence of the resin of the seed, which is separated during clarification when the oil is prepared by boiling.

Several commercial samples were now tested with sulphuric acid with the following results :—

Description of Sample.	Behaviour with Acid.	Conclusions.
No. 1. Colour golden sherry; consistence fluid; no deposit; strong odour of Chaulmogra.	Turned at first burnt sienna colour, afterwards rich olive green, no tenacious resin-like mass formed.	Genuine oil extracted by boiling.
No. 2. Colour pale sherry; consistence fluid; no deposit; sp. gr. 0·910; odour of Chaulmogra not very strong.	Turned at first burnt sienna colour, and a small resinous mass formed round the drop of acid. Upon stirring the bulk of the oil turned a pale dirty green.	About one-third genuine cold drawn oil mixed with two-thirds of some cheap oil, probably sesame.
No 3. Colour and consistence of commercial soft soap. Strong odour of Chaulmogra.	Turned a dirty greenish brown. Small resinous particles afterwards separated.	Probably a mixture of genuine oil with some solid fat.
No. 4. Colour pale sherry; consistence fluid; no deposit good odour of Chaulmogra.	Turned a dirty greenish brown. No resinous mass.	A mixture of boiled oil with some cheap oil, perhaps ground nut.
No. 5. Same character.	Do.	Do.

It would appear that genuine chaulmogra oil shows two marked peculiarities when treated with sulphuric acid in the way above mentioned, viz., the oil, whether drawn cold or by means of heat, gives first, a burnt sienna, and afterwards a rich olive green colour; if drawn cold a tenacious reddish brown resinous mass forms round the drop of acid and cannot be mixed with the rest of the oil.

The only genuine commercial sample (No. 1) was obtained from Messrs. Kemp and Co. of Bombay. If the resin contained in chaulmogra seeds is the active principle the cold drawn oil or the seeds themselves should be used.

Several of the common cheap oils likely to be used as adulterants were tested by sulphuric acid with the following results:

Ground Nut	Turned light brown.
Cocoa Nut	„ opaque white.
Castor Oil	„ dirty white.
Sesame	„ pale dirty green.
Linseed	„ dirty greenish brown, bulky tenacious brown resinous mass also formed.
Several Animal Fats . . .	Turned different shades of brown.

The oil of *Hydnocarpus Wightiana* has an odour resembling chaulmogra, but more acrid; the colour is greenish, not unlike some samples of cajuput oil. If kept long it throws down a white fatty deposit like that of chaulmogra. With sulphuric acid a tenacious resinous mass is formed in the cold drawn oil, and the rest turns of a light green colour. The boiled oil is of a deeper green colour, and with acid it first turns sienna brown and afterwards a light green. The seeds of *Hydnocarpus* cannot be mistaken for those of *Gynocardia;* they are much smaller, flattened, and of a dirty white colour. The kernel is dark brown, like that of the *Gynocardia.*

Bombay, Feb. 25, 1876.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 742.)

We now pass to applications of polarized light which do not require the co-operation of a microscope, but of quite different appliances. Some of these applications are not of much practical use, but all are of considerable interest to those who have an optical bent, and their inclusion here may be considered justifiable on that ground, if on no other.

Amongst the earliest observed of miscellaneous polarization phenomena the "mysterious and beautiful phenomenon"* of the polarization of the sky is, perhaps, the most interesting. The phenomenon itself may be readily observed by putting a thin selenite film before a Nicol prism, and having placed the latter to the eye sweeping across the sky from the eastern to the western horizon. The colour of the selenite will at once reveal the presence of polarized light, and the changes of colour will, as shall be shown immediately, point to changes in the direction of the polarization. But although the phenomenon was long ago observed, and its observation lies within the reach of the most simple appliances (for a bundle of glass plates and film of mica or selenite will answer the purpose), the explanation of it eluded the search of the acutest investigators, who were quite unable to make their observation of polarization by reflection from particles of vapour or particles of air fall in with the ordinary law by which the angle of polarization of any substance is the complement of its angle of refraction. But Professor Tyndall†, in about 1868, stimulated, as he says, by a remark of Sir John Herschell that he was glad that his then researches on the influence of radiations on certain vapours had brought him "into contact with the blue colour of the sky; still more so, if it should lead you to any satisfactory explanation of the polarization of skylight," set about the experimental investigation of the subject by observations upon the polariscope reactions of his experimental vapours, and obtained the following remarkable results:—First, the independent result that the blue of the sky may be produced by exceedingly minute particles of any kind of matter; secondly, that light reflected by these particles is polarized, and that the phenomena of this polarization are identical with those of the sky; and thirdly, that "matter in the fine state of division, where its particles are probably small in comparison with the height and span of a wave of light, releases itself entirely from Brewster's law (referred to above), the direction of maximum polarization being absolutely independent of the polarizing angle as hitherto defined." The experimental proofs will be found in the places cited, and do not lie within the reach of ordinary experimenters in small private laboratories, except in an illustrative experiment after Brücke.* A gramme of clean mastic is dissolved in eighty-seven grammes of absolute alcohol, and the transparent solution is allowed to drop into a beaker containing clear water briskly stirred. An exceedingly fine precipitate is thus formed, which declares its presence by its action upon light. Placing a dark surface behind the beaker, and permitting the light to fall into it from the top or front, the medium is seen to be of a very fair sky blue. The polarization phenomena of the sky may be approximately repeated on this experimental beaker, due care being taken with the relative positions of beaker, light, and polariscope. A very effective method of performing polariscope experiments upon these minute particles has been described by Professor G. G. Stokes, and consists of polarizing the light before it is allowed to fall upon the beaker, interposing the selenite film, if desired, between the polarizer and the beaker, and using the scattering particles as an analyser. The whole surface is then implicated in the phenomena.

A reference to Brewster's important confirmation of Newton's theory of the rainbow, by his discovery (in 1812), that "the light of both rainbows is wholly polarized in planes passing through the eye and the radii of the arch demonstrating that the bows are formed by reflection at or near the polarizing angle from the surface of a transparent body," is all that can be given here, and would not be thought necessary were it not that a "re-discovery" of the phenomena by Mr. G. Finlay, in 1873, was thought worthy of insertion in *Nature*, with a P.S. by no less notable a man than Professor Clerk Maxwell calling attention to Biot's and Brewster's prior observations (see Brewster's 'Optics Art, edition of 1833,' and *Nature*, of October, 1873).

Sir Charles Wheatstone's polar clock is an ingenious application of plane polarized light to practical purposes, although its use, where clocks and watches abound, is not sufficiently great to have caused it to come before the general public, or to be other than a scientific curiosity. Its action depends upon the polarization of the light of the sky just referred to. That polarization, it will be remembered, varies in character over different portions of the sky, being at a maximum in directions at right angles to a line drawn from our eye to the sun. Thus, if we examine the sky with a Savart, bi-quartz, or Nicol and sele-

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* Herschell's 'Meteorology,' 233. See also an important paper by Professor Pickering in Philosoph. Mag., 1874, vol. 47, page 127; and by M. Soret, *op. cit.* 205; and by the latter author, *ibid.* 1875, vol. 49, page 50.

† 'Fortnightly Review,' February, 1869; also 'Fragments of Science,' and 'Researches in Molecular Physics.'

* Tyndall 'On Light,' 1st ed., page 155. See also M. Soret's paper cited above in foot note.

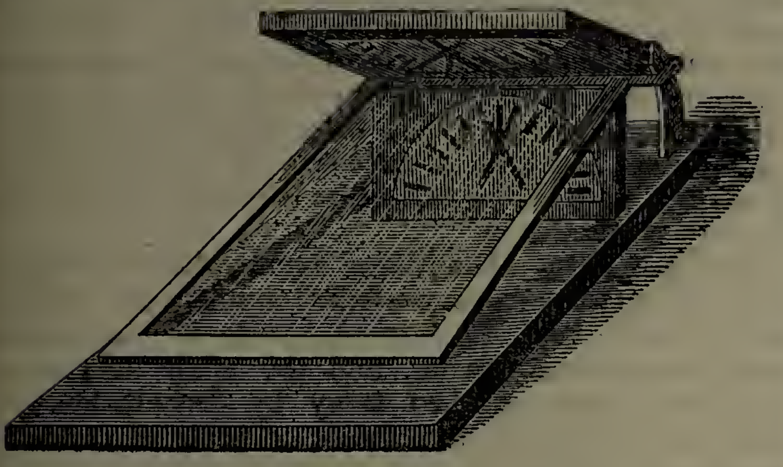

Fig. 27.

uite, we shall find that the colours or bands seen vary gradually in character as we sweep along, and that if we fix the polariscope so that it remains stationary, pointing to the north pole of the heavens, the colours or bands will vary hour by hour through the day, approaching to and receding from their maximum effect. All that is necessary then is to devise some means by which these changes of polarization shall be readily distinguished, and by which the times of their occurrence can be registered in terms of our chronology. To this end several instruments have been devised, of which one of the simplest is figured (Fig. 27), in addition to the more elaborate instrument of Sir Charles Wheatstone's construction* (Fig. 28). The former instrument could be readily made at small cost by any one accustomed to delicate work, and would not only be far more interesting than a sun-dial, but also far more useful, because not dependent upon the direct light of the sun as is the dial. The following is† a description of the instrument. “ On a plate of glass twenty-five films of selenite of equal thickness are arranged at equal distances radially in a semi-circle; they are so placed that the line bisecting the principal sections of the films shall correspond with the radii respectively, and figures corresponding to the hours are painted above each film in regular order. This plate of glass is fixed in a frame, so that its plane is inclined to the horizon 38° 32′, the complement of the polar elevation; the light, passing perpendicularly through this plate, falls at the polarizing angle 56° 45′ on a reflector of black glass, which is inclined 18° 13′ to the horizon. The apparatus being adjusted so that the glass dial plate shall be perpendicular to the polar axis of the earth, the following will be the effects when presented to an unclouded sky. At all times of the day the radii will appear of various shades of two complementary colours, which we assume to be red and green, and the hour is indicated by the figure placed opposite the radius which contains the most red.” The more elaborate instrument is by far the most accurate, but does not so fully illustrate the principles upon which both depend. The following is an abstract of Sir Charles Wheatstone's description of it. “At the extremity of a vertical pillar is fixed, within a brass ring, a glass disc, so inclined that its plane is perpendicular to the polar axis of the earth. On the lower half of this disc is a graduated semi-circle, divided into twelve parts (each of which is again sub-divided into five or ten parts), and against the divisions the hours of the day are marked, commencing and terminating with VI. Within the fixed brass ring containing the dial-plate the broad end of a conical tube is so fitted that it freely moves round its own axis; this broad end is closed by another glass disc, in the centre of which is a small star or other figure, formed of thin plates of selenite, and a hand is painted in such position as to be a prolongation of one of the principal sections of the selenites. At the smaller end of the conical tube a Nicol prism is fixed, so that either of its diagonals shall be 45° from the principal section of the selenite films. The instrument being so fixed that the axis of the conical tube shall coincide with the polar axis of the earth, and the eye of the observer being placed to the Nicol prism, it will be remarked that the selenite star will be in general richly coloured; but as the tube is turned on its axis the colours will vary in intensity, and in two positions will entirely disappear. In one of these positions a smaller circular disc in the centre of the star will be a certain colour (red for instance), while in the other position it will exhibit the complementary colour. This effect is obtained by placing the principal section of the small central disc 20° 30′ from that of the other selenites. The rule to ascertain the hour is as follows:—The tube must be turned until the coloured star entirely disappears, while the disc in the centre becomes red; the hand will then point accurately to the hour. The accuracy with which the solar time may be determined depends on the exactness with which the plane of polarization can be determined, one degree of change in the plane corresponding with four minutes of solar time.” As figured, the instrument comprises a quadrant, but this can be dispensed with when the instrument is intended to be permanently fixed, in any given latitude, and is constructed accordingly. The instrument may be set in the proper azimuth by observation as follows:—“ Ascertain the true *solar* time by means of a good watch and a time equation table” (the “sun fast and sun slow” table of the almanacks), “set the hand of the polar clock to correspond thereto, and turn the vertical pillar on its axis until the colours of the selenite entirely disappear. The instrument will then be properly adjusted.” The graduation of the lower half of the glass disc is only applicable to this hemisphere. In the southern hemisphere the upper half must be graduated, since the plane of polarization of the north celestial pole moves in the opposite directions in each hemisphere. The possessors of a bi-quartz or Savart can readily extemporize a polar clock by following the directions given so far as regards polar elevation and position in azimuth.

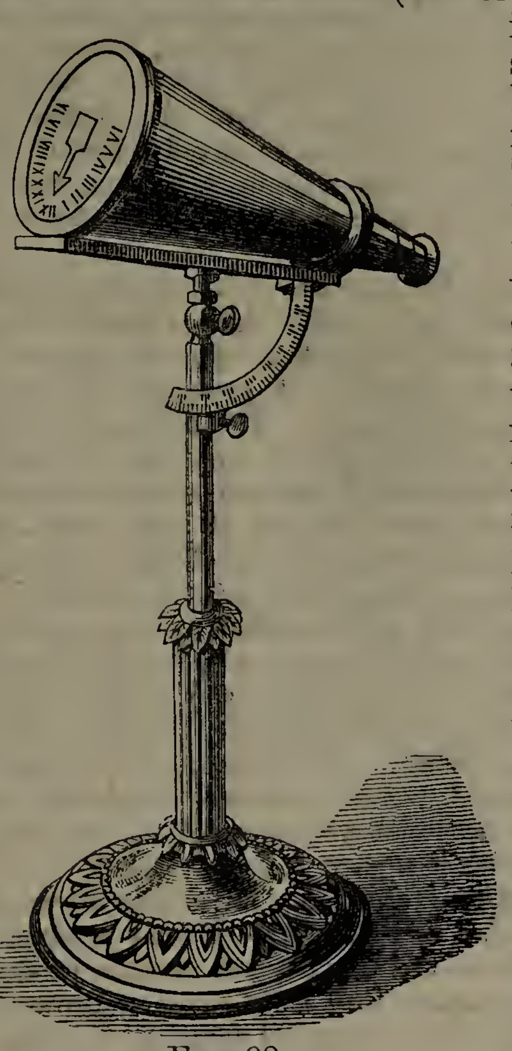

Fig. 28.

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* Both from Mr. Spottiswoode's treatise in “Nature Series.” † Quoted in *Op. Cit.*, page 89.

COTOIN; A CRYSTALLIZABLE CONSTITUENT OF COTO BARK.*

BY JULES JOBST.

The author refers to the examination of coto bark recently described by Dr. Wittstein† and states that he has obtained the same general results. But besides the constituents mentioned by Dr. Wittstein, Herr Jobst has succeeded in separating a crystallizable constituent to which he has given the name of cotoin, and considers to be probably the body to which the medicinal action of the bark is due. It was prepared in the following manner.

Coarsely powdered coto bark was extracted with cold ether in a displacement apparatus until completely exhausted. The ethereal extract was distilled in a water-bath to one-tenth of its volume, then poured still warm into a porcelain dish, and mixed with six parts of hot petroleum ether. Upon the resulting perfect evaporation of the ethylic ether a large quantity of resin was precipitated; the clear and still warm supernatant liquor was then poured off, and allowed to crystallize. Some resin was always removed with the crystals, but this generally adhered closely to the bottom, so that the crystals by stirring and decantation could be removed without difficulty. The crystalline mass was next thrown upon a filter, pressed, and recrystallized several times from hot water.

The cotoin so obtained forms yellowish white (resembling in colour commercial gallic acid) light crystals, which under a glass, or even to the naked eye, are seen to be built up of quadratic prisms. It possesses the biting taste of the bark in a high degree. It is difficultly soluble in cold water, but more soluble in hot, and is readily soluble in alcohol, ether, chloroform, and carbon bisulphide. Benzine and petroleum ether dissolve it with more difficulty, but from alcohol it can easily be obtained in large sulphur-yellow prisms. Its melting point is 124° C.

Alkalies dissolve cotoin with a yellow colour, and it is again precipitated from such solutions by acids. Concentrated nitric acid dissolves cotoin gradually in the cold, but rapidly when heated, with a blood red colour. Upon freely diluting this solution with water, brownish-red flocks are precipitated. Concentrated sulphuric acid forms with cotoin a brownish-yellow solution, and hydrochloric acid forms with it a pure yellow solution.

The aqueous solution is neutral. It reduces silver and gold salts in the cold. Basic acetate of lead produces a very yellow precipitate, but the neutral acetate produces none. In a dilute solution iron salts cause a brown-red coloration, and from a concentrated solution they throw down a dark brown precipitate. Fehling's liquor is reduced slowly in the cold, but rapidly with heat.

Elementary analyses of cotoin, dried at 100° C, gave the following results, from which the author has constructed the formula $C_{21}H_{20}O_6$.

	I.	II.	III.	Required.
Carbon .	68·54	68·36	68·68	68·47
Hydrogen.	5·47	5·12	5·50	5·43
Oxygen .	—	—	—	26·10

The lead compound obtained by precipitating an aqueous solution of cotoin with basic acetate of lead was dried at 130° C., and ignited after addition of nitric acid. The result of analysis corresponded with the formula $C_{21}H_{20}O_6 + 2\,(PbH_2O_2)$.

BISMUTH AND IRON.‡

BY R. ROTHER.

The normal bismuthous salts are very definite chemicals, and most of them can be quite easily prepared There are, though, a number of bisthumous oxysalts' which in general present great difficulty of preparation, owing to the variable nature of their composition. As several of these basic compounds are used in medicine, a certain regularity is aimed at in their constitution. But none of the various methods in use always yield exactly the same product by the same course of procedure.

Of the normal salts, the citrate has been the most troublesome to produce in a desirable shape and of constant composition. The writer believes to have made the first advance towards a satisfactory method of preparing it. The process was published in the *Pharmacist,* for September, 1872, and consisted in crystallizing the citrate from a moderately dilute and not too strongly acidulated solution of the ammonio-citrate. Since then, the writer has adopted an entirely new method, which, for simplicity, rapidity and precision, ranks the process as absolutely perfect. The astonishing simplicity is so remarkable that one is surprised the process was not discovered long before this, since it is in its nature almost directly synthetic.

If the ordinary bismuthous oxynitrate is heated for a few moments with a concentrated solution of an equivalent of citric acid, the normal citrate is generated as a heavy crystalline powder, and the nitric acid entirely freed and easily washed away by decantation. Ten parts of bismuthous oxynitrate, 7 parts of crystallized citric acid, and 30 to 40 parts of water are heated together for a few minutes, until a drop of the mixture forms a clear solution with ammonia water, the crystalline mass is then diluted with eight to ten times its volume of water, set away for a short time to let the citrate subside, and the clear liquid then decanted. The crystalline sediment is now washed three or four times in a similar manner, drained from superfluous water, and either dried on a water-bath or by exposure in the open air. The yield is about 13 2–3 parts, showing that the salt is anhydrous, and therefore its formula is $Bi'''C_6H_5O_7$.

The bismuthous citrate, as such, is not much prescribed, but it is undoubtedly superior to either the oxynitrate or oxycarbonate, both of which are medicinally much employed. The ammonio-citrate is considerably used, and as no method thus far proposed for this salt has been particularly applicable, the writer's new process for preparing the citrate in a perfectly pure and definite state will make it possible of producing an ammonio-citrate with great ease and dispatch, and also of perfect purity.

Dry bisthumous citrate, treated with the ordinary ammonia water, dissolves to a syrupy liquid, but a part agglutinates to a hard white mass, unaffected by excess of ammonia; if gentle heat is applied this dissolves, and on cooling, the whole forms a crystalline mass, soluble in water. These crystals, dried over a water-bath, are again soluble in water. The yield from 8 parts of the citrate is nearly 10 parts. This product shows that there are several modifications of the ammonio-citrate which may differ in chemical constitution as well as in physical properties.

The chemical composition of the ammonio-citrate has not been correctly given. The writer found that the same quantity of ammonia was required to form a neutral ammonio-citrate, as was separately required to form normal triammonium citrate, with the equivalent of citric acid in combination as bismuth salt, and the decomposition may be written thus: $BiC_6H_5O_7 + 3\,(NH_4OH) = (NH_4)_3C_6H_5O_7Bi(OH)_3$. The compound represented by the second number is assumed to be a combination of normal triammonium citrate with normal bismuthous hydrate, and this compound must therefore be looked upon as the true ammonio-bismuthous citrate, as all other formulæ are based upon an analysis of the scaled salt which must of necessity be an indefinite substance.

The writer has also found that normal ferric citrate when treated with ammonia, absorbs an amount corresponding as normal triammonium citrate, with the equiva lent of citric acid contained in the iron citrate, and hence the true or normal ammonio-feroxycitrate is also produced as follows:—

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* Abstract of paper in 'Neues Repertorium,' vol. xxv. p. 23.

† See before p. 301.

‡ From the *American Journal of Pharmacy* for March, 1876.

$$Fe'''C_6H_5O_7 + 3\,(NH_4OH) = (NH_4)_3\,C_6H_5O_7.Fe\,(OH)_3,$$

that is triammonium citrate combined with normal ferric hydrate. It is, therefore, the iron analogue of ammonio-bismuthous citrate.

The writer has also ascertained that besides the normal green ammonio-ferric citrate, two other ammonio-ferric citrates exist, corresponding to the di and mon-ammonium citrates. The formulæ for the three green double salts are, for triammonio-ferric citrate, $Fe'''(NH_4)_3 2(C_6H_5O_7)$, for diammonio-ferric citrate, $Fe'''(NH_4)_2C_6H_5O_7.C_6H_6O_7$, or $Fe'''(NH_4)_2H2(C_6H_5O_7)$, and for monammonio-ferric citrate, $Fe'''(NH_4)2(C_6H_6O_7)$, or $F'''(NH_4)H_2 2(C_6H_5O_7)$. The first one only is neutral, the other two are acid salts. If either of these salts is treated with ammonia in excess, the solution becomes brown, and in some cases, as for instance with the potassium double citrates, which do not hold the iron as firmly as the corresponding ammonium salts, ferric hydrate is precipitated. The reaction, therefore, indicates that a monado-fer-oxy-citrate was produced. It is, however, remarkable that the addition of citric acid or an acid monad citrate does not immediately restore the green colour, but in some instances proceeds very slowly, the transition from brown to green is not simultaneous throughout the solution, but progresses from the bottom upwards; even if the solution is occasionally shaken it resumes this order of progressive action.

The most surprising relationship is, however, evinced when ammonio-bisthumous citrate and triammonio-ferric citrate are brought together, and the change of colour is the same as when triammonium citrate is added to the iron salt. The light green solution is further remarkable for the very important fact that moderate or strong acidulation with citric or nitric acid fails to separate the bismuthous citrate. This property, therefore, renders it possible of holding bismuthous citrate in acidulated solution, providing ammonio-ferric citrate is also present.

The same amount of citric acid in combination as ammonio-bismuthous citrate, is required to change an equal equivalent of the acid combined as ferric citrate into the green ammonio-ferric citrate, as would be required in the condition of triammonium citrate. Therefore, the result is expressed as follows:—

$$\begin{aligned}&Fe'''C_6H_5O_7 + (NH_4)_3C_6H_5O_7.Bi(OH)_3\\ &= Fe'''(NH_4)_3 2(C_6H_5O_7).Bi(OH)_3.\end{aligned}$$

That is, one equivalent of triammonio-ferric citrate combined with one equivalent of normal bismuthous hydrate. This is a most peculiar compound, and possibly indicates that the normal bismuthous hydrate ($Bi(OH)_3$) differs in its affinities from the basic or oxyhydrate ($Bi(OH)O$) as the normal salts differ from the oxysalts. The compound treated with ammonia in excess becomes brown, but addition of citric acid again restores the green colour, however, similar as in case of the ammonio-ferric citrate alone, but slowly.

The new compound will doubtless become of pharmacal value, since the property of retaining the bismuth in an acidulated solution must strongly recommend it.

A NEW FORMATION OF IODOFORM, AND ON THE ACTION OF IODINE UPON WHITE PRECIPITATE.*

BY C. RICE.

About three months ago my attention was drawn by a friend to a peculiar reaction observed in preparing the following prescription:—

℞	Tinct. Iodinii.	℥ ss.
	Hydrarg. Ammon.	gr. ij.
	Ung. Acidi Carbol..	ʒ i.
	M.	

On incorporating the ingredients a sudden fading of colour was observed, and the resulting ointment was entirely white. Now, although this is in part to be ascribed to the peculiar action of iodine upon white precipitate, which, according to the investigations of V. Schwarzenbach and others (Wittstein's *Viertelj.*, vols. xi. and xiii.), consists in the elimination of the amide-group, and the formation of mercuric (red) iodide and mercuric chloride (corrosive sublimate), yet in the present instance the change was so marked, and so much more rapid than we are accustomed to see, especially in presence of an indifferent diluent like lard, as to point to some other cause. In order to ascertain, if possible, the nature and products of the reaction, the various ingredients were alternately brought in contact with each other, and it was soon found that an alcoholic solution of iodine reacted in an entirely different manner with white precipitate, than dry iodine or a solution in any other menstruum. On placing some white precipitate into a capsule, and slowly rubbing it with tincture of iodine, a dingy-grey matter was seen forming at the bottom, which occasionally gave out a peculiar crackling sound, and small bubbles of gas were seen to rise through the liquid. As the colour of the liquid was not observed to be much changed, and the substance at the bottom of the capsule was suspected to be iodide of nitrogen, I at once added a small quantity of carbolic acid—leaving out the lard—which immediately caused the quiet disappearance of the greyish deposit and produced a nearly colourless liquid, with a portion of undecomposed white precipitate as sediment. In order to further examine the difference in behaviour of alcoholic solution of iodine towards white precipitate with and without the presence of carbolic acid, the following experiment was made:—Two fluid ounces (59 c.c.) of a weak tincture of iodine—15 grs. (0·98 gm.) in 1 fluid ℥ (29·5 c.c.)—were placed into a beaker (α), and a small paper filter, containing 20 grs. (1·29 gm.) of white precipitate and tied into a loose bag, was suspended in it. Another beaker (β) was treated in the same manner, with the addition of about 10 grs. (0·6 gm.) of carbolic acid. In the course of about thirty minutes the filter-bag in (α) burst with considerable violence, and a greyish substance was found deposited in the bottom of the beaker. On shaking this gently, a series of rapid crackling and faintly explosive sounds were heard, which increased in violence with the degree of shaking. Projecting the contents of the beaker upon the flagstones, outdoors, produced a considerable explosion in bulk, accompanied and followed by a great number of fainter separate snaps, as each particle of iodide of nitrogen reached the ground. The filter-bag contained in the other beaker (β) likewise burst, owing to the escape of gas, but without violence, and at no time could there be heard any of those crackling sounds. It was evident, therefore, that the presence of carbolic acid prevented the formation of iodide of nitrogen.

A second experiment was conducted in the following manner: The same amounts of white precipitate were placed into two beakers, and 30 grs. (1·96 gm.) of iodine in scales, and 2 fl ℥ (59 c.c.) of alcohol were added to each. One beaker (α) was suspended by a cord tied below the rim in an out-of-the-way corner, and left to itself. To the other beaker (β) 20 grs. (1·2 grm.) of carbolic acid were added, and it was likewise placed on one side. In the course of about an hour the contents of the first beaker (α) exploded with a loud report, cutting off that portion of the beaker which had been in contact with the liquid, while the upper portion was left intact; this occurred every time the trial was repeated. The other beaker (β), however, even after standing for twenty-four hours, and frequent shaking, showed no signs of disturbance. There is a marked difference between the action of alcoholic solution of iodine, and dry iodine in presence of alcohol, upon white precipitate. In the former case, only as much iodine as is contained in the portion of the solution in contact with the white precipitate can form iodide of nitrogen, which is small in quantity and after explosion (which is not strong enough to shatter the vessel) merely causes a new layer of iodine solution to come in contact with the white precipitate. In the second case, however, the alcohol forms around each piece of iodine a very concentrated and dense layer of solution, which has not time to diffuse itself through the remainder of the liquid, but immediately reacts with the white precipitate, forming a much larger quantity of iodide of nitrogen at one and the same time, which by its simultaneous explosion—chiefly directed downwards, the air acting as a sort of anvil—shatters the lower part of the vessel.

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* Reprinted from *New Remedies*, Feb. 15, 1876.

In one experiment the gas bubbles, which were given off during the reaction, were carefully collected and found to be nitrogen.

During all preceding trials, made on a small scale, a very distinct iodoform odour was observed in the finished product. New trials were therefore made on a somewhat larger scale, to ascertain the proper proportions of each ingredient, as well as the products of the reaction, among which iodoform had to be looked for. I soon found that it is advisable to add some carbolic acid (about five grs., or 0·3 gm. for every 120 grs. or 7·76 gm. iodine present) to the tincture of iodine before introducing any white precipitate, as in this manner all formation of dangerous by-products is prevented. Then small lumps of white precipitate (about 184 grs. or 11·9 gm. are required for 120 grs. or 7·76 gm. iodine) are added, which will give out a peculiar hissing sound and emit a quantity of gas bubbles (nitrogen). Trituration changes the colour to muddy-brown or yellow, and finally the end of the reaction is brought about by the addition of more (about 40 grs., or 2·59 gm.) carbolic acid.

The resulting liquid is now filtered off from the undissolved residue, which is of a pure white colour, the filter is washed with alcohol until a drop of the filtrate ceases to produce cloudiness when dropped into water, and the washings are added to the first filtrate (*a*). The residue remaining upon the filter, after being completely freed by continued washing with alcohol from all soluble matters, and after again being washed with water, was found to be unchanged white precipitate, which, by prolonged washing with water, was converted into the yellowish dimercurammonium chloride. The alcoholic filtrate (*a*) was added under constant stirring to about five times its own bulk of water, producing an abundant precipitate of a yellow colour and of a strong iodoform odour. The liquid filtered from this precipitate contained small quantities of mercuric iodide and chloride. The yellow precipitate was first thoroughly washed with water, then exhausted with ether, yielding an ethereal filtrate (*b*) and a residue free from iodoform odour. This residue was dried for twenty-four hours at a temperature of about 80° C., until it ceased to lose weight, and a portion thereof was analysed. The mercury was determined as sulphide and the iodine was estimated volumetrically (by sodium hyposulphite), after being separated by Duflos' method. The figures obtained, however, did not agree with any of the known formulæ of iodides of mercury; the rest of the residue was therefore again dried at 100° C., which caused it to melt into a purplish brown mass, and a portion of it again subjected to analysis. The amount of iodine found in each case varied between 40 and 40·5 per cent., while the three known iodides of mercury contain respectively 38·6, 48·6, and 55·7 per cent. of iodine. We therefore have here, probably, a mixture of mercurous iodide (HgI) with mercuroso-mercuric iodide (Hg_2I_3), which supposition is strengthened by the reducing action which hydriodic acid and alkaline iodides exert upon the substance.

The ethereal filtrate (*b*), which contained the iodoform and mercuric iodide, was allowed to evaporate to dryness spontaneously, during which time magnificent ruby red crystals of mercuric iodide formed on the upper margin of the vessel. The residue was collected and shaken with a concentrated solution of potassium iodide, in order to remove the mercuric iodide. The undissolved portion was washed with water and weak alcohol, finally dissolved in ether, and the ethereal solution allowed to evaporate, when iodoform was left behind, amounting in quantity to only about two per cent. of the iodine originally employed. Although this reaction is therefore too unprofitable in yield to be made use of in practice, yet it is interesting in a chemical point of view, owing to the peculiar part which the carbolic acid plays in decomposing, or preventing the formation of, iodide of nitrogen as produced from alcohol, iodine and white precipitate. Without alcohol the two latter produce no iodide of nitrogen, nor does a solution of iodine in carbolic acid, without alcohol, produce iodoform.

After having concluded the main portion of my experiments, my attention was drawn to a new paper, by V. Schwarzenbach, "On the Chemistry of the Metallic Salts containing the Amide Group," published in the *Berichte der Deutschen Chemischen Gesellschaft*, 1875, 1231, which gives some further details of the action of alcohol upon iodine and white precipitate, but does not mention the peculiar behaviour with carbolic acid, as the author's attention was not directed to this substance by circumstances, such as induced me to investigate the subject nearly at the same time. In order to complete the subject, I will quote from his paper the following extracts: "Alcohol is the only liquid, which, under ordinary circumstances, can cause the production of iodide of nitrogen. Carbon bisulphide, propylic and amylic alcohols, chloroform, and glycerine were tried and found passive. However, on taking six atoms of iodine to two molecules of white precipitate, corresponding to the saturating capacity of all the constituents, and using either chloroform or amylic alcohol, strong snaps or detonations were heard in the liquid, without however at any time shattering the vessel. Gaseous chlorine acts likewise with violent energy upon white precipitate. On sprinkling some of the latter into a glass flask, filled with chlorine gas, the powder becomes very much heated in a short time, swells up, and either produces at once an explosion, or more commonly gives out a vivid green flame, which lasts a considerable time. Bromine produces similar results." (Bromine in the presence of alcohol, carbolic acid, and white precipitate produces bromoform, which may be separated finally by distillation from the accompanying bromides of mercury. Chlorine, under the same circumstances, probably produces chloroform, although I have not actually tried it; and it may perhaps be possible to produce fluoroform, if such a substance exists, by employing an appropriate apparatus.) "Other metallic salts containing the amide group were found to act in a similar manner, although with much less violence."

COMPOUNDS OF PHENOL WITH NEUTRAL SALTS OF QUININE.*

BY J. JOBST AND O. HESSE.

If an equivalent quantity of carbolic acid be added to a hot aqueous solution of neutral sulphate of quinine, the solution deposits upon cooling crystals of phenolsulphate of quinine. The same compound is obtained by dissolving sulphate of quinine in hot alcoholic solution of carbolic acid. This compound is perfectly pure after one recrystallization from boiling alcohol, and forms fine white shining prisms, easily soluble in boiling water and alcohol. At 15° C. one part of the salt requires 680 parts of water or 74 parts of 80 per cent. alcohol for solution. Ether and pure chloroform dissolve traces, but a mixture of two volumes of chloroform and one volume of 97 per cent. alcohol dissolves it freely. The latter solution, when $t=15°$, $p=2$, $l=220$, deviates the beam of polarized light to $\alpha=-6·99°$. Hence $(\alpha)_D=-158·83°$.

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* Abstract from paper in Liebig's *Annalen der Chemie,* vol. clxxx, p. 248.

The phenolsulphate of quinine in aqueous or dilute alcoholic solution acquires with perchloride of iron a yellowish colour, notwithstanding that phenol is easily separated by dilute sulphuric, hydrochloric, or nitric acids, caustic soda or ammonia, and that therefore a violet colour was to be expected. With moderately concentrated nitric acid it forms a brown red solution, which after dilution with water yields a beautiful yellow precipitate upon the addition of an excess of ammonia.

At 100° C. the salt only parts with water of crystallization, but at 130° and above it gives off a small quantity of carbolic acid, whilst the substance undergoes a further decomposition.

Analysis of the air dried salt gave figures corresponding with the formula, $2 C_{20}H_{24}N_2O_2 SO_3 \cdot C_6H_6O + 2, H_2O$.

The great similarity which exists between the crystals of this salt and the crystals which are obtained by treating commercial carbolate of quinine with alcohol, led the authors to examine them more closely. It was found that this salt corresponded completely both in its composition and properties with the phenolsulphate of quinine; so that the crystallizing power of commercial carbolate of quinine appears wholly to depend upon the presence of sulphuric acid derived from the quinine. Of a similar nature is the phenylsulphate of quinine recommended by the Berlin physicians, which consists principally of phenolsulphate of quinine.

Quinine hydrochlorate also combines very readily with carbolic acid. When a solution of carbolic acid is mixed with a hot aqueous solution of neutral hydrochlorate of quinine, upon cooling the mixture shows a preliminary milky turbidity, and then the phenol hydrochlorate of quinine crystallizes in handsome white prisms, which after a single recrystallization from boiling water are perfectly pure. This salt dissolves easily in hot water and alcohol, also in 101 parts of water at 15° C., and 4 parts of 80 per cent. alcohol. Ether dissolves traces of it.

In solution in 97 per cent. alcohol, phenol-hydrochlorate of quinine rotates the ray of polarized light, with $t=15°$, $p=2, l=220$, to $\alpha = -6{\cdot}18°$; consequently, $(\alpha)_D = -140{\cdot}45°$.

The taste of this salt is bitter, hardly like that of carbolic acid. Acids as well as bases, set the phenol free. Ferric chloride gives with it a brown yellow colour. At 100° C. it loses water of crystallization. If the crystals are heated somewhat higher, especially to 120°, carbolic acid also is set free under partial fusion. The amount of carbolic acid thus given off reaches 5 or 6 per cent. (estimated as loss), whilst the amount present in the compound reaches 10·44 per cent. Analysis of the air-dried substance gives results corresponding with the formula

$$2\,(C_{20}H_{24}N_2O_2,HCl) \cdot C_6H_6O + H_2O.$$

As this compound contains two molecules of hydrochlorate of quinine with one molecule of phenol, it might be predicted that it could be obtained through chloride of barium from phenolsulphate of quinine in the same manner as hydrochlorate of quinine from sulphate of quinine. By careful treatment of the phenolsulphate of quinine with the baryta salts of other acids still further compounds could be obtained. In this manner the authors have prepared phenolhydrobromate of quinine, which crystallizes in handsome white prisms.

The authors have named the above described salts phenol compounds in order to indicate that the phenol contained in them is easily regenerated. The phenol takes up, they consider, in respect to the sulphuric acid, a position evidently different to that it holds in the so-called phenylsulphates. This question they do not, however, discuss, but simply affirm that the carbolic acid present in their compounds has lost its caustic, and therefore its poisonous properties, whilst as far as they have been able to judge it still retains its useful properties. They have now taken the necessary steps for testing the therapeutic value of these compounds on a considerable scale.

PENCILS OF NITRATE OF ZINC.[*]

Pencils and cones of nitrate of zinc, which have come into use of late for cauterizing purposes, may be made as follows: Dissolve good commercial zinc in nitric acid (specific gravity 1·200), until the latter is saturated; separate the solution from the undissolved zinc, and while still warm, add one part of precipitated carbonate of zinc for every thirty-two parts of zinc in solution. The carbonic acid of the carbonate of zinc is transferred to the iron, which contaminates the commercial zinc and is present as ferric nitrate, and an additional quantity of nitrate of zinc is formed; the heat, however, causes the decomposition of the ferric corbonate, the carbonic acid escapes, and ferric oxide together with the excess of carbonate of zinc is deposited. Filter the solution, which must be considerably diluted with water to prevent it from tearing the filter, and evaporate it on a sand-bath until it appears as a quiet, fused mass, but yet liquid. Should the evaporation have been conducted too far, which is indicated by the escape of yellowish fumes, the vessel should be removed from the fire, allowed to cool, and a quantity of very dilute nitric acid added, after which it is again to be evaporated to the proper point. This fused liquid, which must not be so hot as to ignite paper on which a few drops have been allowed to fall, is poured into paper moulds about four inches in length, made by rolling paper around glass rods or lead pencils, pasting the edge and closing the bottom. No oil or fat of any kind must be used, as the paper will invariably take fire in this case. When the sticks are hard they are inclosed in glass tubes, and the latter well corked. For use, a small quantity of the paper is removed from one end by means of a knife, and, if desired, the end of the pencil may be pointed.

THE MANUFACTURE OF CITRIC AND TARTARIC ACID.[†]

BY ROBERT WARINGTON.

We have to-night to speak of two manufactures which are frequently pursued together; they are, however, on many points essentially distinct, and we shall have to treat the whole subject with considerable brevity in order to include the principal facts in the compass of a single paper. Some months ago I laid before the Chemical Society a series of laboratory notes on the chemistry of citric and tartaric acid. These notes were chiefly occupied with a description of analytical processes suitable for the examination of the various materials and products of the two manufactures. This paper will be found in the Journal of the Society for October, 1875.[‡] I propose on the present occasion to omit this part of the subject as far as possible, and to treat rather of the general chemistry of the manufacture.

Citric acid has been known to us as a distinct acid since 1784, when it was separated from lemon juice by Scheele. Citric acid occurs in many vegetable juices; it is obtained for the purpose of the arts from the fruit of three species of the genus *Citrus*, namely, the lemon, bergamot, and lime. Lemon juice (from which about three-fourths of English citric acid is made) is exported as concentrated juice from Sicily. Concentrated bergamot juice is prepared on the Calabrian coast of South Italy, and is exported thence or from Messina. Concentrated lime juice is exported in small quantities from Montserrat and Dominica in the West Indies. The total quantity of lemon and bergamot juice shipped to England during 1875 was certainly not under 1800 pipes, and perhaps reached 2000; of this about 500 pipes were bergamot. Besides the juice used for the citric acid manufacture, a rather considerable quantity is exported to Liverpool and Glasgow for the use of the calico printers. The quantity of concentrated lime juice used in the citric acid manufacture in 1875 was about 100 pipes.

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[*] Reprinted from *New Remedies*, Feb. 15, 1876.

[‡] Paper read before the Chemical Section of the Society of Arts. From the *Journal of the Society of Arts*.

[‡] See before, pp. 384, 407, etc.

The concentrated lemon juice of Sicily is obtained from windfalls, and from more or less damaged fruits, which could not be shipped as lemons; from such fruit essence and juice are prepared. The lemons, after peeling, are packed in flag baskets, having a very small mouth; these baskets are placed one on the other, so that the mouth of each is closed by the basket above it; the whole is then pressed in a screw press. On an average 13,000 lemons are required to yield one pipe (108 gallons) of raw juice. The concentration is effected in a copper vessel over an open fire; the juice is boiled down till it marks, when cold, 60° on the citrometer. On the citrometer 1° is equal to ·004 specific gravity, 60° therefore equal 1·24 specific gravity. The hot concentrated juice is strained through canvas into pipes, and is then ready for exportation.

We turn next to the composition of juice. The mode of testing raw juice in Sicily is rough in the extreme. Solid carbonate of ammonium is placed in a tall glass, and a certain measure of juice is poured on it; the character of the juice is then judged by the height which the effervescence reaches in the glass. In England juice is also purchased on the basis of its acidity. The free acid in juice is expressed in ounces of citric acid per gallon; but it must be recollected that in commercial analyses this citric acid is reckoned as containing only half a molecule of water (atomic weight 201), while ordinary crystallized citric acid really contains a whole molecule (atomic weight 210). In the present paper the citric acid in juice will be expressed in terms of ordinary crystallized acid.

There are two well marked kinds of lemon juice; the first is of high acidity, and contains a very small proportion of combined organic acids; the second is of low acidity, and contains a much larger proportion of combined acid. The raw juice which is pressed in England from fine lemons belongs to the first class; it contains about 12 ozs. of free acid per gallon, and the combined organic acids are only about 2½ per cent. of the total organic acids present. The juice pressed in Sicily from inferior fruit has a much lower acidity. The pressings in November will contain about 9 ozs. of free acid, and this will diminish to about 6 ozs. by the end of April; the combined organic acids are, however, as much as 7 to 9 per cent. of the total acids. The concentrated juice from Sicily is similar in character to the juice last mentioned, concentration increasing indeed to a small extent the proportion of combined acid. Now and then, however, concentrated juice, similar to that obtained from English pressed juice, is to be met with.*

Concentrated lemon juice is considered to be of standard quality when it contains 64 ozs. of nominal citric acid, that is 66·87 ozs. of crystallized acid per gallon. In bygone years the acidity was usually as high as 71 or 72 ozs., but is now often below 62 ozs. of the crystallized acid. The present average is about 63 ozs. Concentrated juice generally contains 7—8 ozs. of combined organic acid (calculated as citric) per gallon, amounting to about 10 per cent. of the total organic acids. When concentrated juice is kept, a deposit of citrate of calcium generally takes place, which is often considerable.

Concentrated bergamot juice has a higher gravity, but a lower acidity than lemon juice; it will average about 51 ozs. of crystallized acid per gallon. The acidity being low, the proportion of combined acid is high. The quantity of combined acid per gallon is about 7-8 ozs., and its proportion to the total acids 12-13 per cent. Bergamot is very commonly mixed with lemon juice, or sold under that name, manufacturers of citric acid having a prejudice against it.

With lime juice I am less acquainted; it appears to vary in the same manner as lemon juice. Raw Montserrat juice has an average acidity of about 12 ozs. per gallon, and contains combined acid equal to about 5 per cent. of the total acids. Concentrated lime juice is very different from concentrated lemon or bergamot juice; it is a very thick viscid fluid. The average gravity of concentrated Montserrat juice is 1·32, and its acidity equals 93 ozs.; occasionally the acidity of lime juice will reach 112 ozs., and I am told that crystals of citric acid have been observed in it. Two samples of Montserrat juice gave me an average of 8·6 ozs. of combined acid per gallon, equal to 7·36 per cent. of the total acids. A very acid Dominica juice contained 4·6 ozs. per gallon, or 3·93 per cent.

We have hitherto spoken of the total organic acid in juice, whether free or combined; it is clearly, however, of great importance to ascertain to what extent this acid is citric acid. There is no difficulty in determining the quantity of the acids in juice which yield insoluble calcium salts, and as citric acid is, we believe, the only acid in juice which has this property, the method practically amounts to a direct determination of citric acid. Examining lemon juice in this manner we again find that it falls into two classes. In English pressed juice—the kind which shows a high acidity and low proportion of combined acid—apparently about 1 per cent. of the total organic acids forms a soluble calcium salt, and is therefore not citric. In a single analysis of Sicilian raw juice there was, on the other hand, 8·3 per cent. of the organic acids unprecipitable. With this agrees Sicilian concentrated juice, which gave as a mean of several analyses of 8·5 per cent of unprecipitable acid. There is, however, great variation in the proportion, and I have met with concentrated juice containing as little as 5·4, and as much as 11·2 of unprecipitable acid per 100 of total acids. The juice of different seasons is well known by the manufacturer to differ frequently in quality. Two analyses of concentrated bergamot juice gave a mean of 11·9 per cent. of unprecipitable acid; three analyses of raw lime juice 8·8; and four analyses of concentrated lime juice 11·3 per cent. of acids having soluble calcium salts. It has naturally been supposed that the rough mode of concentrating the juice, employed in Sicily and the West Indies, must destroy a portion of the citric acid, and introduce simpler acids in its place; the figures here given do not, however, point to any large increase in the proportion of unprecipitable acid during concentration, and show that unprecipitable acids may occur in notable quantity in raw juice. Of the acids other than citric occurring in juice, a small proportion is made up of formic, acetic, and homologous acids, but by far the larger proportion consists of non-volatile acids.

Malic acid is mentioned in most books as a constituent of lemon juice; no distinct proof of its existence is however given. Mr. D. Howard has, however, told me that he once obtained a large quantity of malic acid from a parcel of bergamot juice. I believe that other acids besides malic are generally present.

Having ascertained in many instances the amount of precipitable acid in juice, it is important to inquire—How does this direct mode of determination agree with the usual valuation of juice based upon its acidity? In the case of lemon juice, it appears that the result arrived at by precipitation is 2—3 per cent. more or less than that calculated from the acidity. In two analyses of bergamot juice the two methods gave nearly agreeing results. With lime juice, on the other hand, whether raw or concentrated, the precipitable acid is always below that calculated from acidity, and indeed 3—7 per cent. less. I am told by a maker using concentrated lime juice, that this juice never yields so good a return of citric acid as lemon juice; an experience which quite agrees with the above statement. Of the two methods of valuing juice, that by precipitation as calcium salt is of course the more accurate.

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* Some English pressed juice, concentrated in the laboratory, gave a product marking only 49° on the citrometer, and containing 68·9 ozs. of free acid, and 2·26 ozs. of combined acid, equal to 3·2 per cent. of the total.

The process of preparing citric acid from juice is exactly the same as that employed by Scheele in his original investigation; the improvements since his time have been chiefly mechanical The concentrated juice, diluted with water, is first neutralized by whiting, the operation being aided by heat. The resulting citrate of calcium has a different mechanical character, whether the juice is added to the whiting, or the whiting to the juice; in the former case precipitation is immediate, and the precipitate is finely divided; in the second case precipitation is more gradual, and the citrate heavy and more crystalline.

Concentrated lemon juice is never perfectly neutralized by chalk, however long the boiling may be continued; litmus is thus of no use in determining the point of saturation ; this is, however, readily ascertained by testing a portion of the mixture for acid by a further addition of whiting, and for excess of whiting by a few drops of acid, effervescence in either case being the indication sought. The amount of unneutralized acid on the large scale is 1—2½ per cent. of the acidity of the juice. It has been proposed to complete the neutralization with slaked lime. This would no doubt precipitate a further quantity of citric acid; but it is found that perfect neutralization occasions the precipitation of much colouring matter and impurity; the manufacturer prefers, therefore, to leave the liquor in its natural feeble acidity. Pure citric acid is readily and completely neutralized by chalk, malic and aconitic acid are not. Citric acid if mixed with phosphoric acid, and especially with phosphate of iron, is also not neutralized by boiling with chalk. As phosphoric acid and iron are certainly present, and probably also malic and aconitic acid, the explanation of the partial neutralization of juice is not difficult.

A considerable improvement in the manufacture both of citric and tartaric acid is the introduction of vacuum filters ; by their means precipitates can be washed with a far smaller quantity of water than formerly; this is specially important in the case of citrate of calcium, owing to its partial solubility in water. Crystalline citrate of calcium prepared in the laboratory, I find to have a mean solubility of 1 in 1180 at 14° and of 1 in 1730 at 90-100° C., the citrate being, as is well known, less soluble in hot than in cold water. A specimen of amorphous citrate, prepared by adding juice to whiting, had a higher solubility, namely 1 in 707 at 18° C., and 1 in 1123 at 100° C. There is no doubt that a rather considerable loss occurs in washing citrate, and in warm weather there is also risk of decomposition if this operation is not quickly conducted.

The citrate of calcium after washing is mixed with water, and is then ready for decomposition with sulphuric acid, by which sulphate of calcium (gypsum), and free citric acid are produced. There is a very clever practical test for ascertaining when the sulphuric acid has been added in excess. The weak liquor being saturated with gypsum, chloride of barium would indicate sulphuric acid long before the sulphuric acid was actually in excess, and would therefore be of little use. The manufacturer employs as his test chloride of calcium; this in a liquor saturated with gypsum yields a precipitate only when free sulphuric acid is present: the precipitate takes a little time to form.

The gypsum resulting from the decomposition of the citrate is washed on a vacuum filter, and the citric acid liquors are evaporated, generally in leaden baths about 9 inches deep, heated by steam. Vacuum pans may be used both in concentrating citric and tartaric liquors, but are more convenient for weak liquors than for stronger solutions evaporated for crystallization. During the evaporation much gypsum is deposited ; this adheres to the bath, the clear liquid is run off, and concentration resumed. The first crystallizations are by granulation. The hot concentrated liquor is run into a tub provided with a revolving agitator; this is kept in motion for about 24 hours, and the acid is deposited as a granular salt. The mother liquor is then again concentrated, and a second granulation takes place. From the second mother liquor a third crystallization can be obtained. The residual liquor is then generally too dark and impure to yield further crops of crystal, and is then known as "old liquor." Granulation may be looked on as a great practical improvement on the former method of crystallizing by standing, the citric acid being separated from the solution in about 1-5th the time required for ordinary crystallization. Granulation seems to have been introduced about 1856.

The white saleable crystals of citric acid are obtained by re-dissolving the granulated salt, heating it with animal charcoal, filtering, and then crystallizing the concentrated bright liquor in leaden trays about three inches deep. The difference in the solubility of citric acid in hot and cold water is such that a hot saturated solution almost solidifies on cooling; it is necessary, therefore, to employ shallow vessels for crystallization. The animal charcoal used is free from phosphate of calcium, which is removed by a previous treatment with hydrochloric acid ; without this precaution the phosphate would pass into the citric acid.

Commercial citric acid always contains a trace of lead, most of the operations being performed in leaden vessels; if acid is required free from lead, stoneware apparatus must be used.

The "old liquor," which will no longer yield crystals of citric acid, is diluted with water, and precipitated by whiting with the aid of heat, precisely as in the case of the original juice. The citrate of calcium thus obtained is pure and clean; it is decomposed with sulphuric acid in the ordinary way, and the citric acid thus recovered is added to the general liquors. Old liquor is never perfectly neutralized by chalk. The acidity may possibly be partly due to aconitic acid, formed during the long heating of the citric acid liquors ; it may also, as already mentioned, be occasioned by the presence of phosphate of iron or aluminium in the liquor ; the latter reaction we shall refer to more presently.

The proportion of citric acid, which can be obtained from juice in the form of crystal, varies in different seasons, according to the quality of the juice employed. It has been ascertained at the experimental stations in Germany that the proportion of malic acid to tartaric acid varies in the grape in different years ; that in good years the proportion of tartaric acid is high, and of malic acid low, while in bad years the reverse is the case. Probably similar variations may be observed in the juice of all fruit, though the fruits of tropical and subtropical countries will naturally be less liable to such variations. Most books, at the present day, continue to quote the statement of Samuel Parkes in his essay published 1815, that 20 gallons of (raw) lemon juice will yield 10 pounds of citric acid. Supposing the juice to contain 12 ounces to the gallon, this is a yield of only 66 per cent., one third of the acid being lost. In the trade it is usual to speak of 20 per cent. as being the loss in making citric acid. This however may be taken as the extreme loss, occurring only in years of inferior juice. If the citric acid in the juice is reckoned from its acidity, we may assume the loss in manufacture to vary from 12—20 per cent. as its extreme ranges, and depending chiefly upon the season.

The quantity of citric acid made in this country, in 1875, was about 300 tons. The manufacture has lately been in a depressed state, due to the high price of juice, owing, it is said, to disease in the lemon orchards ; the make is nevertheless much higher than formerly, being estimated in Muspratt's Dictionary (rather more than 20 years ago) at 60 to 80 tons per annum. With the exception of Messrs. Sturge's factory, at Birmingham, the manufacture is confined to the neighbourhood of

London, where there are four factories. Citric acid is made in various foreign countries, but none is imported.

We turn in the next place to the manufacture of tartaric acid.

Tartaric acid was first obtained in a separate form by Scheele in 1769. It occurs, like citric acid, in many vegetable juices. The source from which it has always been prepared on the large scale is the grape. Grapes contain a considerable, but variable amount of acid tartrate of potassium, with probably a little tartrate of calcium, and some free tartaric acid. When grape juice is fermented, and alcohol produced, the acid tartrate of potassium is gradually thrown out of solution, being insoluble in spirit. A crystalline deposit of the acid tartrate of potassium, with some tartrate of calcium, is formed on the sides of the casks, and is known as "argol." At the same time, a more bulky precipitate is separated, consisting of yeast, and the various suspended matters of the must; this precipitate, which is known as "lees," also contains a considerable amount of tartrates, thrown out of solution by the formation of alcohol. From these two products, argol and lees, a purer form of bitartrate of potassium is prepared by a rough process of solution in hot water and crystallization; the substance thus obtained is known as "tartar." This tartar is always more or less highly coloured. By a subsequent process of refinement, it is obtained without colour, and is known as "cream of tartar." Nearly the whole of the tartaric acid manufactured in this country is made from coloured tartars. Argols and lees are also used, but to a much smaller extent.

Every country producing wine does not manufacture tartar. If the wine is plastered, the quantity of bitartrate of potassium deposited during fermentation is greatly diminished, tartrate of calcium being formed instead; in such cases the lees contain too little bitartrate to pay for its extraction. Plastering is effected by treading plaster (a baked native sulphate of calcium) with the grapes. This process is almost universal in Spain, is common in the south of France, and is adopted in some of the Greek Islands, and in the Marsala district of Sicily; in other districts of Sicily, in Italy, Germany, and a great part of France, plastering is not practised.

Italy exports nearly the whole of the coloured tartars used in England; a small amount of coloured tartar, and a good deal of cream, come to us from Bordeaux and Marseilles. The total imports of tartar recorded in the Customs' bills of entry for 1875 amounted to 6765 casks of which 2295 casks were from Bordeaux and Marseilles, and consisted in greatest part of cream. The weight of coloured tartar imported might be from these data, 2000 to 2500 tons. The amount of tartar used, calculated from the tartaric acid made, would be 1650 tons. It must be recollected, however, that tartar is used for other purposes besides the manufacture of tartaric acid. The records in the bills of entry are also liable to serious errors, both of excess and deficiency. Besides tartar and argol, wine lees are imported from Spain, Italy, France, and Greece. About 1400 tons of wine lees were employed last year in this country for the manufacture of tartaric acid.

The best class of coloured tartars consist of nearly pure bitartrate of potassium; such tartars, as those of Messina, contain about 76 per cent. of tartaric acid, of which 1½ to 3½ exists as tartrate of calcium. Good ordinary tartar, as that of Naples (St. Antimo), will contain 74 to 75 per cent. of tartaric acid, of which 3 to 4½ is present as tartrate of calcium. Vinaccia tartar is of lower quality; it is prepared in a variety of districts from the skins and solid matter of the grape, which remain after pressing; it will contain about 70 to 73 per cent. of tartaric acid, 5 to 7 per cent. being in the state of calcium tartrate. The table following shows the detailed composition of two samples of good tartar of different quality. The potash in these analyses is calculated from the acidity of the tartar.

Argol being a natural, and not a manufactured product, has a much wider range of composition than tartar. Superior qualities are equal to tartar, while very inferior kinds are scarcely better than good lees. The tartaric acid varies from 40 to 70 per cent., and is always chiefly in the form of bitartrate of potassium. Sulphur is a frequent ingredient, derived from the practice of sulphuring the casks.

Detailed Composition of Tartar.

	Messina Tartar.		St. Antimo Tartar.
Tartaric acid as acid tartrate	74·05	...	69·34
Tartaric acid as neutral tartrates .	2·60	...	4·66
Total tartaric acid	76·65		74·00
Sand	·140	...	·425
Silica	·055	...	·130
Ferric oxide . . .	·053	...	·086
Alumina	·021	...	·092
Phosphoric acid . .	·041	...	·068
Lime	1·081	...	1·778
Magnesia	·025	...	·041
Potash	[23·236]	...	[21·773]
Tartaric anhydride	67·408	...	65·120
Combined water .	5·688	...	6·396
Water, vegetable, and undetermined matter	2·252	...	4·091
	100·000		100·000

Lees, compared with tartar or argol furnish a very inferior source of tartaric acid. They contain a great bulk of vegetable matter, and all the dirt that has accumulated in processes not remarkable for cleanliness. Lees have been largely used as manure; their general employment as a source of tartaric acid seems comparatively recent. The composition of lees varies very much according as the wine has been plastered or not. The following table shows the average composition of the lees of various countries, so far as the quantity of tartaric acid, and its form of combination, are concerned:—

General Composition of Lees.

	Tartaric acid as		Total tartaric acid.
	Bitartrate of potassium.	Tartrate of calcium.	
Italian lees (33 samples) .	24·1	6·1	30·2
Greek lees (14 samples) .	19·9	11·8	31·7
French lees (9 samples) .	17·3	6·0	23·3
Ditto (30 samples) .	5·3	20·5	25·8
Yellow Spanish lees (59 samples	8·7	18·2	26·9
Red Spanish lees (17 samp.)	8·8	17·4	26·2

In the unplastered lees the tartaric acid exists chiefly as bitartrate of potassium; in the plastered lees the tartaric acid is in combination with calcium. The French lees have been divided into two classes, some being plastered and some not. Plastered lees contain gypsum, the residue of the plaster employed. Carbonate of calcium is now and then found in Spanish lees in considerable quantity. Resin frequently occurs in lees from the Greek islands. The lees from Spain are sometimes largely adulterated with Spanish earth; this is a native silicate of aluminium and magnesium, commonly employed for fining the wine.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, MARCH 25, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

SALE OF PATENT MEDICINES.

Some at least of our readers will be glad to learn that the subject of the sale of patent medicines has been provisionally mooted in the House of Commons. As stated in our report at p. 778, Colonel Leigh asked the Secretary of State for the Home Department whether he saw any objection to obliging all owners of quack *(sic)* medicines to declare the ingredients of which they were made. The reason he gave for suggesting that this should be done was that much illness and loss of life prevails, especially among young children, from the unrestrictad sale of quack medicines, often containing laudanum or even a more dangerous drug. The reply of Lord Sandon merely went the length of acknowledging the importance of the subject and intimating that it was already under the consideration of the Lord President of the Council, and we may therefore anticipate that before long some steps will be taken by the Government.

One of our correspondents of this week expresses the opinion that it would be a mistake to make a parliamentary or public question of the subject of patent medicines as proposed by the subscribers to the Exeter Memorial. His only argument in support of this view appears to rest upon the assumption that past legislation has sufficiently associated the trade of the chemist and druggist with poisons, and unless we misunderstand his letter, he puts forward this assumption as if it referred to some hardship inflicted upon the chemist and druggist. We cannot agree with him in this, nor can we perceive that such an association of chemists and druggists with poisons in the public mind, can be regarded as anything more than a desirable recognition of a fact which is not only indisputable, but likewise too frequently unheeded. It is the want of due appreciation of this fact that tends to make a large portion of the public indifferent whether they obtain medicines from the hands of persons competently acquainted with the characters of drugs and thus qualified to deal in them, or whether they purchase them from persons who are fitted only for dealing with ordinary groceries.

The case of vermin killers has sufficiently demonstrated the advantage of restriction in the sale of articles containing poison, for whereas accidental or criminal poisonings were of constant occurrence before these preparations were added to part 1 of schedule A., it is now but seldom that we hear of such a circumstance.

We cannot therefore understand the disinclination manifested by some members of the trade to join in any endeavour to limit the sale of patent medicines containing poisons, by applying to them the provisions of the Pharmacy Act 1868 respecting the sale of poisons. Still less is it possible to account for that disinclination when we remember how constant are the complaints addressed to us in reference to the indiscriminate sale of patent medicines by all classes of retail traders.

Another correspondent in this week's Journal in forms us that hair dressers are now to be pressed into the ranks of patent medicine vendors and he thinks it does not require a very far sighted person to tell what the result will be. We can so far thoroughly agree with him from our own experience of the pushing pertinacity with which these useful servants of the public generally take advantage of their customers' helpless position for the purpose of sounding the praises of their particular hair restorers, washes, etc. But we cannot agree with our correspondent J. W. B., in his opinion that the Council of the Pharmaceutical Society is to blame for this. He appears to be under the impression that the reduction of the patent medicine licence was brought about by the Council, and in opposition to the general desire of the trade. In both points he is entirely wrong, and so far as we can remember it was not the reduction of the licence but its increase that was advocated as being most likely to conduce to the advantage of the chemist and druggist.

Apart, however from the question whether the licence to sell patent medicines should be great or small, or whether there should be any, the plain common sense of the subject so far as it concerns the chemist and druggist has been very forcibly put by Mr. Slipper in his letter of 8th March, and we recommend those who like J. W. B. are hemmed in by antagonistic grocers and threatened with the competition of persuasive hair dressers, to consider the subject of patent medicines with the aid of the light thrown upon it by some of the letters we have published in reference to it, notably those of Mr. Slipper, A "Northern M. P. S.," and "Circumambulans." It seems highly probable that action will be taken independently by the Government and it would be well to have something to say about the measures proposed before rather than after they have become part of the law of the land.

It has been suggested by one of our correspondents that the preparations known as Patent Medicines have in reality nothing to do with patents and that the exemption of patent medicines provided by the sixteenth section of the Pharmacy Act does not apply to proprietary preparations containing any of the poisons comprised in the schedule, unless they be protected by Letters Patent. Hence it is inferred that no alteration of the law is required. But this is a misconception; there is no question about the term "Patent Medicine" being a misnomer, and we believe this is generally understood to be the case. So far as we are aware there are no such things, strictly speaking, as Patent Medicines, and the exemption in the sixteenth clause of the Pharmacy Act refers not merely to preparations actually the subject of letters patent, but also to all secret preparations commonly known by the term "Patent Medicines," whether they contain poisons or not. It is precisely with regard to that class of these preparations which contain scheduled poisons that the question is now raised whether they shall not be made amenable to the provisions of the Act respecting the sale of poisons.

THE VANILLA CULTURE.

The great demand for vanilla that has sprung up during the last few years in the markets of Europe, has given a great impetus to its cultivation. To such an extent have plantations been multiplied in the island of Reunion or Bourbon that it is reported the crop will probably, in two or three years, amount to fifty or sixty tons, being about three times the quantity exported in 1874. The cultivation is also carried on extensively in Madagascar and the Mauritius. The crop is a favourite one with the small proprietors, as provided the soil be fertile, moist, and shaded, it needs but a small space to accommodate thousands of plants, whilst at the present average price the crop yields to the cultivator a profit exceeding that obtained from any other grown in the island. The cultivators are represented, however, as having been recently very much disturbed by a report which has reached the islands, but which is received with a certain amount of doubt, that a German chemist has succeeded in extracting from the pine tree an essence of which the perfume is identical with that of vanilla and which can be offered in the market at a very reduced rate. It will not be inappropriate to mention here the analogous instance of alizarine, which has now so universally displaced madder, that the cultivation of madder roots is being gradually abandoned, and this branch of commerce will probably soon be extinct. A great portion of the madder land in the island of Cyprus has been already turned to other purposes, as the price to be obtained for roots no longer remunerates the grower.

THE MALTING OF WHEAT.

The Commissioners of Inland Revenue report that during the past year a few attempts have been made to malt wheat, but with the usual want of success. The failure of wheat to yield malt of even middling quality is attributed to the absence of husk, which in barley affords protection to the germ or vital portion of the grain, and thus prevents the germinating seed from being easily injured or becoming mouldy. A mixture of barley and wheat has, however, in some instances, been successful.

ETHER TIPPLING.

We learn from the *Times* that the Registrar of Drapers Town, county Londonderry, reports having had to register a death occasioned by drinking ether. He further states that this practice, to which we have before referred in these columns, has become rather prevalent in the locality, notwithstanding great efforts made by influential persons to stop it. The person whose death was registered had been drinking for two or three days without taking proper food, and the evening of his death drank some ether with two companions and never spoke afterwards.

THE EARTH ALMOND.

The "Chefa" or "Earth Almond," an account of the uses of which we extracted from the *Garden* and published at p. 748 of our last issue, is the tuber of *Cyperus esculentus*, L. In Spain these tubers are commonly sold in the markets for making a refreshing acid drink in hot weather. For this purpose they are soaked for two days in water, then pounded and the liquid frozen. The tubers of this plant as seen in the markets of Madrid are fully as large as a small hazel nut.

BORNEO CAMPHOR.

Her Majesty's Consul at Labuan, speaking of the Borneo camphor, attributes its comparative rarity to the fact that not one in a thousand of the trees of the species yielding it (*Dryobalanops aromatica*, Gärt.) is found in the state which causes its secretion in the crevices of the wood. When of the first quality this variety of camphor is highly valued by the Chinese, it being specially suited to the process of embalming the dead on account of its slow loss by evaporation. Its value as an export from Brunei increased in 1874 to £2578, against £1043 in 1873.

THE EUCALYPTUS AS AN INSECTIFUGE.

The *Garden* quotes from a private letter a statement that the placing of a young plant of Eucalyptus in a bedrooom infested with mosquitoes has been found sufficient to cause the disappearance of the insects.

A sample of amorphous mixed alkaloids of bark of *Cinchona succirubra* which has recently been extensively manufactured at the Government Cinchona plantations in British Sekkim has just been received at the Kew Museum. The sample is in the form of a very fine powder and nearly white. Dr. King the superintendent of the Botanical Garden, Calcutta, says that the cost of this alkaloid including all charges of plantation, etc., is about 2*s.* per ounce. It is further stated that about one ton was manufactured last year, and it is expected that as much as three tons will be produced during the present year.

Of Ipecacuanha, about the acclimatization of which in India equal interest has been felt as that which attached to the Cinchonas some years back, a very fair sample has also been received at Kew.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The tenth general meeting was held at the Royal Institution, March 2nd, 1876. The President Mr. A. H. Mason, F.C.S., in the chair.

Messrs. Joseph Abbott, B.A., and T. Lloyd Evans were unanimously elected members.

Donations to the library of current numbers of the *Pharmaceutical Journal* and the 'Calendar of the Pharmaceutical Society of Great Britain,' were announced and thanks voted to the donors.

The President called upon Mr. E. W. Parnell, F.C.S., to exhibit a new form of gas generating apparatus for laboratory use. Mr. E. Davies, F.C.S., moved a vote of thanks to Mr. Parnell for bringing before the meeting so useful an apparatus.

Mr. Fingland, an instrument used for dividing pills before pill machines were invented. It was about one hundred years old, and belonged to the late Dr. Latham.

A lengthy discussion took place upon Mr. Kingzett's lecture, which was delivered at the previous meeting, in which the President, Messrs. Evans, Sumner, Armstrong, Davies, Garside, and Simpson, took part.

A number of queries were found in the question box, and replied to by the members present.

Mr. Edward Davies, F.C.S., exhibited a very fine specimen of Salicylic Acid which was made at his laboratory, and described the mode of its preparation.

The meeting then adjourned to the Museum where a conversazione was held.

The eleventh general meeting was held at the Royal Institution, March 16th, 1876. The President, Mr. A. H. Mason, F.C.S., in the chair.

Mr. Thomas Jenkinson was unanimously elected a member.

Donations to the library of the current numbers of the *Pharmaceutical Journal*, and 'Catalogue of the Library of the Pharmaceutical Society of Great Britain, 1874,' with lists of additions to the Library down to 1875, were announced, and thanks voted to the donors.

The President exhibited a specimen of Erythroxylon Coca.

Mr. T. Allison Readwin, F.G.S., F.S.S., etc., read a paper on "Mineralogical Nomenclature."

Mr. Martin Murphy, F.C.S., proposed and Mr. Edward Davies, F.C.S., seconded a cordial vote of thanks to the author of the paper, which was supported by the President and carried unanimously.

THE ASSOCIATION OF CHEMISTS AND DRUGGISTS FOR WOLVERHAMPTON AND DISTRICT.

A meeting of the members of the above society took place on the evening of the 23rd inst, in the committee room of the Agricultural Hall. The President (Mr. W. Fleeming) occupied the chair.

After some introductory remarks by the President, the minutes of the previous meeting were read, and the senior secretary (Mr. W. Y. Brevitt) announced that he had received the following donations as prizes (to be distributed amongst the more successful students as the Council might think desirable):—"The Vice-President's Prize," half-a-guinea; "The Honorary Secretaries' Prize," one guinea; Mr. W. Coleman, one guinea, for the best herbarium; The Rev. Mr. Davenport, half-a-guinea. Also 2 vols. of 'Animal Chemistry,' for the library, from Mr. T. H. Davis. He stated that a council meeting would shortly be called to take into consideration these matters, and also to consider the desirability of applying for a grant from the Pharmaceutical Society to assist them in defraying the expenses of classes, etc. The scheme for the holding of their first *soirée* was now withdrawn, as it was too late in the season for it to be held. The Council, however, wished most heartily to thank those gentlemen who had volunteered their assistance in making the necessary arrangements, etc.

The President, in moving a vote of thanks to the donors of books and prizes, said it would affort him great pleasure in giving as an extra prize one guinea, to be called "The President's Prize."

After the unanimous election of Sir John Morris as a patron of the Association, the Chairman briefly introduced Mr. T. H. Davis as the lecturer of the evening, and alluded to the importance of the subject, viz., "Disinfection." He was pleased to see their two chief sanitary authorities present.

Mr. T. H. Davis then proceeded to give his lecture on "Disinfection." After a few preliminary remarks, the lecturer went on to define the terms disinfectants and disinfection, and also called attention to the confounding of the terms "deodorants" and "disinfectants," but stated that their functions were quite distinct, the latter being used with a view to destroy the invisible organic germs which constitute contagious matter, and the former to alter the character of a gas, and at the same time change its natural odour. He showed, also, that the action of deodorants was explainable by chemistry, but with regard to disinfectants, he stated that their action is beyond explanation, and all that could be said of them is that it is known by experience that they do kill or destroy the contagious germs, thus preventing the spread of infectious diseases. After showing an experiment on the deodorizing property of chlorine, he went on to say that contagious disease is of a parasitic character, and quoted the words of Professor Tyndall, to the effect that so surely as the plant grows from its particular seed as surely does the typhoid virus increase and multiply into typhoid fever, small pox virus into small pox, etc., and when once this evil form of disease has established itself within the body it must run its course, medicine is as yet powerless to arrest its progress, and the skill of the physician is defied. The great point is therefore to prevent the access of these germs to the body, and wishing to do this we naturally ask what is the best agent to use and what is the best way to use it? The lecturer then gave a list of several agents of disinfection, and went on to say that the efficacy of chloride of lime as a disinfectant is due to the fact that chlorine is liberated on exposure to the air, and it is on account of this property that chloride of lime is of such value as a disinfectant. Here the lecturer performed an experiment to show the bleaching action of chlorine gas, in which a piece of red cloth was turned white in a few minutes on exposure to chlorine. He then gave some useful hints and instructions as to the process of disinfection by means of this agent, and after this took up another agent of disinfection, viz., sulphurous acid, generated by burning sulphur in the air. This agent, he stated, also had the same drawback as chlorine, viz., its bleaching action, saying that if care were not taken in the use of either of these agents, one need not be surprised to find the contents of a room in a very different state on re-entering to that in which they were left. He further stated that as it is absolutely necessary that all the contents of an infected room should be exposed to the action of the agent used for disinfection, it is evident that chlorine and sulphurous acids are not the proper agents to use. The lecturer then mentioned and gave the composition of several other agents of disinfection, and after noticing the disinfectant "chloralum" a little more in detail, he passed on to say that a special commission, appointed by the Academy of Science, Paris, to study different means of disinfecting contagious or infectious places, after many experiments settled that nitric peroxide, generated by the action of nitric acid on copper, and subsequent action of oxygen in the air, was the most efficient. The lecturer, however, commented upon the use of so dangerous an agent as this. Condy's fluid was the next disinfectant considered, and this fluid the lecturer considered was of use only in the sick room, there to instantly disinfect obnoxious matters before the germs of disease had time to free themselves from it, and he did not think it could be effectively used for the thorough disinfection of a room. After an experiment on the oxidizing power of this agent, the lecturer went on to consider carbolic acid, which he stated was obtained from coal-tar oils; he mentioned several mixtures of carbolic acid with other bodies which are sold for the purpose of disinfection, and then passed on to say that when a mixture containing carbolic acid is dusted over a putrescible mass it prevents putrefaction by poisoning the germs in the air before they reach the mass. He then stated that carbolic acid has an antiseptic action, that is, it destroyed the source of the poisonous germs and gases by attacking and arresting fermentation in the putrescible matter. The lecturer gave some interesting facts concerning carbolic acid, as to its extensive use, and then proceeded to say that carbolic acid was most certainly best applied in the form of vapour, combined with steam. Several pieces of apparatus for effecting this were shown, and among them the apparatus used by the medical officer of health for disinfection of houses in the borough. The next point taken up was the mixture of carbolic acid with various articles of toilet, such as soaps, etc., and a large number of samples were shown. There were also shown two beautiful samples of crystallized carbolic acid, and two equally beautiful samples of dye products obtained from it (viz., picric acid and aurine), kindly sent by Messrs. Lowe and Co., of Manchester.

Summing up, the lecturer said, "Considering that carbolic acid is an effectual agent for disinfection, that it can be used with such ease, without danger or trouble, and that it can be employed effectually in such simple ways as soaps, etc., I think I may venture to say that carbolic acid is the most useful and effective agent which has yet been produced and employed as a disinfectant." The lecturer concluded by saying that cleanliness and ventilation are disinfectants in the power of all, and until these two important matters are thoroughly considered and maintained, all the disinfectants in the world will not prevent the existence of contagious and infectious diseases.

Mr. J. H. Love (the medical officer of health) agreed with all that Mr. Davis had said respecting the superiority of carbolic acid as an antiseptic. He also made some remarks upon the value of potassic permanganate as a deodorizer, and sulphur as a disinfectant. He said he had used the former freely diluted with water, and applied in the form of vapour. The latter was objectionable on account of its suffocating odour when vaporized. He thought if some of the chemists present could devise a plan for vaporizing sulphur without converting it into sulphurous anhydride, this objectionable character would be got rid of, and then sulphur would probably prove a more effectual disinfectant than carbolic acid. Mr. Love concluded by exhibiting in action, an extremely efficient carbolic acid vaporizer, which he had directed should be used in house disinfection.

Mr. E. W. T. Jones, borough analyst, said he differed from Mr. Love in the opinion that permanganate of potash, applied in the form suggested, would prove to be an efficient deodorizer. He had always understood that that substance was not volatile, and he therefore thought (unless Mr. Love could correct him) that it would be useless to apply it in the manner suggested. With regard to Mr. Love's remarks on sulphur, he considered that sulphur, uncombined with oxygen, would also prove useless as a disinfectant. Mr. Jones then briefly criticized Mr. Davis' remarks, and ended by saying that he entirely agreed with the conclusion that gentleman had arrived at.

After some remarks by Mr. Alexander Gow and Mr. W. B. Cooley, Mr. Love replied to the objections raised by the borough analyst.

Mr. F. J. Barrett, F.C.S., said he should also be glad to thank the lecturer for his very able paper. He certainly was surprised at the large amount of useful information contained in so short a lecture. He differed from Mr. Davis upon one or two points, and thought sulphurous anhydride, for several reasons was to be preferred to carbolic acid. It was a most efficient disinfectant, not poisonous, cheap, and easily used. With two-pennyworth of brimstone, a lucifer match, and a fire shovel, even the most inexperienced person could thoroughly disinfect a large-sized room. With carbolic acid it was different; it was more expensive, there was some trouble in converting it into vapour, it was a dangerous poison, and as such should not be used by inexperienced and careless people. In answer to Mr. Cooley he explained the supposed constitution and mode of manufacture of "Terebine," "Chlor-Alum" and salicylic acid. In conclusion he touched upon a point not treated by Mr. Davis in his lecture, *i.e.*, the value of essential oils as atmospheric purifiers. As an example he spoke of the benefits which had resulted from the planting of the *Eucalyptus globulus* in certain malarial districts, and said certainly their knowledge of the oxidizing properties of essential oils was in its infancy; it afforded a wide field for further research, and he hoped that Mr. Davis would at some future time continue (in this direction) the lecture so ably given that evening.

Mr. Davis having replied to the objections raised, the President, in proposing a vote of thanks, said he was greatly pleased with the lecture and discussion, and wished to second strongly the suggestion made by Mr. Barrett that at some future occasion Mr. Davis should continue his subject. A vote of thanks to the chairman having been passed, the remainder of the evening was spent in the examination of specimens of disinfecting apparatus and substances, with which the table was covered, amongst which were toilet carbolic acid preparations of Messrs. McDougall and Calverts, disinfecting preparations of carbolic acid and a large quantity of disinfecting apparatus exhibited by Mr. Barrett, who also showed a specimen of concentrated infusion of gentian preserved with chloroform, which had been kept eighteen months (quite fresh, bright, and aromatic), and some ointments of belladonna which had been preserved by salicylic acid instead of benzoin.

The next lecture (announced to take place on the 20th proximo), would be delivered by Wentworth L. Scott, Esq., F.C.S., county analyst, on "The Inductorium or Induction Coil; its Principles and Applications."

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

At the February meeting of this Association Professor Maisch presented a specimen of nut galls, forwarded from Texas. They resembled in structure Aleppo nut galls, differing, however, in being lighter in colour, having a smoother surface, and containing less tannin.

Mr. Trimble read a paper on "The presence of Ammonium in Phosphoric Acid," prepared by Professor Markoe's process, the conclusion of the writer being that the amount of ammonia formed is so small as to be of no practical importance. Some remarks followed, in which Professor Markoe's process was warmly commended, no objection, however, being found to the first process of the U. S. Pharmacopœia.

Mr. Chas. L. Mitchell read the following paper on the preparation of the red iodide and yellow oxide of mercury, and exhibited specimens prepared by the processes recommended.

HYDRARGYRI IODIDUM RUBRUM AND OXIDUM FLAVUM.

BY CHARLES L. MITCHELL.

The disadvantages arising from the use of mercuric chloride in the preparation of the above named mercurials, have long been known to pharmaceutists. Owing to its comparative insolubility in water, a large bulk of liquid is required in order to obtain any appreciable quantity of product, thus necessitating the use of large vessels, when manufacturing in any quantity. Heat is also required, in order that the water shall take up as much of the mercuric chloride as possible, and thus lessen the disadvantage of bulky utensils. This, however, only partially removes the difficulty, and runs the additional risk of breakage of vessels, etc. It seems, therefore, that the corrosive sublimate used in the officinal processes for making the red iodide and yellow oxide of mercury of the U.S.P., could be replaced with considerable advantage by some mercurial salt or preparation possessing the advantages of ready solubility and concentration in small bulk of a considerable quantity of mercury. For this purpose, I would suggest the mercuric nitrate. It can readily be prepared by dissolving mercury in a slight excess of nitric acid, and then can be used either strong or diluted with water to any degree necessary. For general purposes, the officinal liquor hydrargyri nitratis answers admirably. Two troy ounces of liq. hydrarg. nit. (representing 384 grs. mercury) were diluted with an equal bulk of water, and then 660 grs. of iodide potassium dissolved in f℥iv water gradually added, until no further precipitation took place. The resulting precipitate of red iodide of mercury was collected on a filter, washed with cold water, and then dried. It weighed 868 grs., being a difference of only a few grains from the estimated theoretical yield, and seemed to possess all the qualities of a good article. The manipulations necessary for the preparation of this salt were all conducted in a vessel of 8 ozs. capacity, and with the expenditure of about ten minutes' attention; whereas, if the officinal process had been followed, a vessel at least five times as large would have been required, and considerably more time needed. Another advantage can be also found in the fact that the process is considerably cheaper than that of the U.S.P. In practice I have found it necessary to use a little more than the theoretical quantity of iodide potassium, in order to allow for moisture in the salt as well as to thoroughly insure the decomposition of the mercuric nitrate. On the other hand, care must be taken not to add a large excess of iodide potassium, on account of the solubility of the mercuric iodide. For preparing the mercuric iodide, I would therefore propose the following formula:

℞. Mercury	1000 grs.
Nitric Acid	1700 grs.
Iodide Potassium	1662 grs. or q. s.
Distilled Water	q. s.

(Instead of the mercury and nitric acid ℥v ʒi ℈ii of liq. hydrarg. nit. can be used.)

Dissolve the mercury in the nitric acid by the aid of a little heat (in large quantities this is not necessary, as the reaction between the acid and mercury generates sufficient heat), and dilute with an equal bulk of water. Then add the iodide potassium, dissolved in 8 fluidounces of water, until no further precipitation ensues, being careful towards the last to add the solution very gradually so as to avoid dissolving the mercuric iodide in an excess of the liquid. Collect the precipitate on a filter, wash well with distilled water, drain and dry.

The solution of mercuric nitrate also affords a very convenient way of preparing the yellow oxide of mercury, and I submit also a formula for its preparation.

Hydrargyrum Oxidum Flav.

℞. Sol. Mercuric Nitrate (prepared by dissolving mercury in an excess of nitric acid)	any convenient quantity
Liq. Sodæ	q. s.

Dilute the solution of mercuric nitrate with an equal bulk of water, and add liq. sodæ until in slight excess. Collect the yellow precipitate, wash well and dry. Sol. soda is used here instead of sol. potassa, as directed by the Pharmacopœia, on account of its cheapness, there being no appreciable difference in the quality of the yellow oxide obtained from the two solutions.

For these formulæ I do not claim any special originality, but regard them only as affording, by the aid of a very common and easily-made preparation, a much more convenient and practicable method of preparing these mercurials than any other process of which I have knowledge. Their greatest merit lies in the fact that they can be prepared with much economy of both time and space, both important points to pharmaceutists whose facilities for manufacturing are of a rather limited character.

Professor Maisch said that in case of the mercuric iodide, the use of mercuric nitrate had been objected to, owing to the free nitric acid necessary to keep the nitrate in solution tending to liberate iodine; Mr. Mitchell's manipulation, however, seemed to obviate this difficulty, the specimen exhibited appearing to be unobjectionable.

Professor Maisch then read the following paper on

THE ASSERTED PRESENCE OF TANNIN IN GENTIAN ROOT.

BY JOHN M. MAISCH.

The root of *Gentiana lutea*, owing to its importance as a medicine, has been frequently subjected to chemical analysis during the last sixty years, and none of the investigators have been able to prove the presence of tannin in it. The long list commences in 1815, with Schrader (*Berl. Jahrb. f. Phar.*, xvi), who is followed by Henry, and by Guillemin and Foecquemin, in 1818 (*Jour. de Phar.*, v); in 1821 by Henry and Caventou (*ibid.*, vii); in 1836 by Denis (*ibid.*, 1836, January); in 1837 by H. Trommsdorff (*Ann. d. Phar.*, xxi), and by Claude Leconte (*Jour. de Phar.*, xxiii); in 1838 by Dulk (*Archiv. d. Phar.*, xv); in 1847 by Baumert (*Ann. d. Chem. u. Phar.*, lxii); in 1861 by H. Ludwig (*Archiv. d. Phar.*, clvii), and in 1862 by Kromayer (*ibid.*, clx). To these investigations must be added the recent ones by Hlasiwetz and Habermann (*Buchn. N. Repert.*, 1874, p. 631; *Amer. Jour. Phar.*, 1875, p. 207). It is true that many of these analyses were undertaken with the principal object of isolating the bitter principle or the gentianic (gentisic) acid; but it is hardly to be supposed that a principle like tannin, the presence of which is so readily proven, should have been overlooked. More particularly is this the case with the analyses of Henry and Caventou, Leconte and Dulk, the two former of which were undertaken for the purpose of ascertaining all the constituents, and that of Dulk verified the substantial correctness of the results of the former.

The results obtained by these chemists agree perfectly well with the physiological effects observed by numerous physicians, and which may be summed up with the words of Pereira: "Gentian is very properly regarded as a *pure* or *simple bitter*; that is, as being bitter, but without possessing either astringency or much aroma." Moreover, none of the works on materia medica, in the English, French and German languages, which the writer had occasion to consult, mentions tannin or a similar compound in this root.

In the face of these numerous investigations, it must appear rather startling to learn that Mr. E. L. Patch, in a paper recently read before the Massachusetts College of Pharmacy, asserted that "he found tannin in the gentian contrary to the usual statement of works on materia medica" (*Drug. Circ.*, 1876, p. 48). This assertion seems to be mainly based on "the incompatibility of the tincture of chloride of iron and the compound tincture of gentian," although it is stated that Mr. Patch exhibited numerous preparations of gentian in connection with his paper. Unfortunately, the gentleman seems to have overlooked the fact that the tincture mentioned contains also orange peel, and that the white parenchyma of the latter is coloured of a deep black on the addition of solution of any ferric salt, which coloration, according to Flückiger and Hanbury ('Pharmacographia,' pages 105, 113), is owing, "*probably*, to a kind of tannic matter." It will be observed that the authors mentioned are very guarded in their expression, notwithstanding the ink-black coloration produced by iron salts.

But what is the effect of ferric salts upon gentian? The investigations mentioned above have thrown considerable light on this point. Henry already noticed the dark colour produced by ferric chloride with what he supposed to be the bitter principle, but which was subsequently proved to be merely the yellow colouring principle contained in the root. Baumert says that the concentrated alcoholic solution of pure gentianic (gentisic) acid produces with ferric chloride a red-brown precipitate, and Ludwig found that the aqueous solution of the extract contains a body which, under certain circumstances, imparts a dark green fluorescence. In these observations we have the key for the behaviour of ferric salts with the preparations of gentian, which I shall endeavour to explain with the following experiments.

Well dried and bruised gentian root was nearly exhausted by cold water, first by percolation and subsequently by expression after maceration. The first portion of the percolate gelatinized on standing a day or two, in consequence of the separation of pectin compounds. This aqueous infusion is not disturbed by gelatin solution, a pretty sure evidence of the total absence of tannin; in the course of a few hours, a scant light-coloured precipitate made its appearance, which, after having been thoroughly washed with water is merely tinged light-brown by dilute ferric salts. The infusion, however, strikes with ferric chloride a dark reddish-brown colour, which in reflected light shows a deep greenish tint; no precipitate takes place, as the liquid remains perfectly transparent in thin layers, although a concentrated infusion apparently becomes opaque on the addition of the iron salt, but after water is added shows not the slightest sign of a precipitate, even on standing. If the infusion has been previously diluted with water, the addition of ferric chloride will scarcely darken it.

Alcohol added to the cold infusion precipitates pectin compounds, albuminous and gummy matter, and the clear liquid behaves exactly as the infusion from which it had been made. The infusion preserved by alcohol was treated with a fragment of fresh hide for twenty-four hours; the behaviour of the liquid to ferric chloride showed no difference. The experiments detailed prove conclusively that the aqueous infusion of gentian does not contain any tannin.

Gentian root, previously nearly exhausted with water, was now macerated, and then displaced with strong alcohol. The tincture thus obtained is of a bright yellow colour, quite distinct from the yellowish-brown colour of the infusion or tincture prepared directly from unexhausted root. It gives, with ferric chloride, a deep brown-green colour, and also a precipitate, if sufficiently concentrated; on diluting it with water, the mixture turns muddy from the separation of resin and fat, its colour becoming of a dirty green-brown; if, instead of water, alcohol be added to the mixture, a perfect solution is obtained, having a brown colour with a greenish tint. The tincture prepared from the nearly exhausted root is, therefore, likewise free from tannin.

In order to further elucidate the subject, a portion of the tincture was evaporated, and the residue washed with cold water to remove the remaining bitter principle, gentiopicrin. The clear, yellow filtrate evidently contains gentianic (gentisic) acid in solution, it yields, with ferric chloride, a deep brown colour, without any perceptible green tint. Dilution of the mixture with water revealed the absence of a precipitate.

The yellow granular mass left, after washing the alcoholic extract with water, was washed with cold ether to remove adhering resin and fat; on evaporation of the yellow ethereal solution, a yellow amorphous mass was left, which, dissolved in a little alcohol, yields, with ferric chloride, a dark brown-green precipitate, the mixture becoming muddy on the addition of water, but perfectly transparent by alcohol.

The portion left undissolved by ether, consisting of nearly pure gentianic (gentisic) acid, was recrystallized by hot alcohol; but the quantity operated on being small, the acid was not obtained in an absolutely pure state. Its alcoholic solution behaved nearly like the solution of the ethereal washings, except that the precipitate of the latter with ferric chloride, and its solution in alcohol, was of a more decided green colour.

If it is remembered that gentianic (gentisic) acid is slightly soluble in water, not freely in ether, but readily in alcohol, the dark coloration imparted to various simple preparations of gentian by ferric salts is easily explained, likewise the dark coloured precipitate occurring by the same agent with fluid extract of gentian; and if it is remembered that alcohol takes up from gentian root also resin and fat, which are precipitated on the addition of water, the occurrence of a permanent precipitate in the presence of iron apparently remaining on diluting the alcoholic liquid with water, will likewise become obvious.

In proximate analysis it is of the utmost importance not to place any reliance upon any single reaction, much less when the test is applied in such complex mixtures as infusions and tinctures must necessarily be. While it is true that tannins produce, with iron salts, blueish-black or greenish-black colorations or precipitates, according to the state of concentration, it must be borne in mind that there are numerous other compounds which produce somewhat similar reactions, without being in the least related to the interesting group of tannins.

CHEMICAL SOCIETY.

Thursday, 16th March, 1876, Professor Abel, F.R.S., President, in the chair. Before commencing the ordinary formal business of the Society, Dr. J. H. Gladstone rose and in a short speech proposed a vote of thanks to the President for the exceedingly enjoyable visit to the Royal Arsenal, at Woolwich, on the preceding Tuesday, and for his generous hospitality on that occasion. This was seconded by Dr. Gilbert and carried by acclamation. The following papers were then read:—"On Crystallized Glycerine," by Dr. P. F. van Hamel Roos; "Notes on the Fatty Acids and on a Suggested Application of Photography," by Mr. W. H. Hatcher; "On Stibine," by Mr. F. Jones; "On the Use of Platinum in the Ultimate Analysis of Carbon Compounds," by Mr. F. Kopfer; and "On the Action of Organic Acids and their Anhydrides on the Natural Alkaloids, Part V.," by Mr. G. H. Beckett and Dr. C. R. A. Wright. The meeting was then adjourned until March 30, the Anniversary. The next ordinary meeting will be held on Thursday, 6th April.

NEWCASTLE-UPON-TYNE CHEMICAL SOCIETY.

At the meeting of this Society on January 27, the President, Mr. John Pattinson, read the following paper:—

On Gas Burners.

How best to burn coal gas so as to obtain the greatest amount of light it is capable of producing is a subject which is perhaps as yet but imperfectly understood, even by those who know most about it. Great improvements have, however, been made in recent years in the construction of gas burners, resulting from the researches of Frankland, Bowditch, Sugg, Silber, the London Gas Referees, and others; but from many causes, chiefly, perhaps, for want of information on the subject amongst the general public, these improved burners have come but very slowly into use. The gasfitters, to whom the choice of burners is usually left, often know as little about the subject as any one, and thus a wretchedly bad kind of burner is in many cases used, which burns the gas so as to destroy a great portion of its light-giving power. In the present paper no attempt is made to describe even a tithe of the multiplicity of burners which have been invented. The object is simply to describe the results of an examination I have recently made of a number of burners taken off fittings in various parts of Newcastle, and to show how unfit these burners are to develop the light-producing properties of gas as compared with good burners, which may be had quite as easily as the bad ones.

Gas burners may be divided into two great classes—first, argands, such as give a ring of light and require glass chimneys; and, second, flat-flame burners, which may be sub-divided into what are known as "batwings" and "fishtails," so called from the shape of the flames they produce.

In the experiments I have made, the gas used was of the same quality throughout the whole of the tests. It gave a light equal to 14·1 standard sperm candles when burnt at the rate of five cubic feet per hour in the standard argand burner, known as the Sugg-Letheby burner. Before about seven or eight years ago this was the best burner known, and as it was in use at the time when the Newcastle and Gateshead Gas Company obtained their Act of Parliament, it is still retained as the standard by which the gas is tested. It is but fair to state here that the quality of the gas was unusually low when the experiments were made, the gas usually being equal to about fifteen standard candles. It may be explained for the benefit of the uninitiated that the standard sperm candle with which the gas is compared is one defined in the Act of Parliament as a "sperm candle of six to the pound, burning at the rate of 120 grains per hour."

I will first of all give the results of the testing of argand burners. The argand burner when properly constructed is the one best adapted for obtaining the greatest amount of light from common coal gas. The air supply, upon which so much depends, is most perfectly under control in such burners. Argand burners are certainly more expensive in their first cost, and perhaps are more troublesome to keep in order than flat flame burners, owing to the occasional breakage of chimneys and other causes, but it will be seen that the amount of light they can produce in comparison with the latter is very great, and would soon compensate for their extra cost and the extra trouble of keeping in order, especially in private houses. They require the gas to be supplied to them at a uniform pressure, otherwise they are liable to smoke when the pressure is increased and more gas passes through than they can burn. They should, therefore, always be used with regulators for regulating the pressure of the gas. These may be conveniently placed near the supply meter.

In each of the following tables the first column shows the actual amount of gas consumed per hour in cubic feet during the experiments; the second gives the illuminating power of the gas consumed expressed in standard sperm candles; the third gives the illuminating power calculated per five cubic feet of gas:—

Argand Burners.

Kind of Burner.	Cubic feet of Gas used per hour.	Illuminating power in Candles.	Illuminating power per 5 cubic feet of Gas per hour.
Sugg-Letheby Standard	5·0	14·10	14·10
Sugg's "London Argand"	5·0	15·90	15·90
Sugg's "Improved London Argand"	4·5	16·08	17·86
Silber's Argand . .	5·0	17·80	17·80
Common Argand .	5·0	11·20	11·20
" " .	7·0	17·80	12·70

The common argand here mentioned was one similar to a great number used in shop windows in Newcastle. It will be seen that with the Sugg's Improved London Argand and Silber's Argand as much light is produced when burning five feet of gas as is produced when burning seven feet of gas in the common argand, thus showing a saving of 40 per cent. over the last-named burner.

Flat flame burners do not consume the gas so as to give as much light from a given quantity of gas as argands. This is perhaps chiefly owing to the circumstance that it is necessary to make the gas issue from the burner under a certain amount of pressure, in order to produce the required shape of flame, and this pressure causes a portion of the gas to mix with too much air, so that it becomes over-burnt, as in the Bunsen burner. The best flat flame burners are those in which this pressure is reduced to the minimum amount found necessary, and such burners generally have some contrivance for checking the pressure of gas supplied at the mains. But although flat flame burners are not so economical as argands in their consumption of gas, yet they possess other advantages which probably will always cause them to be extensively used. The first cost of the burner is very trifling, no chimneys are required, they are not so liable to smoke under varying pressures of gas as argands, and they are easily lighted and attended to.

It is in this class of burner that the most extraordinary differences in quality for burning gas so as to produce light have been found. The following table shows the results of my tests of various new batwing and fishtail burners which can be had in Newcastle. Some of the burners were tried with different consumptions of gas:—

New Batwing and Fishtail Burners.

Kind of Burner.	Cubic feet of Gas used per hour.	Illuminating power in Candles.	Illuminating power per 5 cubic feet of Gas per hour
Bray's No. 4 Fishtail	4·0	5·02	6·28
Same Burner . .	5·0	5·80	5·80
Bray's No. 6 Fishtail	5·0	9·00	9·00
Bray's No. 8 Fishtail	5·0	11·80	11·80
Same Burner . .	7·0	14·21	10·15
Brönner's No. 4 Batwing	4·0	10·10	12·62
Same Burner . .	5·0	11·60	11·60
Sugg's No. 4 Batwing	4·0	8·40	10·50
Same Burner . .	5·0	10·90	10·90
Batwing, with narrow slit	5·0	8·60	8·60
Batwing, used in Street Lamps . .	5·0	11·60	11·60
Fishtail, with small platinum disc in flame	5·0	10·20	10·20
No. 5 Fishtail—metal top	5·0	7·50	7·50

It is difficult to get exact uniformity in the same kind of burner of each manufacturer, and the above burners may be inferior to others of the same kind. They were, however, selected at random. The results show that the best argand burners produce upwards of one-third more light from the gas than the best of the flat flame burners, so that, taking light producing properties alone into consideration, there is an advantage to this extent in favour of argand burners. Bray's, Brönner's and Sugg's are all good burners. It will be seen that Bray's No. 8 fishtail is much better adapted for burning the kind of gas experimented with than the No. 4 and No. 6 fishtail of the same maker.

The next table gives the results of my trials of various burners recently taken from fittings in houses in several parts of Newcastle.

Burners in use in Newcastle.

Kind of Burner.	Cubic feet of Gas used per hour.	Illuminating power in Candles.	Illuminating power per 5 cubic feet of Gas per hour.
Batwing—metal top	5·0	9·26	9·26
Batwing—metal top double slit . . .	5·0	8·90	8·90
Fishtail, No. 3—metal top . .	3·5	4·10	5·85
Fishtail, No. 3—steatite top . .	3·7	4·40	6·00
Fishtail, No. 3—steatite top . .	4·0	3·00	3·75
Fishtail, No. 4—steatite top . .	4·9	5·20	5·31
Fishtail, No. 5—steatite top . .	5·0	7·80	7·80

It thus appears that burners are in use in Newcastle which give a light equal to only 3¾ candles, when burning the same quantity and quality of gas as when burnt in a good argand will give a light equal to 17¾ candles, or, if burnt in a good burner of its own class, will give a light equal to 12½ candles, and such burners are very extensively used in Newcastle. Is it, then, a matter of wonder that we occasionally hear complaints of the bad quality of Newcastle gas? By the substitution of good burners for these wretched ones, from three to five times the amount of light will be produced from the same amount of gas; or, if the light of the present burners is sufficient, the same amount of light can be obtained from one-third or one-fifth the amount of gas. In the latter case, besides the saving in cost of gas, there is also the additional advantage of having the vitiation of the air in the room by sulphur compounds and carbonic acid from the burning gas reduced to the same extent.

It is in the hope that public attention will be called to this matter, and the wasteful misuse of gas prevented, that these results are now published.

Parliamentary and Law Proceedings.

CONVICTION UNDER THE PHARMACY ACT, 1868.

THE COUNCIL OF THE PHARMACEUTICAL SOCIETY *v.* FRASER.

This was a complaint at the instance of the Pharmaceutical Society of Great Britain and their registrar, Mr. Bremridge, against Mr. Alexander Fraser, of No. 38, South Portland Street, Glasgow, for keeping open shop for the retailing, dispensing or compounding poisons without being duly registered under the Pharmacy Act, 1868.

The case was heard before Mr. Sheriff Spens within the County Buildings, Glasgow, on Wednesday the 22nd current, Mr. John B. Aiken, writer in Glasgow, appeared for the complainers.

No evidence required to be led in the case as Mr. Fraser pleaded guilty to the contravention of the Act libelled on after the complaint had been read over to him.

Mr. Aiken then said as the Pharmaceutical Society had no desire to act oppressively in the matter he would be satisfied if the Sheriff-substitute subjected Mr. Fraser to one penalty of £5 with expenses. The Sheriff thereupon imposed a fine of £5 with £5 costs.

SUPPOSED POISONING BY THE ROOT OF ŒNANTHE CROCATA.

A serious case of poisoning has occurred at Stockton. On Friday last, two men, named John Kindler and George Cowen, went up the river Tees from Stockton in their sand boat as far as the Horse Shoe, on the way to Yarm. While at this bend in the river, Kindler went ashore and picked up some roots, which he wrapped in a handkerchief and brought away with him. Returning to Stockton at night, he left the roots on board the boat. On Saturday he brought the roots ashore, and, according o the statement of a little boy, who has suffered great agony from eating a portion of them, he gave them to him and other children who were playing near the Beef-house, on the Quayside. The boy, John Fish, ten years of age, ate some of the root, which it has since been ascertained belonged to the *Œnanthe crocata*, and he soon became very ill. His brothers and sisters took some of the root during the afternoon, and his mother was distressed to find the whole of her family—five children—including a baby in arms, in agony from eating a portion of what appeared to her a kind of white carrot. Medical aid was quickly obtained, and the stomach pump applied. Two of the poor children, however—Henry, five years old, and George, eight years old—were lock-jawed, and after writhing in pain till about seven o'clock, died. The other three children belonging to Fish are under medical treatment, and it is hoped will recover. On the same afternoon three children of a labouring man named M'Naughton, ate a portion of one of the roots while playing on the Quayside, and they are very ill, especially a girl, Hannah M'Naughton, five years old. Inspector Harrison has apprehended Kindler, and has him locked up on a charge of being suspected of having caused the death of two children.—*Manchester Guardian.*

POISONING BY A LOTION.

On Saturday last a man named Briggs, residing in Arthur Street, Gravesend, met with his death under singular circumstances. He had been ill for some time past, and was receiving attendance from a medical gentleman, who prescribed certain medicine to be taken at given times, and also provided a lotion for outward application. His daughter, a little girl about eight years of age, proceeded to give him his medicine on Saturday morning, but by mistake gave him a dose of the lotion, not being aware of the serious consequences which her act would entail. The man became worse, and although every means were taken by the use of emetics, etc., he died from the effects of the poison which the lotion contained on Saturday evening. An inquest was not deemed necessary.—*Gravesend Reporter.*

QUACK MEDICINES.

In the House of Commons, Monday evening last, Colonel Leigh asked the Secretary of State for the Home Department whether he saw any objection to obliging all owners of quack medicines to declare the ingredients of which the doses were made previously to being allowed to sell them (as was done in France), since much illness and loss of life prevails, especially among young children, from the unrestricted sale of quack medicines, the basis of which is often laudanum or some noxious or dangerous compound.

Viscount Sandon said the subject referred to had only been brought recently under the notice of the Lord President of the Council. It opened up some very important questions, and it was receiving his grace's consideration, and he must ask the hon. and gallant member to allow him not to state an opinion upon it at present.

RIVERS POLLUTION BILL.

The same evening Mr. Sclater-Booth stated, in answer to Mr. Holt, that he could not at present name a day for the introduction of this Bill. It would not, however, be brought in before Easter.

Notes and Queries.

[501]. OAK STAIN.—What can I use to stain the floor of a room a dark oak? and how is it to be applied?—C.

[502]. SYR. FERRI LACTOPHOSPHATIS.—"*Pil Garlic*" wishes for a good formula for Syrup of Lactophosphate of Iron.

[503] DISPENSING PRICES.—Perhaps some of your numerous correspondents, will kindly give me an idea as to what they would charge for the following prescription, which was presented to me to dispense a day or two since.

℞	Potassæ Chlorat.	℈iij
	Quiniæ Sulph.	℈ij
	Acid. Sulph. dil.	ʒiiss
	Syr. Aurantii	℥iss
	Tinct. Cinchonæ ad	℥viij

M.—JUPITER PLUVIUS.

Obituary.

Notice has been received of the death of the following:—

On the 26th December, 1875, Mr. William Croft Hodgman, Chemist and Druggist, of Hucknall Torkard, Notts. Aged 42 years.

On the 25th of February, 1876, Mr. John Roberts, Chemist and Druggist, of Caledonian Road, N. Aged 32 years. Mr. Roberts had been a Member of the Pharmaceutical Society since 1871.

On the 25th of February, 1876, Mr. Thomas Goodman, Chemist and Druggist, of Oldham Road, Manchester. Aged 66 years.

On the 13th March, 1876, at Bradford, Mr. Charles Urwick, eldest son of Mr. W. W. Urwick, of Pimlico. Aged 19 years. The deceased was a Registered Apprentice of the Pharmaceutical Society.

On the 19th of March, 1876, after a lingering illness, Mr. R. Marshall, Pharmaceutical Chemist, of Boston. Mr. Marshall had been a Member of the Pharmaceutical Society since 1853, and for several years had served it as its Local Secretary.

Review.

BOTANY. By J. D. HOOKER, C.B., P.R.S. With illustrations. Macmillan and Co.

It is refreshing, in the present day, when the redundancy of scientific terms has become quite bewildering, to find that it is possible to treat such a subject as botany in a simple and attractive manner.

The first thing that strikes one in perusing this little treatise is the remarkable way in which details, usually dry and uninteresting, are rendered so clear and intelligible, that it is a pleasure to read them. Nevertheless, the subject matter is so condensed, that looking at the small size of the book, one can hardly believe it contains so much information as it really does.

The author's intention is evidently to induce the beginner in botanical science to study it practically. With this view there is appended at the end a list of those plants and their various organs which are referred to in its pages. These plants, with few exceptions, are such as may be commonly found in fields, hedges, or gardens.

By means of this list the teacher is aided in his selection of specimens and the learner in finding out what parts of the various plants especially deserve examination.

Tissues or structures which should be examined under the microscope are pointed out by an asterisk, and thus the student is guided in his selection of those specimens which will best illustrate the facts to be observed.

The formation of school gardens systematically arranged is also recommended, in order that a good idea of the various natural groups of plants may be easily obtained, and to aid in this project a classified list of most of the natural orders which contain plants indigenous to Britain has been made out, and the familiar names of several species appended to each.

These are admirably selected, so as to give an excellent idea of the various types to be met with in each natural order. This may be seen in the very first on the list in which the plants recommended for growth and examination are as follows:—"Ranunculaceæ: clematis, anemone, buttercups, hellebore, ficaria, columbine, larkspur, aconite, peony."

The use of Professor Henslow's admirable schedules for examination of the parts of the flower is also recommended and another extremely useful schedule for the examination and description of leaves has been devised by Dr. Hooker. By the systematic use of these schedules the habit of accurate observation and of thorough examination so necessary to the attainment of any degree of proficiency in botanical science will, it is thought, be induced.

In one of the sections, directions are given for carrying out physiological experiments respecting the various processes concerned in plant life.

The section devoted to the description of the different kinds of fruit is treated in a very simple manner. Those familiar terms only are mentioned which are commonly used in systematic botany, and such terms as cremocarp, caryopsis, caruncule, æterio, and siliqua are entirely eschewed. Even the terms follicle and capsule, which are frequently met with, are replaced by the word pod. This mode of treatment being in consonance with general usage is perhaps best adapted for the use of beginners in the science, although it is evidently not calculated to induce thorough examination of the structure of fruits. The author regards the fruit of the rose as consisting in part of the hollowed out top of the peduncle, and considers the fleshy part of apple, etc., to be of the same structure, a conclusion in which it is difficult to concur.

The whole subject of the best nomenclature for fruits is undoubtedly a difficult one and might form an excellent subject for discussion at the next International Botanical Conference.

One term used by the author may be welcomed as a slight approach towards uniformity in botanical terms, a painciple which, if carried out thoroughly, would make botany a much easier study. The term alluded to, is infructescence as applied to an aggregation of fruits as in the mulberry, or pine, in the same way that inflorescence is applied to an aggregation of flowers.

The only part of the book which appears to have received less care than the rest is the list of plants for a school garden.

In this list Division III. is twice repeated, although the second time of its occurrence it evidently refers to Monochlamydeæ. Neither of the divisions have any name attached to them except the Corollifloral.

A few plants also occur in this list, which would have been better omitted, owing to their disputed position, and the various opinions held by different botanists as to the natural orders in which they should be grouped. These may perhaps be pointed out with advantage so that our readers may consult different works upon their various views held with regard to them. The following are the plants referred to:—Holly placed in Thalamifloræ, maple in Sapindaeæ, jasmine in Oleaceæ, fig and mulberry in Urticaceæ, asparagus and butcher's broom in Siliaceæ, buckthorn in Celastrineæ, and laurustinus in Cornaceæ.

Taken as a whole, however, this little work is admirably adapted for the purpose for which it is intended, and is decidedly the best of the little books of its class which have appeared during the past few years. The clear statements and opinions unhesitatingly expressed, emanating as they do from so high an authority as Dr. Hooker, must render this little book extremely valuable to those who are puzzled by the various theories and opinions given in more extensive works on botany.

BOOKS, PAMPHLETS, ETC., RECEIVED.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the Twenty-third Annual Meeting, 1875. Philadelphia: Sherman and Co. 1876.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF PATENT MEDICINES.

Sir,—As the law as to what is a patent medicine, and to the sale thereof is a puzzle to those whom it most concerns, may I be allowed to suggest what might be a remedy for the evils so justly complained of. I would suggest the repeal of the present law, and an entire recast in one short act of the laws relating to patent medicines. The definition as to what should require a stamp or need a license for its sale should be strictly laid down by the act, and not left to be interpreted by any board, council, or committee of the Inland Revenue as at present. We have witnessed the uncertainty of this interpretation in the corn pencil cases lately.

As to the sale of proprietary or stamped medicines containing poisons I would suggest that where such patent medicines contain as part of the ingredients one or more of the poisons on the schedule of poisons as defined by law, the maker thereof should be required to state the proportion or quantity of such poison, or at least the name of such poison, on the label outside of each package, and the retailing of such proprietary medicine should be confined to the educated and registered chemist, who having the requisite knowledge would be enabled to give a word of caution as to the use of the same. It seems to me that if it be reasonable that a restriction should be placed on the sale of a vermin killer because it contains strychnia it is equally reasonable that a restriction should be placed on the sale of a similar article contaning morphia.

The restriction of sale to chemists would also put a stop to the selling of tincture of opium under cover of a stamp, by hucksters and others. There is also another aspect of the question, and that is the sale of sundry ointments, pills, powders, cordials, cough mixtures, etc., in small shops, and for this, certain chemists are themselves to blame. They are not content with a legitimate counter trade for want of scope and consequently fill little shops with medicines to the detriment of the legitimate chemist who is bound on all sides by law and penalty.

A NORTHERN M.P.S.

Sir,—I have been anxiously hoping some of your correspondents would have brought forward the subject of grocers, etc., vending patent medicines at nearly cost price. I have now both right and left two of these grasping individuals, and am told to-day one of our large firms are offering to pay the licence for all hair dressers who will commence selling them; it does not require a very far sighted person to tell what the result will be, and who have we to thank but our worthy representatives for having the licence reduced much against the desire of the trade generally. As far as my experience goes it would have been better had it been doubled. While the unimportant controversy is going on about patents being labelled "poison," I think it would be far more beneficial were a bill to be introduced prohibiting any but qualified chemists dealing in such dangerous compounds.

J. W. B.

Sir,—I have just perused in last week's journal the copy of the Exeter patent medicine memorial, and cannot help thinking that to make a parliamentary or public question of the subject will be a mistake. Surely past legislation has associated us sufficiently in the public mind with poisons! We all desire to prevent accidents, either from patent or other medicines. Some persons would do away with the former entirely, but with regard to these compounds they are our legitimate articles, and although the underseller is satisfied with the smallest possible profit from them, yet we cannot afford to abandon their sale. And then there is scarcely a chemist who has not his pet proprietary medicine. It has not been and perhaps never will be a source of profit to him, nevertheless, it is one of innocent excitement. If the article has scarcely any sale, he is buoyed up with the belief that so good a remedy must some day go off; and if perchance there should be a slight demand for it, then his hopes are raised and he feels happy with the thought that the good time has really come and that he is now fairly on the road to fortune. Moreover, patent medicines, like prescribing chemists, are a very great public convenience, and are patronized by all classes from the premier to the peasant, and when consulted, we are ever ready to give our conscientious opinions as to the value or dangerousness of any proprietary medicines in our establishments.

J. R. S.

March 21, 1876.

TABLESPOONFULS, ETC.

Sir,—The idea of your correspondent J. N. B. suggesting legislation concerning the measuring of doses of medicines seems to me very absurd.

As spoons vary in size, we have a remedy in graduated bottles, which are easily obtainable, of sufficient accuracy.

The matter is more in the province of the prescriber than the dispenser, and I would suggest with you that the Pharmaceutical Society take steps to bring it under the notice of the Medical Council.

FELIX STEVENS.

51, *Judd Street, March* 21, 1876.

G.—The specimens of catkins sent appear to belong to *Salix caprea* and *S. cinerea.* We cannot, however, undertake to name willows unless the specimens are accompanied with young leaves. The inflorescence should be dried and preserved until the leaves appear.

F. M. R.—A new edition of 'Taylor on Poisons' has just been issued by Messrs. Churchill. Also a new edition of Dragendorff's 'Ermittelung von Giften" has just been published.

"*Pil Garlic.*"—(1) We will try and obtain this formula. (2) Beasley gives the following formula for Syr. Ferri et Quiniæ Iodidi:—Digest ʒj of iodine with ʒss of iron filings and ʒiv of water with a gentle heat and frequent agitation till the solution is colourless. Filter it rapidly into a vessel containing ℥xxviij of simple syrup. Dissolve also gr. xij of sulphate of quinine in ʒij of water acidulated with sulphuric acid and add to the former. It contains 3 grains of iodide of iron in ℥j. (3) This preparation is sent out by a manufacturer, but we do not think the formula has been published. (4 and 5) Consult some work on perfumery.

W. H.—(1) This question had better be addressed to the editor of a homœopathic journal, we are unable to answer it. (2) 'Tomes' Dental Surgery,' published by Churchill. (3) See an article on 'Pill Coating' in vol. iv. p. 953; also p. 575 of same vol., and p. 212 of vol. iii.

J. Manley.—If you refer to the article on the subject by the late Mr. D. Hanbury (vol. v. p. 421) you will see that you are mistaken, and that Ruiz and Pavon spelt the word "*Chondodendron.*" Notwithstanding the evident omission of a letter, we prefer to follow this orthography for the reasons given in the article referred to.

F. L. W.—We believe a tincture of Phyalis Alkekengi is prepared from proof spirit, 1 in 8, and that the dose is from 1 to 2 drachms.

"*An Associate.*"—You are recommended to communicate any definite information you may possess respecting a breach of the Pharmacy Act to the Registrar.

W. Findlater.—In the British Pharmacopœia of 1864 the avoirdupois pound of sixteen ounces was adopted and it was retained in the edition of 1867.

St. Hardwick.—As "aquæ" is not always written, "q. s." is evidently not always understood.

C. W. T.—Mix the spirit of chloroform and ether and add gradually to the camphor mixture, shaking after each addition. A slight separation of chloroform may take place, if kept at a very low temperature, but the proportion of chloroform is not so great as in Aqua Chloroformi, B.P.

A. M.—Add the Liq. Ammon. to the iodine, then the Lin. Saponis and Ol. Terebinth. After standing a short time a colourless but non-homogeneous liniment will be formed.

Messrs. Goodall, Backhouse and Co.—You appear to be under some misapprehension, the article referred to by you was the review of Dr. Hassall's book.

COMMUNICATIONS, LETTERS, etc., have been received from Mr. Findlater, Mr. Harper, Mr. Castle (New York), Mr. Tebbutt, Mr. B. Squire, Mr. Jackson, Enitar, Country M.P.S., J. B., J. W. B., C. F., H. W., Mr. W. Wilkinson Mr. Rimmington and Mr. Jones are thanked for their communications.

LIQUOR AMMONIÆ ACETATIS B.P.

BY J. C. THRESH, F.C.S.

It is somewhat strange that this, one of the most readily prepared official solutions, should be found to be frequently carelessly prepared and varying much in strength; yet I am afraid such is the case. This arises from the acetic acid found in commerce varying much in strength (often being 10 to 20 per cent. weaker than the B.P. standard) and from the practice so prevalent of making concentrated solutions.* Few appear to take the trouble to apply heat to the solution previous to ascertaining that the fluid is neutral, hence nearly all the specimens examined were distinctly alkaline. According to Pereira this is erring on the wrong side, since it would be better if it were slightly acid.

The seven following samples were purchased from three wholesale and four retail chemists. No. 1 was prepared by myself.

Samples 5, 6, 7 and 8 were concentrated preparations, being labelled 1 to 2, 1 to 5, 1 to 7, and 1 to 7, respectively, and before being examined were duly diluted.

No.	Reaction	Sp. Gr.	Action of H_2S.	P.c.of Am.A.
1	Neutral	1·016	None	6·9
2	,,	1·016	Slight colour	7·0
3	Strongly Alkaline	1·015	,,	6·5
4	Alkaline	Not taken	None	4·6
5 (1 to 2)	,,	1·018	Slight colour	7·9
6 (1 to 5)	,,	1·014	,,	5·8
7 (1 to 7)	,,	1·011	Deep colour	4·9
8 (1 to 7)	,,	1·015	Slight colour	6·5

Sample 4 appeared to have been extemporaneously prepared, since after being in my possession a few minutes the cork was blown out with considerable violence and brisk effervescence ensued.

No. 6 I learn was made by neutralizing acetic acid with ammonium carbonate. If by thus neutralizing the acid there was no increase in volume, the solution would be exactly six times the B. P. strength, but as 10 oz. acetic acid makes nearly 12 of this concentrated solution it is obviously only about five times the proper strength.

In the next edition of the B. P. I think it would be advisable to order this solution to be made with solution of ammonia instead of with carbonate (as in Liq. Ammon. Cit.), thereby saving both time and trouble. The characters, tests, etc., should also be added, and it should be directed to be kept in green glass bottles to avoid contamination with lead.

Buxton.

NOTES ON SOME AMERICAN MEDICINAL PLANTS.

BY E. M. HOLMES,

Curator of the Museum of the Pharmaceutical Society.

California has lately proved a prolific source of new drugs for investigation and trial in America, and two more new medicinal plants have been lately introduced into notice from that country. Through the kindness of Professor Maisch of Philadelphia, specimens of these have been presented to the Society's Museum, and a short notice of them may not be unwelcome to those who take an interest in the pharmacy of the sister country.

Eriodictyon Californicum, Benth.

This drug consists of the leafy tops of the plant, the leaves being stuck together by a resinous exudation which gives quite a varnished appearance to the upper surface of the leaves and to the stems, the under surface of the leaves, except the veins, being almost entirely free from this resinous substance. It is this curious character of the leaves which gave rise to another name for the plant, *E. glutinosum*, Benth.

The leaves, which are leathery but brittle, are elliptic-lanceolate in outline, tapering below into a short petiole; the margins of the leaves being slightly toothed. The upper surface of the leaves is smooth and the veins are indistinct. The under surface is whitish from the presence of minute downy hairs, and the veins are prominent, the midrib forming a stout keel. Owing to the resinous coating on the veins the under surface of the leaf has a strongly reticulated appearance. The taste of the leaves is very similar to the odour exhaled in spring by the opening buds of the well-known balsam poplar (*Populus Tacamahaca*, Mill.)

The plant yielding these leaves is an evergreen shrub, about four or five feet high, which grows abundantly in dry rocky places on the mountains of Northern Mexico and Southern and Central California. The leaves are alternate, three to four inches long, and from half to one inch broad in the middle. The light purplish blue flowers are arranged in scorpioid cymes, the flowers themselves bearing a distant resemblance to the common lungwort (*Pulmonaria officinalis*, L.) of our gardens. The plant belongs to the natural order Hydrophyllaceæ, a family nearly allied to the Boraginaceæ, from which it differs chiefly in the parietal placentation of the capsular fruit.

For the following remarks I am indebted to the *Pharmacist*, February, 1876, p. 34:—"The plant has long been used by the Spaniards and Indians as a specific for lung diseases, from which it has obtained the name of 'consumptive's weed.' It is also known as 'yerba santa,' 'mountain balm,' and 'bear's weed,' from the partiality which bears show for its foliage."

Dr. J. H. Bundy, of California, reports that he has cured some severe cases of chronic bronchitis; that he has successfully treated pneumonia with the drug, and that he has noticed a peculiar action upon the kidneys resulting from its use. The natives are said to make an aqueous decoction as a general tonic, and a decoction with whisky for chronic lung diseases. In acute coughs and colds it appears to be of little value.

Mr. H. S. Wellcome treated the leaves with strong alcohol for an hour, which dissolved all the surface resin and left on evaporation an amber-coloured aromatic resin. On being afterwards exhausted with alcohol the leaves yielded a dark green resin similar to the first in general character, but having a bitter taste. A subsequent aqueous infusion of the leaves which had been exhausted by alcohol, yielded an intensely bitter extract. He therefore recommends the drug to be used in the form of tincture, 4 ozs. of the leaves being used to a pint of spirits of wine containing 75 per cent. of alcohol. Of this tincture the dose is 1—2 drachms. A syrup may be made by triturating the resin with powdered French chalk and then following the process for making syrup of tolu. The syrup thus made has an agreeable odour and taste, like that of the pine apple.

Raiz del Indico.

This name is used by the natives of Mexico for the root of a plant growing along the Rio Grande.

The root received from Professor Maisch consists of fusiform tubercules, about 2 inches long, and nearly

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* Liq. Ammon. Acet. Conc. is frequently prescribed, and it would be interesting to know which of the three various strengths (viz., 1 to 2, 1 to 5, and 1 to 7) is intended by prescribers. I always use the 1 to 5.

¾ of an inch broad in the middle; the external surface is dark chocolate brown, and strongly wrinkled, with a few transverse ridges. The internal surface is of a rather paler brown colour with a reddish tinge, but does not usually present any marked feature. In some pieces, however, the large meditullium can be distinguished from the cortical portion, which occupies only about one-fourth of the diameter of the root. The taste is very astringent.

Mr. F. G. Voelcker, who has examined the root,* reports that the leaves of the plant, as grown by him, are entire, petiolate, 12 to 13 inches long by 2½ to 3 inches wide, oblanceolate in outline, acute, glabrous, shining, juicy, and of a light green colour, and that from the stipules and the general appearance of the plant he infers that it belongs to the Polygonaceæ, although he has not seen the flowers.

This root does not appear to possess any advantage over bistort or other polygonaceous roots, but is chiefly interesting on account of the results obtained from a chemical examination of it. These results, as recorded by Mr. Voelcker, show that the root assimilates closely to rhubarb in composition. Thus, by treatment with ether, he obtained crystals, giving the reactions of chrysophanic acid, and by subsequent treatment with alcohol, he obtained bodies which he considers to be aporetin, phæoretin, and erythroretin. He also found oxalate and malate of calcium, starch, gum, albumen, glucose, and 23·16 per cent. of tannin.

THE MANUFACTURE OF CITRIC AND TARTARIC ACID.†

BY ROBERT WARINGTON.

(*Concluded from page* 770.)

The detailed composition of three lees is shown in the following table. Lees I. and II. are undoubtedly plastered; Lees III. is unplastered.

Detailed Composition of Lees.

	I. French Lees.	II. Spanish Lees.	III. Spanish Lees.
Tartaric acid as acid tartrate	4·48	5·27	22·66
Tartaric acid as neutral tartrates	21·34	19·13	11·67
Total tartaric acid .	25·82	24·40	34·33
Water at 100°	11·305	10·694	9·750
Sand	4·600	4·900	4·730
Silica	2·130	1·960	
Ferric oxide	·394	·351	·214
Alumina	·844	·832	·578
Phosphoric acid	·527	·486	·569
Lime	10·567	10·600	4·514
Magnesia	·327	·363	·209
Potash	1·868	2·123	[7·115]‡
Soda	·100	·060	—
Sulphuric acid	4·566	5·729	—
Chlorine	·040	·042	—
Carbonic acid	·435	·388	—
Tartaric anhydride . . .	22·721	21·472	30·210
Combined water . . .	5·904	5·552	4·159
Vegetable matter . . .	33·672	34·448	[37·952]
	100·000	100·000	100·000

The vegetable matter of lees contains a considerable amount of nitrogen.

Before leaving the consideration of lees, we would compare the proportion of impurity present with that found in tartar. Alumina, ferric oxide, and phosphoric acid, are three impurities most injurious to the tartaric acid manufacturer. The proportion of these impurities in lees and tartar for 1000 of tartaric acid present, is shown in the following table:—

Impurities present for 1000 *of Tartaric Acid.*

	TARTAR.		LEES.		
	Messina	St. Antimo	Spanish	Spanish	French
Ferric oxide . .	·69	1·16	6·23	14·38	15·26
Alumina . . .	·27	1·24	16·84	34·10	32·69
Phosphoric acid .	·53	·92	16·57	19·91	20·41
Total . . .	1·49	3·32	39·64	68·39	68·36

A glance at these figures shows at once the inferiority of lees as a source of tartaric acid. In extracting the acid the impurities we have mentioned are in great part dissolved, and are the occasion of much hindrance and loss, as we shall presently describe.

The commercial analysis of tartar and argols is usually performed by various indirect methods; these will be found described in the paper in the Chemical Society's journal already referred to. By these indirect methods the tartaric acid in good tartar may be correctly found, but it is impossible to determine with any exactness the tartaric acid in lees and low argols. I have recommended for the analysis of these latter a direct method, based on the conversion of all the tartaric acid into neutral tartrate of potassium, and its subsequent separation in the form of bitartrate of potassium. Until a trustworthy direct method for the analysis of lees is employed, their use will be restricted and unsatisfactory, the common methods of analysis on which lees have to be purchased giving results 10 to 15 per cent. above the tartaric acid actually present.

We may now pass from the materials used to the process of manufacture. This has been somewhat altered from that originally employed by Scheele. He was satisfied with merely neutralizing the tartar with chalk, by which only half the tartaric acid was precipitated; the tartrate of calcium thus obtained was then decomposed with sulphuric acid precisely as in the case of citric acid. The first improvement seems to have been the substitution of lime for chalk; by this means a far larger amount of tartrate of calcium was obtained from the tartar; but the process was not perfect, the caustic potash produced holding tartrate of calcium in solution. Lowitz (quoted in Aikin's 'Dictionary,' 1807) then suggested the use of chloride of calcium to decompose the neutral tartrate of potassium formed by the action of the chalk, and thus precipitate the second half of the tartaric acid. This method has been largely used, and chemically leaves little to be desired. It involves, however, the purchase of chloride of calcium, and the inconvenience of dealing with a deliquescent substance, the excess of which also contaminates the chloride of potassium produced. The proposal to use the hydrated sulphate of calcium, which, as one of the products of the tartaric acid manufacture is always at hand, seems to have originated with M. Desfosses, and this process is the one which is, I believe, now universally adopted in this country. I was surprised, therefore, to find that Hofman in his exhibition report of 1863 describes the use of chloride of calcium, and says:—"Some manufacturers have endeavoured to decompose the neutral potassic tartrate by calcic sulphate, but this method occasions considerable loss of tartrate of calcium, which remains dissolved in the sulphate of potassium."

The method adopted in England is to add the tartar

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[*] *American Journal of Pharmacy*, February, 1876, p. 50.

[†] Paper read before the Chemical Section of the Society of Arts. From the *Journal of the Society of Arts.*

[‡] This figure is calculated from the acidity.

gradually to a boiling mixture of whiting and water, till the whiting is consumed and the tartar neutralized. A sufficient quantity of wet gypsum is then added to decompose the resulting neutral tartrate of potassium, the agitation of the whole being continued for some time. The result is a dense precipitate of crystalline tartrate of calcium (mixed with all the insoluble matters of the original tartar), and a solution of sulphate of potassium, coloured, slightly alkaline, and containing some sulphate of calcium in solution.

It is quite true that this sulphate of potassium liquor contains some tartaric acid in solution. This tartaric acid does not exist, as books tell us, as tartrate of calcium dissolved in sulphate of potassium, but is simply a residue of neutral tartrate of potassium which the gypsum has failed to decompose. In fact, if to this sulphate of potassium liquor an acid be added, a precipitate of bitartrate of potassium is produced on standing; and this is the best and most accurate mode of determining the amount of tartaric acid that may be present, bitartrate of potassium being very insoluble in a solution of sulphate of potassium. Although the action of the gypsum is not quite perfect, it may by care be made nearly so, and the advantages of its use are believed to be greater than the disadvantages.

The sulphate of potassium liquor is boiled down and allowed to crystallize; the resulting crude sulphate of potassium is one of the valuable products of the tartaric acid manuafacture. The crude salt will contain about 90 per cent. of real sulphate of potassium, the impurities being chiefly water, gypsum, a little carbonate of calcium, and organic matter. If the decomposition has been badly conducted, tartrates and carbonates may be present in notable quantity.

By no means all the potash present in the tartar is recovered by the manufacturer. Some of the washings of the tartrate of calcium are too weak to pay for concentration, and some potash remains behind with the tartrate of calcium, and passes into the tartaric acid liquors. On the whole I do not think that more than 80 per cent. of the potash present in the tartar is recovered, and this estimate is probably too high. Assuming it, however, to be true, the amount of 90 per cent. sulphate of potassium produced last year in the tartaric acid factories of this country should be about 745 tons.

The tartrate of calcium having been washed on a vacuum filter is mixed with water, and decomposed with sulphuric acid. The test by which an excess of sulphuric acid is recognized, the mode of evaporation, the granulation, etc., are quite similar to the methods employed in the case of citric acid, and need not be again described. The final crystallization of the bright liquor is, however, conducted in deep cylindrical leaden vessels, about two feet high, and not in the shallow trays used for citric acid.

The mother liquor remaining after three crystallizations have been taken is precipitated with whiting, as in the case of citric acid, but the result is in some respects very different. If a solution of tartaric acid, containing ferric oxide, or alumina, is treated with chalk, the iron and aluminium are precipitated along with the tartrate of calcium; it follows that precipitation with chalk will not purify tartaric liquors from these substances. If, however, the iron is in the ferrous state, a considerable amount will remain in solution after boiling with chalk. In a laboratory experiment, in which an old liquor of known composition was treated with chalk in the usual manner, I found that only about 1 per cent. of the aluminium, 3½ per cent. of the phosphoric acid, and 30 per cent. of the iron present were removed by this method of purification. It appears, therefore, that in a tartaric acid factory in which iron, aluminium, and phosphoric acid are continually being introduced in small quantities in the tartar, the whiting, and perhaps in the animal charcoal used, an accumulation of aluminium and phosphoric acid in the liquors will gradually take place, the accumulation being greater in proportion to the impurity of the materials used. When a factory has been newly started the mischief is perhaps not felt for a few years. Gradually more and more free sulphuric acid has to be employed to induce the liquors to crystallize; this excess of sulphuric acid occasions a greater decomposition of tartaric acid during the evaporations, and oxalic, and probably other acids are produced, which further load the old liquor with worthless matter. At last the old liquor becomes intractable. It is very thick, and if induced to crystallize it yields potash-alum and oxalic acid, but no tartaric acid can be obtained from it. When analysed it is found to contain far less tartaric acid than had been supposed; that a quantity of organic acid not tartaric is present, with a large amount of alumina and phosphoric acid, and an enormous quantity of free sulphuric acid. This is the *caput mortuum* of the tartaric acid manufacture. The liquor is probably thrown away, and the manufacturer's books show for that year a considerable loss. All these facts point to the economy of using pure materials, and to the importance of seeing that the whiting and animal charcoal used are as free as possible from iron, aluminium, and phosphoric acid. With citric acid, as already mentioned, no such accumulation of impurities takes place, iron, and aluminium not being precipitated from a citric solution by boiling with chalk. The purity of citric liquors is maintained, however, only by a loss of citric acid, and the absence of iron and aluminium is therefore as important in the citric as in the tartaric manufacture.

The proportion of tartaric acid which can be obtained from tartar on the large scale depends very much on the purity of the liquors. In a freshly started factory the loss in manufature may be as low as 8 per cent.; in one that has been several years in work without removal of the old liquors the loss may be as high as 12 per cent., and these probably may be taken as the two extremes in cases where only tartar is used.

We must refer briefly in conclusion to C. Kestner's process for extracting tartaric acid; the process is employed in Germany, and is specially adapted for the treatment of low argols and lees. The tartaric matter is in this process heated with hydrochloric acid, which dissolves both bitartrate of potassium and tartrate of calcium; the hydrochloric solution is then decanted from the undissolved matter, and the tartaric acid it contains precipitated by neutralization with chalk or lime. The remainder of the process is similar to that already described.

The amount of tartaric acid manufactured in England in 1875, is estimated at about 1350 tons; there are six factories, all in the neighbourhood of London. Besides the acid made in England large quantities of German and Hungarian acid are imported, chiefly to Liverpool and Glasgow. The principal foreign factories are at Heilbronn in Würtemberg, Pforzheim in Baden, and Pesth in Hungary. The Hungarian manufacture is rapidly developing. The total quantity of acid made in Germany, Austria, and Hungary is, I am told, about 1000 tons per annum. The manufacture of France is very small, and is said to be under 200 tons.

We have now concluded our rapid survey of the more important features of the citric and tartaric acid manufacture. I must not sit down without expressing my obligations to many friends, who have most kindly placed their information at my service, and I must especially mention Mr. Northcott, to whom I am indebted for many of the estimates given, and Mr. W. Kemball, manager of the Atlas Chemical Works, who has kindly placed his long experience at my disposal. I must add, that if any of the results mentioned in this, or in my earlier paper, are found of service by tartaric or citric acid manufacturers, it should be recollected they are really indebted for them to Mr. Lawes, by whose liberality the results both of the laboratory and factory have been made public.

THE EMPLOYMENT OF SNOW AND HYDROCHLORIC ACID AS A FREEZING MIXTURE.*

From some experiments made by MM. Pierre and Puchot, and recently reported to the French Academy, they have drawn the following conclusions respecting the use of a mixture of snow and hydrochloric acid as a refrigerant :—

(1) By mixing 2 parts of snow with 1 part of commercial hydrochloric acid the temperature can be lowered to − 32° C.

(2) By cooling the acid previously to mixing to − 15° or − 16° C. the temperature can be lowered to − 35° C.

(3) Acid supersaturated at − 16° or − 18° C. does not appear to present any advantage over ordinary hydrochloric acid.

(4) Although it is difficult to retain the temperature of a refrigeratory bath of snow and hydrochloric acid for any considerable time so low as − 34° or − 35° C., it is not difficult to obtain a persistent temperature of − 25° or − 26° C. by successive additions of snow and slightly cooled acid.

When the temperature shows too pronounced a tendency to rise the subjacent liquor should be siphoned off and fresh snow and acid added. The siphoned liquor can be used to cool the acid before using it.

A DEFENCE OF PORTUGUESE PHARMACY.†

BY ALBANO ABILIO ANDRADE.

Pharmaceutist of the 1ª class, Graduate of the Oporto Medico-Chirurgical School.

In the previous number of this periodical† we promised to give the enlightenment asked for from the Portuguese pharmaceutical journals by the worthy President of the Pharmaceutical Society of Great Britain as to pharmacy in Portugal, with respect to a black narrative read before that Society by Mr. Thomas Greenish concerning the teaching of pharmacy and the exercise of the pharmaceutical profession in Portugal. We now proceed to fulfil our promise.

Mr. Greenish commenced by saying that the Codigo Pharmaceutico Portuguez ill deserves the name of a Pharmacopœia since it has in it no original formulæ peculiar to the country ; it being a collection of formulæ that have gained fame in their respective countries, and, for the rest, a compilation of formulæ used in France or met with in the London Pharmacopœia.

The Codigo Pharmaceutico Portuguez contains :—

97 regular formulæ of alcoholic tinctures of plants and other medicinal substances, being 49 formulæ more for preparations of this class than were contained in the London Pharmacopœia, 39 more than are met with in the British Pharmacopæia, 31 more than are admitted to the French Codex, 55 more than are inserted in the Farmacopea Española, 51 more than are published in the United States Pharmacopœia, etc. ;

125 formulæ of aqueous, alcoholic and ethereal medicinal extracts, being 94 formulæ of this class more than are contained in the British Pharmacopœia, and many more also than are admitted into the other pharmacopœias cited ;

35 formulæ of vinegars and vinous medicines, or 29 more than are met with in the British Pharmacopœia.

32 formulæ of medicinal distilled waters, or 20 more than are contained in the British Pharmacopœia.

Of medicines in the shape of pills, plasters, ointments, oils, and in one word, of all other classes, there are also in the Codigo Pharmaceutico Portuguez three or four times as many formulæ as are met with in the British Pharmacopœia. Now, no person can rightly say of formulæ of the nature of those we have just cited, and which are to an extent exclusively abundant in our Codigo Pharmaceutico, that they are taken from one country or another. These formulæ were invented originally by medical men and pharmacists of all countries ; they appeared publicly in medical periodicals; they were printed in pharmaceutical and other papers; and in this way they have been preserved, according to their merit, for the pharmacopœias of all countries, and for one pharmacopœia as much as for another.

Thus, for example, in the existing English Pharmacopœia, published in 1864, we find preserved under the name of compound powder of tragacanth (*pós d'alcatira compostos*) a formula that is met with in our old Pharmacopea Geral, published in 1794; a formula that was afterwards introduced into the Pharmacologia de Francisco Tavares, published in Latin in 1809 for the use of the alumni of the University of Coimbra, appearing there under the name of Pulvis Tragacanthæ Compositus, being exactly the same name with which it now appears in the British Pharmacopœia.

Such formulæ have no country. For this reason we cannot understand Mr. Greenish when he affirms that the formulæ of our Codigo Pharmaceutico are not peculiar to the country. Nor do we find him more correct when he says, " France is largely represented, the London Pharmacopœia has also been copied ;" the truth being that scarcely a single formula transcribed from the London Pharmacopœia is met with in our Codigo, except the compound decoction of aloes, whilst not one can be met with from the French Codex, since that was published eight years after ours.

Instead then of Mr. Greenish speaking in such a superficial manner upon the source of the formulæ in our Codigo, we had rather he would express himself in clear terms, specifying the French formulæ and those from the London Pharmacopœia that he says are present in it in so great quantity.

Moreover, we do not know, speaking now of formulæ of other kinds, upon what grounds Mr. Greenish says that the Codigo Pharmceutico Portuguez appears to be a collection of formulæ that have gained fame in their respective countries, citing as an example the formula for Morrison's pills.

Expressing himself in these terms Mr. Greenish does not make it quite clear whether he wishes to refer only to the formulæ of pharmaceutical specialities, or also to any others that are designated by custom under the names of their authors. But whether he refers to the first only or to the second also, it is certain that he exaggerates much in such an affirmation ; for among about 2000 formulæ that our Codigo Pharmaceutico contains, there are few met with belonging to either the one or other class. Further, if this be vicious or defective, we see it followed in the formularies of all nations, and nobody has yet thought of criticizing them for such a cause.

In the famous Supplement to the Pharmacopœia of the learned Professor Redwood are met with not only a note upon the composition of Morrison's pills, but also many formulæ of particular authors, national and foreign, among them, Eau de Melisse de Carmes, Emplastrum Paracelsi, Pilulæ Rufi, and the classical Theriaca d'Andromache. In the French Codex are also found the formulæ of the ancient Theriaca, Van Swieten's Liquor, Tisane de Feltz, Emplâtre de Vigo, Decoction blanche de Sydenham, Black Drops, Thé de Saint-Germain, Poudre temperante de Stahl, etc.

In the full and well-arranged Beasley's 'Pocket Formulary,' are met with the formulæ of Baume tranquille de Chomel, Eau bénite de Ruland, Sucre vermifuge mercuriel de Baumé, etc. In the Farmacopea Española are found formulæ for Emplastro de Ricord, Unguento d'Agrippa, Trochiscos de Rhasis, etc. In the Pharmacopœia of the United States are the formulæ of Plummer's Pill, Monsel's Solution, Hoffman's Anodyne, etc.

The practice, then, of introducing into Pharmacopœias besides the formulæ which they should more specially contain, those also drawn from their respective countries which could assist the pharmaceutist in the preparation of recipes that foreigners might present to him, is a practice, we say, not peculiar to the Codigo Pharmaceutico Portuguez; it is, as has been seen, generally adopted in all countries. The special committee that constructed the British Pharmacopœia introduced into it the formulæ of Plummer's pill and Dover's powder, with the bare circumstance of concealing the names of the authors of those formulæ.

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* *Comptes Rendus*, vol. lxxxii. p. 45.

† Translated from the *Revista de Pharmacia e Sciencias Accessories do Porto*, for March, 1876.

From what has been said it may be inferred that the Codigo Pharmaceutico Portuguez contains, and in great abundance, the formulæ that we are accustomed to meet with in such books, and that if Mr. Thomas Greenish wishes to make the contrary accredited, this only proves that either he was not very careful in the information he collected and in the examination he made of our Codigo Pharmaceutico, or that he wished to narrate a history which should cause an impression without attaching sufficient importance to its being correct.

Continuing his narrative Mr. Greenish said that when it becomes necessary in Portugal to construct a new pharmacopœia the Faculty of Medicine makes a request to the Council of Superior Instruction in Lisbon, and that this council addresses itself to the Minister of the Interior, who then entrusts the work to the Faculty of Medicine of Coimbra, nominating for the purpose a committee composed of three medical men, one being a professor of chemistry, one of pharmacy, and one of botany. The narrator adds that a new edition of the Codigo is now being prepared.

Of the whole of this that Mr. Greenish says, only this is true that a new edition of the Codigo Pharmaceutico Portuguez is in preparation. Its construction, however, is not entrusted to the Faculty of Medicine of the University of Coimbra, but to a commission composed of four medical men, professors in the Escola Medico-Cirurgica de Lisboa, one of whom holds also the qualification of a pharmacist of the 1st class; three pharmacists, one of them being a professor, and another an ex-professor in the same school; and four professors of chemistry, two of whom hold also the qualification of pharmaceutist of the 1st class. Thus then the commission is composed of eleven members and not of six as stated by Mr. Greenish; it carries on its labours in Lisbon and not at Coimbra; and it was nominated by a decree of the 15th of November, 1871, without the preceding ceremonial described by Mr. Greenish.

Speaking of the pharmaceutical qualifications in Portugal, Mr. Greenish says that in our country there are neither special schools for the teaching of pharmacy, nor a course of specially pharmaceutical studies, pharmaceutical students having to go to the Academia Polytechnica to study that science. Also, that by more stringent regulations, published in 1854, the pupils in pharmacy who were at that time practising in pharmaceutical establishments, are to-day, after having undergone a modified examination, considered to be pharmacists of the 2nd class; as those who have undergone the rigour of the major examination are considered to be of the 1st class.

Nothing of this, as stated by Mr. Greenish, is correct.

By legal regulations of the 29th of December, 1836, special schools of pharmacy were created in connection with the medico-chirurgical schools of Lisbon and Oporto, which in 1837 were already frequented by pupils; these are governed by professors of pharmacy. Many years before, in 1772, the same studies had been instituted, by legal regulations, in connection with the University of Coimbra. In each of these three State educational establishments are laboratories where the students who attend the course of pharmacy are compelled to do practical work.

Before being admitted to attend the pharmaceutical course in any of the three State schools students must have completed their fourteenth year of age, and are required besides to undergo the following preparation:—

(1) A complete course of Portuguese.
(2) Course of the primary part of Latin.
(3) Complete course of French.
(4) Complete course of English.
(5) Complete course of Mathematics.
(6) Course of the principles of Physics and Chemistry and introduction to Natural History.
(7) Course of the primary part of Philosophy.
(8) Complete course of Geography and History.
(9) Complete course of Drawing.
(10) Medicine.
(11) Inorganic and Organic Chemistry.
(12) Botany.

It remains to be mentioned that Latin, notwithstanding what Mr. Greenish has said, forms part of the instruction of the Portuguese pharmaceutists who attend the Escolas de Pharmacie, and also forms part of the instruction of the medical students.

Besides this method of obtaining the pharmaceutical qualification, the Portuguese law permits another, with fewer studies and without attending the special schools in the three above-mentioned establishments.

The circumstance of attending or not attending the pharmaceutical course in one of these three establishments is, however, what constitutes the difference between pharmacists of the first class and those of the second; consequently, contrary to that which Mr. Greenish says, not only were pharmacists of the first class qualified many years before 1854, but also at the present time the qualification of pharmacist of the second class is granted to those who have commenced to practice pharmacy since that time.

With respect to the teaching of pharmacy in Portugal there had already been published in the *Pharmaceutical Journal*, in July 1871, another article under the same title as that by Mr. Greenish, but written with more seriousness and reflection, and in this it was stated that in the University of Coimbra there is a course of study for the qualification of pharmacists. It is, therefore, to be regretted that Mr. Greenish, when he attempted to write upon the qualifications of pharmacists in Portugal should not have had the slightest acquaintance with this article which had been published in the Journal of his Society a few years before.

Speaking of the state of prosperity in which he found the pharmaceutical class in Portugal, Mr. Greenish says that this calling has been supplanted among us by foreign pharmaceutical specialties, and that these are prescribed by Portuguese medical men.

At the time when Mr. Greenish spoke thus before the Pharmaceutical Society of Great Britain, November 3, 1875, Messrs. Baiss Brothers, druggists in London, were to complete a remittance of drugs, which they forwarded to us on the following day, of the value of £46, not being the first or the second that they had sent to us. It is hardly necessary to say that these drugs (48 lbs. (*sic*, ? ozs.) of quinine, 6 lbs. of bromide of potassium, 4½ lbs. of iodide of potassium, 13 lbs. of glycerine, etc.) were destined for the compounding of the prescriptions of Portuguese medical men, who, according to Mr. Greenish, only prescribe pharmaceutical specialities. But the more remarkable coincidence is—Mr. Greenish having instanced, as an example, that when the same Portuguese wish to administer strychnia they prescribe a foreign preparation containing the alkaloid—that it happens among the drugs sent to us by Messrs. Baiss Brothers on that date came a flask containing crystallized strychnia, which we had also ordered from them in order that we might satisfy the prescriptions of Portuguese medical men.

We do not wish, however, to say that all Mr. Greenish has stated with respect to the invasion of Portugal by foreign pharmaceutical specialities is without foundation. In consequence of the system followed by the French specialists of publishing advertisements of their preparations in the periodicals of all countries, French pharmaceutical specialities have invaded Portuguese pharmacy in the same manner, as by the advertisements in the *Pharmaceutical Journal*, and by the price lists of the English druggists,* we see they have also invaded England. But in Portugal the people procure the pharmaceutical specilities voluntarily, induced by the many virtues proclaimed in the advertisements; the medical men are not consulted in the matter.

Here and there a Portuguese doctor prescribes some of the more important of these specialities, such as Dr. Papillaud's granules of arsenate of antimony, Blancard's iodide of iron pills, and others of the same nature; but the major part of them not only do not prescribe any pharmaceutical specialities, but are opposed to them as being prejudicial to their interests.

What is more singular is that Mr. Greenish should say that English pharmaceutical specialities are used with fanaticism (*con fanatismo*) in Portugal. We can assure our colleague from London that beyond the preparations of Holloway and the Revalenta of Du Barry, which alone are advertised in the Portuguese journals, none others of English origin are known here; except, it may be, by English doctors who prescribe them, or persons coming from England, or those that receive English journals in which they are advertised.

In any case, the situation of pharmacists in Portugal is not agonizing, as Mr. Greenish has described. In this class, as in all others, are individuals to whom chance and skill have allotted fortune. In general, especially in the cities, the pharmacist gains more than sufficient to be able to satisfy the necessities of life without being obliged to exercise other callings at the same time.

Mr. Greenish said also that the pharmaceutical aspirants who have passed an apprenticeship accumulate afterwards in the principal cities, in order to attend the schools. This is not only the truth, but it is also natural; but that which is neither natural nor true is that they will give their services solely for food and lodging to pharmacists who will allow them to attend the schools, as stated by Mr. Greenish. Even in these circumstances the pupil gains a salary.

Mr. Greenish alludes to the anomaly—and in this part we find him right—that there is in Portugal a tariff of prices for the sale of medicines in pharmaceutical establishments. But it should be known that the last tariff was published in 1868, and it is evident to us that the government will consult ultimately the junta of public health as to whether it should be continued and that the reply of the junta will be in the negative. So far we consider this trouble for our class to be extinct, and we are hoping that the government will revoke article 2 of the decree which authorized the last published tariff, because in that article it is stated the same tariff shall be in operation until another is published.

Finally, to show the indifference of Portuguese doctors and pharmacists to medicines of importance, Mr. Greenish mentioned as an example that jaborandi as yet has found little favour in Portugal.

Upon this point we will limit ourselves to saying that immediately Dr. Coutinho gave information in France respecting the properties of that plant, and the journals of that country published the results of the experiments there made with it (April, 1874), the Portuguese medical and pharmaceutical journals reproduced those notices. A few months afterwards jaborandi was already at the disposal of the Portuguese doctors, and in the sitting of the Lisbon Society of the Medical Sciences on the 13th of February, 1875, notice was given of the employment of jaborandi in more than twenty cases, with good results in most of them. In subsequent sittings the members of the Society continued to give information as to the results of the administration of this plant in other cases. And is this what Mr. Greenish calls small favour given to jaborandi?

We think that we have brought forward evidence as we promised to do in a previous issue of this journal, that the narrative given by Mr. Greenish touching the teaching of pharmacy and the exercise of the pharmaceutical profession in Portugal offends by its incorrectness (*pecco por menos verdadeira*).

It was certainly because of the apparent improbability that Mr. Attfield asked for information on the matter from the Portuguese pharmaceutical journals, and on our part we express our acknowledgements to the noble president of the Pharmaceutical Society of Great Britain for so prudent a proceeding. But such an inexact narrative having found publication in the *Pharmaceutical Journal* we hope that Mr. Attfield will further prove to us his impartiality and integrity of character by causing to be published also in the same Journal these reflections, which, as a guarantee of their correctness, are attested by our signature.

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* In the price list of the house of Evans, Sons and Co., who have one establishment in London and another in Liverpool, are to be found announcements for the sale of 120 French specialities.

THE ESSENTIAL OIL OF EUCALYPTUS GLOBULUS.*

BY I. HOMEYER.

The leaves of *Eucalyptus globulus* are distilled in Australia with water, whereby a yellow, heavy, fragrant oil is obtained, which, when exposed to the air, gradually becomes brown and resinizes. Cloez has recently found that the main constituent of this oil is a higher homologue of camphor, $C_{12}H_{20}O$, boiling at 175°, to which he gave the name *eucalyptol*; the author, however, came to very different conclusions on examining three kilos of eucalyptus oil, the sp. gr. of which was 0·8762 at 12°C. By one or two distillations this oil was separated into portions, boiling below 186°, and above 200°, the former greatly predominating; by further fractionations this was found to yield no substance of absolutely constant boiling point; although the greater portion always boiled at 172° to 175° a portion was invariably left boiling over at 180°. The distillate at 172° to 175° was finally distilled over sodium, whereby the boiling point was wholly confined within these limits, but little action being exerted on the sodium. This distillate proved to be a hydrocarbon, giving on combustion numbers agreeing with a mixture of a terpene and cymene. By boiling it with nitric acid of sp. gr. 1·4 diluted with two parts of water, paratoluic acid, melting at 178°, and terephthalic acids were produced, to the extent of 28 and 8 per cent. respectively. By treatment with sulphuric acid diluted with 4 parts of water, the terpene was polymerized, and cymene boiling at 174° to 175° was obtained; from this barium cymene sulphonate, $Ba(C_{10}H_{13}SO_3)_2,3H_2O$, was prepared. This salt lost its water of crystallization at 180°, and was soluble in water to the extent of 2·35 grams of anhydrous salt in 100 of water at 14°; calcium cymene sulphonate, $Ca(C_{10}H_{13}SO_3)_2 2H_2O$, was also examined.

On comparing together the behaviour of commercial turpentine oil with diluted sulphuric acid, and that of the eucalyptus hydrocarbons, the author found that 1½ to 2 per cent. of cymene was formed in the first case, and 20 to 25 per cent. in the second.

A terpene boiling at 150° to 151° is also present in eucalyptus oil, the author having obtained a small quantity of distillate at that temperature giving numbers agreeing with $C_{10}H_{16}$; whilst an oxidized substance is also contained, boiling at 216° to 218°, and giving numbers agreeing with a mixture of substances, $C_{10}H_{16}O$ and $C_{10}H_{14}O$; to this the author applies the term "eucalyptol." When treated with phosphorus pentasulphide it yields pure cymene.

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* From the *Journal of the Chemical Society*, February, 1876. (Arch. Pharm. [3], v, 293).

The Pharmaceutical Journal.

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SATURDAY, APRIL 1, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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THE BENEVOLENT FUND.

IT is so recently that we dealt with the subject of the Benevolent Fund in these columns that we should not now have resumed its consideration had we not been induced to do so by several correspondents who still continue reluctant to join the ranks of subscribers, and put forward in their letters various reasons for not subscribing. We do not think any good purpose would be served by the publication of these letters, but at the same time certain of the arguments urged against the present mode of administering the Fund, and certain of the ideas mooted in reference to what course is thought would be preferable, are deserving of notice if it be only for the purpose of showing that they will not bear the test of detailed examination.

One of the most prominent objections raised is to the accumulation of so large a sum as £14,000 in consols, and it is thought by some that in the face of this fact there can be no such want of money as to require more general subscriptions. It is true that there is no want of money, strictly speaking, and so far as the funded capital of the Fund goes there is no risk attending the grant of annuities payable out of the interest accruing from the funded capital. But it is obvious that it is only from that source that secure annuities can be granted. Some uncertainty must attach to the annuities granted upon the basis of anticipated contributions, and the Council has always endeavoured to make its grants secure by limiting itself to acting with the interest of funded property. When it is asked, whether the present income is insufficient for meeting the just claims of distress in our ranks, and uncertainty on this point is alleged as the reason for not subscribing, it is sufficient we think to point out that the annuitants constitute only a fraction of the number of candidates that are approved by the Council. Clearly, therefore, there is room for further benevolence, and if the funded property were greater, the number of annuitants would no doubt be much larger.

Again, it is urged, that even on the principle of using only the interest of the funded property, some new channels might be found in which the capital of the Fund could be made serviceable.

One of the suggestions made with this object is that loans should be granted, so that chemists and druggists might get the benefit of the principal as well as the interest. No doubt it would be possible in this way to apply the property of the Fund and the idea of doing so has before now been recommended by individual Members of the Council. In the abstract the suggestion appears to be an extremely good one; but on consideration it has become apparent that it involves so many difficulties as to be impracticable. In the first place the adoption of this plan would occasion very great additional expense for legal assistance and the necessary steps for ascertaining the sufficiency of the security offered for loans thus granted. Besides this we can well conceive that the granting of loans on such a principle would give rise to much jealousy and perhaps lead to the withdrawal of subscriptions, for it is not unreasonable to suppose that when subscribers found themselves exposed to competition promoted by the aid of loans from the principal of the Benevolent Fund, they would begin to ask whether this was a legitimate application of funds to which they had subscribed for purposes of benevolence.

If a man in business needs money to meet some temporary difficulty, or to extend his business, there are many ways in which he can obtain it, provided he is able to give adequate security, but we think it would be highly undesirable to apply the principal of the Benevolent Fund in this manner.

We cannot, therefore, attach much weight to the objection made by some non-subscribers that the property of the Fund is not so fully applied to benevolent purposes as it might be, and we must still adhere to the opinion already expressed that these objections and reasons for not subscribing have little rational foundation. At the time when the Fund was available only for members of the Society it was common to hear the argument that general support could not be expected under such circumstances, and it was not unfrequent to hear the remark that if the Fund were only for the good of the trade at large, so and so would be a subscriber. But since this change has been made and the benefits of the Fund thrown open to all, the lists of subscribers are still wanting the names of many who had made this plea of the restriction of the grants to members of the Society a reason for not subscribing.

In truth, we are somewhat weary of these reasons for not subscribing to the Fund, and we regard them as being eminently superfluous. Either a man subscribes or he does not, and as it must be assumed that he takes either course of his own free will from considerations that are sufficiently satisfactory to himself, no one else has much right to dispute the propriety of his action.

While speaking of this subject, however, we are glad to be able to state that there is a very steady and considerable increase in the support given to the Fund by the trade generally. Not only is the amount of subscriptions increasing but the number of subscribers also, and this in a very marked manner. In January, February, and March of 1875 the amounts of the subscriptions received were £100, £81, and £200; in the corresponding months of the present year the amounts received were £172, £293, and £300, or together more than twice as much as in same period of the previous year.

These facts are sufficient to show that the merits of the Benevolent Fund only require to be known to be more generally appreciated and they justify the steps that have been taken to make this matter familiar to the minds of all connected with the trade, either by means of circulars or through the medium of the Journal.

PHARMACY IN THE LABORATORY.

UNDER the above title, some four years ago, Mr. A. F. HASELDEN sent a communication to this Journal which had for its object to induce pharmacists to prepare as many as possible of their preparations at home. The same practice has been more recently advocated in an address to the New Hampshire Pharmaceutical Association from its President, and the arguments put forward in its favour have the merit of pungency.

Mr. PARKER NOYES is of opinion that the low standard of professional proficiency prevalent in the State is due primarily to the practice of pharmacists depending upon large manufacturers for preparations which should be produced in the laboratory of every pharmacist. He considers it should be a point of honour with every principal of a pharmacy never to employ any solid or fluid extracts, pills, tinctures, syrups, medicated wines or powders that are not the results of his own skill and made from materials subjected to the most exacting scrutiny. His reason is, that with a fluid extract, for instance, obtained in the market, the pharmacist cannot be sure that the dose will represent the amount of active principle contemplated in the prescription; on the contrary, Mr. NOYES thinks he would be safe in the conclusion it would not. In confirmation he points to reports issued by rival manufacturers in which "independent" chemists publish analytical results always favourable to the preparations of the persons issuing them, and depreciatory of those of others.

The question whether pharmaceutical preparations can be bought or prepared at home for the least money Mr. NOYES considers of little moment. He states that HOFFMAN'S anodyne can be bought in Boston for 45 cents. per pound, whilst it could not be made for less than 1·75 dols.; rhubarb and gum arabic can be bought for less money in the powdered than in the whole state. But, he asks, would it be economical or indicate a high degree of business shrewdness to purchase such articles?

Considering all circumstances, it is very doubtful whether such a radical change as that advocated by Mr. NOYES will ever obtain in this country; though we think more might be done with advantage in the direction indicated by Mr. HASELDEN. Still the whole tone of Mr. NOYES' address is so healthy that we think the New Hampshire Association is to be congratulated upon having such a man at its head. One other subject is alluded to and that is the practice of underselling, a practice that is not unknown in this country. It would be well if we could persuade some of our complaining correspondents to have a little of the confidence of Mr. NOYES. He says that he would rather have ten competitors whose only tactics were to undersell him than one who competed with him in the quality of his articles, having no fear but that in time he should absorb the best part of their trade.

PHARMACY IN PORTUGAL.

IN November last Mr. T. GREENISH read a paper before the Pharmaceutical Society in which he gave the results of some inquiries which he had made respecting the condition of pharmacy in Portugal during a short visit he had paid to that country, just previously. Mr. GREENISH'S narrative appears to have seriously wounded the *amour propre* of some of our Portuguese brethren, and it has drawn from Senor ALBANO ABILIO ANDRADE, the editor of the *Revista de Pharmacia do Porto*, a lengthy defence of Portuguese pharmacy, in which he disputes the majority of the conclusions arrived at by Mr. GREENISH. As Senor ANDRADE, speaking on behalf of his countrymen, appears to think his reply should be accorded the same publicity as the original paper, we have given a translation of it in another part of this Journal. We do so the more readily, because Senor ANDRADE has the manifest advantage of familiarity in speaking of matters connected with his own country, although he may be disposed to treat them with a certain amount of optimism, and incidentally he supplies some interesting information. But when he deals with alien affairs, he shows in more than one place, and particularly in his last paragraph, how easy it is to fall into error when writing on unfamiliar topics.

THE EVENING MEETING.

THE next and last Evening Meeting of the Pharmaceutical Society for the present session will take place on Wednesday next at 17, Bloomsbury Square. The papers to be read are a "Note on an Ointment containing Calomel, Hydrocyanic Acid, and Acetate of Lead," by Messrs. T. H. POWELL and J. BAYNE, F.C.S., and "Linimentum Saponis of the British Pharmacopœia, with especial Reference to its Employment in Hospital Pharmacy," by Mr. W. WILLMOTT.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, April 6, at eight o'clock, when a paper on 'Glycerine' will be read by Mr. A. J. G. LOWE.

DEATH OF DR. LETHEBY.

WE regret to have to record the death of Dr. HENRY LETHEBY, on Tuesday last. The sad event was made known to the public by the withdrawal of a summons at the Richmond Petty Sessions in a case which had been adjourned in the hope that Dr. LETHEBY would have been able to give evidence. We intend referring to the subject more fully next week.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH, EDINBURGH.

The seventh meeting of the session was held in the Society's rooms on Tuesday evening, 21st ult. The chair was occupied by Mr. Wm. Gilmour, who opened the meeting by alluding to the great loss which the Society had sustained by the death of Mr. William Tait.

Dr. Wm. Craig, F.R.S.E., Lecturer on Materia Medica, Edinburgh School of Medicine, read the following paper on "The Antiseptic Properties of Chloral Hydrate":—

On the Antiseptic Properties of the Hydrate of Chloral.

BY WILLIAM CRAIG, M.D., C.M., F.R.S.E, ETC.,
Lecturer on Materia Medica, Edinburgh School of Medicine.

When pure and dry chlorine gas is passed into absolute alcohol, the alcohol becomes thicker and is converted into a syrupy substance, which afterwards solidifies into a soft white crystalline mass. This syrupy substance is chloral and the white crystalline mass is probably the alcoholate of chloral. Chloral may also be produced by the action of chlorine gas on starch or sugar.

Chloral is a thin oily substance, greasy to the touch, and making greasy spots on paper. It is a heavy substance, its specific gravity being about 1·500—about the specific gravity of sulphuric acid. It has a pungent odour and astringent taste; it has no acid reaction. When chloral is mixed with a small quantity of water heat is developed and crystals are formed. These crystals constitute the hydrate of chloral.

Pure hydrate of chloral crystallizes in oblique rhombic prisms. Their solution in water is attended with great diminution of temperature. It has been said that half a pound of chloral hydrate mixed rapidly with half a pound of water causes the mixture to sink many degrees below zero. On the other hand when water is added to chloral to form hydrate of chloral much heat is developed. The water is not water of crystallization, but forms a true chemical compound.

Chloral was discovered by Liebig in 1832, and in 1869 Liebreich found that chloral could be decomposed by caustic potash into chloroform and the formate of potassium. This fact led him to believe that, if given internally, it would be decomposed by the alkalies of the blood, and free chloroform liberated. He imagined that chloral would thus act as a hypnotic and sedative. As the result of this *à priori* reasoning, Liebreich gave chloral internally, and found that it acted as a powerful hypnotic. Whatever difference of opinion may exist regarding the *modus operandi* of the hydrate of chloral, certain it is that it acts speedily and effectually as a sedative and hypnotic. And, consequently, the British Medical Council have wisely included it among the medicines lately added to the British Pharmacopœia. It was only, however, on account of its uses for internal purposes that it was made an officinal medicine. About the same time that chloral was added to the British Pharmacopœia, Dr. Keen, Lecturer on Anatomy in the Philadelphia School of Medicine, made some interesting experiments with this substance, and clearly proved that, in addition to its hypnotic effects, chloral was a powerful antiseptic, and, as such, might be used for a variety of purposes. Dr. Keen found that a watery solution of the hydrate of chloral formed an excellent antiseptic fluid with which to inject bodies for the dissecting rooms, and was a good preservative fluid for anatomical specimens. He also tried it as a dressing to wounds, and found it answered exceedingly well.

These remarkable effects ascribed to this substance were sufficiently interesting to warrant me making a series of experiments and observations to ascertain the correctness of Dr. Keen's views. I accordingly made, during the years 1874 and 1875, a considerable number of experiments with the hydrate of chloral, and I have now the honour of communicating the results to this branch of the Pharmaceutical Society.

I shall first give an account of some experiments performed on vegetable substances. Being anxious to ascertain if vegetable tissues could be preserved in a solution of the hydrate of chloral I made several preliminary experiments.

The first experiments were performed with solutions of the strength of 1½ grains of the hydrate of chloral to the ounce of water.

1. Leaves and fruits of *Solanum capsicastrum* were put into the solution in a common tumbler, and a piece of paper placed loosely over it to keep out the dust, but admitting free access of air. On the surface a fungus formed, but the specimen is in a good state of preservation, and even the colour of the ripe fruit is preserved. This specimen was put up on the 21st of November, 1874, sixteen months ago.

2. On the 2nd of December, 1874, I put into a glass jar petals of a white camellia, the flower of a fuchsia, and the leaves and fruit of *Ardisia crenulata*. The vessel was covered with a piece of paper but was not filled with the fluid. The leaves and fruits of *Ardisia crenulata* are well preserved, so is the flower of the fuchsia, except that its colour is destroyed. The solution has penetrated into the cells of the white camellia, rendering them transparent, but the tissue is otherwise preserved. They are slightly tinged with the colouring matter of the Ardisia fruit.

The following experiments were performed with solutions containing 1 grain of the hydrate of chloral to the ounce of water:—

1. Petals of a white camellia. These remained for some weeks without apparent change, and afterwards the fluid gradually penetrated into the cells, rendering the petals transparent. They are, however, well preserved.

2. Leaves and flowers of *Desfontainea spinosa*. This specimen is still beautiful. The leaves are green, and the flower yellow, having changed from orange; and the tissue is well preserved.

3. Fruit and flower of fuchsia, flower of Chinese primrose, and the frond of a fern. In all of these the tissues are well preserved; the colour, however, has disappeared from the flowers of the fuchsia and Chinese primrose, and partly also from the frond of the fern.

With the exception of the *Solanum capsicastrum* the specimens were all put up on the 2nd of December, 1874, nearly sixteen months ago.

These experiments, although performed in a very crude manner, are sufficient to show that the subject is worthy of further investigation. Meanwhile we may safely infer from these experiments that many flowers and leaves may easily be preserved in a weak solution of the hydrate of chloral for some weeks or even months, and in some instances years, without loosing either their form or their colour, and consequently could be sent even from a distant country in such a state that they could easily be figured by an artist, or examined and described by a botanist.

I now come to speak of the antiseptic properties of the hydrate of chloral in regard to animal tissues. This is the most important part of my paper, and the experiments I am about to describe clearly prove that the hydrate of chloral is one of the most powerful antiseptics known. Chloral, like chloroform, was long known in the laboratories of chemists before its wonderful physiological properties were discovered, and before man found out the remarkable beneficial effects it is capable of bestowing on the human race. Although discovered in 1832, it was not till 1869 (thirty-seven years afterwards), that its wonderful hypnotic effect was discovered by Liebreich, and though it is only seven years since this important discovery was made yet few medicines are more frequently prescribed in the present day than the hydrate of chloral; nay more, few drugs are more frequently taken without the advice of a medical practitioner, and in not a few cases death has resulted from the incautious use of this substance, and even for the purposes of suicide the hydrate of chloral is occasionally taken.

It was five years later before the antiseptic properties of chloral hydrate were discovered, and during the past year many scientific observers have been investigating this remarkable property of the hydrate of chloral.

Since August, 1874, I have been investigating this subject and shall classify the results of my investigations under the three following heads:—

1. Solution of chloral as a preservative fluid for injecting bodies for the dissecting rooms.
2. Solution of chloral as a preservative fluid for anatomical specimens, and,
3. Solution of chloral as a dressing for wounds and ulcers.

I.—*Solution of Chloral as a Preservative Fluid for injecting bodies for the dissecting room.*

During the session 1874–75, through the kindness of Professor Turner, several bodies were injected with solutions of the hydrate of chloral, and afterwards placed in the dissecting rooms of the University of Edinburgh. The injections were made by Mr. Stirling, Assistant-Keeper of the Anatomical Museum, and the bodies were carefully watched during the whole time that they remained in the dissecting rooms by Drs. Russell and Cunningham, Demonstrators of Anatomy. About 90 grains of the hydrate of chloral, dissolved in water, were injected into each body. The results observed were much the same in all the bodies. The subjects injected with chloral were as well preserved from putrefaction as were those injected with the ordinary preserving fluids, and when the parts were protected from the air, the colour of the parts was remarkably well preserved. This was specially true of the skin. The muscles were decidedly softer than usual, but the nerves were more easily dissected out. In bodies injected with chloral, the delicate plexuses of nerves could be more easily and more successfully dissected out than when injected with other preservative fluids, partly owing to the fact that the muscles and other tissues were softer, and consequently the nerves could be more easily dissected out. There are in the Anatomical Museum of the Edinburgh University some pretty dissections of delicate nerve-plexuses, made by Dr. Cunningham in the University dissecting rooms during the last winter session from bodies injected with the hydrate of chloral. When the bodies injected with chloral were carelessly exposed to the air, they became much darker in colour. Bodies injected with chloral gave off a peculiar mawkish odour, which was rather disagreeable to the students. Several students, at my suggestion, used a watery solution of chloral (5 grains to the ounce) as a preservative fluid for their "parts," and told me that it answered remarkably well. From these experiments the following conclusions may be drawn:—

(1) Bodies injected with the hydrate of chloral are preserved from decay equally well as when the ordinary preservative fluids are used.

(2) If exposed to the air, or carelessly attended to by the students, the tissues become very black, and give off a disagreeable mawkish odour.

(3) Delicate nerve-plexuses can be more successfully dissected out when the bodies are injected with chloral solution; and,

(4) It is much cheaper than other preservative fluids.

II.—*Solution of Chloral as a Preservative Fluid for Anatomical Specimens.*

The hydrate of chloral dissolved in water forms an excellent fluid in which to preserve animal tissues. In this respect its virtues as an antiseptic are well marked. I have the honour of showing to the members of this Society several specimens of animal tissues preserved in solutions of the hydrate of chloral, of the strength of 5 grains of chloral to the ounce of water; and in many cases they seem to be preserved better than when put up in spirit. Amongst other preparations—

(1) I show a wen which I removed from the head of a patient in August, 1874, and which is preserved in an ounce of water containing 5 grains of the hydrate of chloral dissolved in it. The specimen is well preserved.

(2) I show also a small fœtus, which you will perceive is beautifully preserved. It has been kept for nine months.

(3) I next show the heart, lungs, liver, kidneys, and other parts of the abdominal viscera of a rabbit, preserved in the same fluid. These were put up in December, 1874.

(4) I also show three minnows, preserved in a chloral solution. They have now been nearly fourteen months in the bottle, and you will see that they are much better preserved than would have been the case had they been preserved in spirit.

(5) I show part of tapeworm from the intestine of a hare, which has been in a solution of chloral since December, 1874. It is excellently preserved.

I may also mention, that in the Anatomical Museum of the University of Edinburgh there are some beautiful preparations put up in chloral solution by Mr. Stirling, and which he will be happy to show to any member of this Society who may wish to see them.

He has three salmon parr, preserved in a solution of chloral (15 grains to the ounce of water); these have been in the jar for nine months, and nothing can exceed the beauty of these specimens. They are well preserved, and the colour of the skin is still perfect.

Mr. Stirling has also preserved in chloral solution the stomach of a fœtal calf. This is an interesting preparation, inasmuch as the stomach is still filled with its own original fluid, and has some of the fœtal membranes attached. The whole are well preserved. They were put up in March, 1875. He has also the injected heart of the same fœtus. This was put up at the same time. At first the fluid appeared to act on the colouring matter of the injection, but this was only to a very limited extent, as the preparation is in an excellent state of preservation.

Solutions of the hydrate of chloral do not coagulate the albumen of the tissues, and, consequently, delicate transparent membranes are better preserved by chloral than by spirit or carbolic acid. There can be no doubt but, as a preservative fluid for anatomical specimens, it is superior to spirit, if not to every known antiseptic. It is much cheaper than methylated spirit, and is destitute of the disagreeable odour of that fluid.

I would strongly recommend a solution of hydrate of chloral for preserving wet microscopic specimens. The solution is perfectly colourless, very cheap and very fluid.

III. *Chloral as a Dressing for Wounds and Ulcers.*

I have tried chloral extensively as an external application to wounds and abraded surfaces. I found as the result of these experiments that a lotion containing from 5 to 15 grains of the hydrate of chloral to the ounce of water formed an excellent dressing to ulcers and wounds, dressed with lint and gutta-percha in the ordinary manner. I could relate many cases, but I will select only one. A young lad, T. M., lately one of the boys in the Mars training-ship, had one of his legs severely burned, and after being treated by the surgeon in charge of the ship for three months, the boy was recommended to go into Dundee hospital to have the limb amputated below the knee. As T. M. was within a fortnight of receiving his discharge from the ship, he was allowed to visit his friends at Edinburgh, who were unwilling that the leg should be amputated, and put the boy under my care. I saw him in April last, and found a large ulcer on the leg, extending from a little below the knee to the middle of the foot, and several inches in breadth. The edges were very irregular, and a considerable amount of fetid discharge came from the ulcer. The boy and his friends were very anxious that I would try and preserve the limb. I ordered a lotion containing 15 grains of the hydrate of chloral to the ounce of water, some chloral lint, such as is manufactured by J. F. Macfarlan and Co., of this city, as recommended by Dr. P. H. Watson, and some gutta-percha, and gave instructions for having the limb dressed twice daily with these. I may mention that previously it had been dressed with some preparation of carbolic acid. After the chloral dressing the limb healed rapidly. The ulcer got gradually less, the fetid discharge disappeared; and when I saw the patient in July last, only a small ulcer remained, and even that was gradually diminishing in size, notwithstanding the fact that the boy was daily employed in a large drapery shop in town, and was unable to give the leg that rest which was necessary and which I had so much recommended. The boy is now a sailor. I also used chloral solution as an injection into the sacs of large abscesses, and found that it tended much to diminish secretion and make the parts heal. I found it also a useful lotion for the eye in inflammatory conditions of that organ. It is an excellent application to burns, and very specially where there is a fetid discharge. I also found it a good application to remove warts from the hands and fingers. I used for this purpose a lotion containing 15 to 20 grains to the ounce of water, applied by means of lint and gutta-percha. It causes no pain, and the wart speedily becomes smaller, and gradually disappears.

I have also found the solution of chloral hydrate a most useful application to burns in which there was fetid discharge from the wounds. When chloral solution is applied to such burns they not only heal rapidly but the fetor speedily disappears.

I also used it as a lotion to sore nipples and to inflamed mucous membranes. When chloral is applied to an ulcer, a wound, or to the interior of an abscess sac, it causes at first some smarting, but that only lasts for a few minutes, and is soon succeeded by a most agreeable sensation. Patients so treated have frequently told me that soon after the lotion was applied a very agreeable soothing effect was felt in the wound. I believe that in all such cases chloral acts as a local sedative. It produces anæsthesia of the nerves of the part. Wherever there is a wound or ulcer there is irritability of the nerves of that part; and chloral, by soothing this irritability of the nerves, favours the healing process.

I have frequently used with good effect an ointment containing 30 to 60 grains of the hydrate of chloral to the ounce in eczema and other allied affections. I believe it to be one of the best applications in such diseases; and a medical practitioner lately told me that he had used it with marked benefit as a local application during an attack of erysipelas of the head. Chloral in various forms has been extensively used in the royal infirmary of this city by Dr. P. H. Watson, senior surgeon to that institution, and I have the honour of appending a letter from him giving an account of his experience of hydrate of chloral as a dressing to wounds:—

"I have in my wards made use of the chloral hydrate for fully twelve months, and find it quite as active as an antiseptic as carbolic acid or boracic acid. It approaches nearer to carbolic acid in its effects than to the boracic acid, especially in that it is volatile, and thus by its vapour penetrates and surrounds parts to which as a dressing it has been applied with an atmosphere of itself.

"It has a marked advantage over carbolic acid, in so far that its odour is pleasant, resembling some of the ethereal compounds employed for flavouring purposes. It also is absorbed, and, in being so, deadens pain after an operation.

"I employ it in *four* forms:—

"1. A lotion of 5 to 40 per cent. in water, for cleasing away discharges around a wound, cleansing sponges used in operations, and analogous purposes.

"2. An ointment composed of concrete paraffin, white wax (Scotch), and almond-oil, to which 1-12th to 1-8th of chloral is added, while the other ingredients are liquefied by heat. The components of the ointment should at once be rubbed together, covered to prevent the evaporation of the chloral, and cooled to a concrete form as rapidly as may be. It is afterwards rubbed up with a few drops of the solution of chloral to disintegrate it, and prevent its crystalline form being reassumed. This ointment takes great pains to make efficiently. If not properly prepared, it is either inert, containing sometimes, I find, absolutely no chloral; at other times (if made cold) the chloral is so imperfectly mingled that it acts as an irritant, and blisters tender cutaneous surfaces. The ointment is applied spread into the substance of linen cloth, so as to be incorporated with the material. This dressing forms the immediate application to the surface around the wound, and covers in the wound itself. It does not adhere, but peels off like a thin layer of wax.

"3. An external excipient dressing is made by soaking lint in a solution of chloral (ʒi ad ℥j). It is then wrung out of this and carefully dried. The care is necessary to avoid long exposure or a high temperature, as this volatilizes the chloral.

"4. Lint soaked in a solution of chloral in olive oil (1–8), employed to fill cavities such as those left in some excisions, and to employ as compresses when it is desired to prevent bleeding from the cut surfaces in operations for the removal of *dead* bone.

"In some cases, when the chloral appears to act as an irritant, even when carefully prepared, it may be necessary to interpose some impermeable material between the line of operation and the dressing.

"I have never met with any disagreeable results from the absorption of the chloral. On the contrary, I have found the pain of recent wounds only satisfactorily modified and relieved by its employment."

I have thus endeavoured to bring before you a few facts illustrative of the antiseptic properties of the hydrate of chloral, a subject of considerable importance to all engaged in medicine and pharmacy. I have been speaking of a substance only lately introduced into medicine but one most extensively used wherever the healing art is practised.

The special property of that substance to which I have been directing your attention has only lately been discovered, but already it is engaging the attention of some of the most distinguished scientific men not only in this country but also on the Continent of Europe and in America, and although much has been done in this important field of investigation, much remains yet to be accomplished. And in these days when so much is being said about the value of "antiseptic surgery" it is well to know that in chloral hydrate we have such an antiseptic, and one whose antiseptic properties when they become better known will be extensively applied to the healing of wounds.

In the last number of the *Edinburgh Medical Journal*, reference is made to the labours of both British and Continental writers who have been investigating the antiseptic properties of chloral hydrate.

I trust then, Mr. President, that in selecting this subject on which to address you this evening, one in which I have been working for nearly two years, I have not brought before the North British Branch of the Pharmaceutical Society a subject either devoid of interest or unworthy of your attention.

Dr. Craig's illustrations consisted of several specimens of plants and animal substances in a good state of preservation. In the conversation which followed, Mr. Mackay suggested the use of chloral as a preservative for meat for domestic purposes, and briefly noticed the various antiseptics which had been tried for that purpose. Dr. Craig, however, had not carried his experiments in that direction but thought the matter worthy of attention. Mr. James

R. Young referred to it as a dressing for wounds, and received a satisfactory answer in reply as to its suitableness in a particular case.

Mr. A. H. Young, Warrington, exhibited and explained the working of a model case designed to prevent errors in dispensing. It attracted considerable attention from the audience, whose opinions as to its utility were very diverse; the ingenuity and neatness displayed, however, in its construction met with unqualified approval.*

Mr. Mackay mentioned that Sir Robert Christison had observed that some Calabar beans on being split gave indications of being in an altered condition as compared with the healthy nut. At Sir Robert's suggestion he submitted specimens of these apparently faulty beans, from which it would be seen that the white fresh looking kernel had become quite changed to a dark chocolate looking substance, while the skin was quite loose and brittle. It was thought possible that such beans would be deficient in the active principle, and might lead to disappointment in the use of preparations of the Calabar bean. The fact, therefore, was mentioned with a view of suggesting an examination of the beans before manipulating for pharmaceutical purposes. Mr. Mackay further stated that he had taken a dozen beans from a large quantity in stock, and these on being examined were found fairly good, although a few gave indications of the transformation referred to. It was the more necessary to make this observation because the exterior of the bean gave no sign of an altered condition within.

The donations to the museum were—a specimen of vaseline, presented by Messrs. Corbyn, Stacey and Co., through Mr. Moss; the specimens used in illustrating his paper on "Perchloride of Iron," by Mr. W. Inglis Clark. And to the library—the *Pharmacist* for February, from the Chicago College of Pharmacy; and the *Journal of the Chemical Society* for December and February, from Mr. Mackay.

Provincial Transactions.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION.

The last ordinary monthly meeting of the session took place on Friday evening, March 17th, Mr. B. Robinson in the chair. A specimen of vaseline was presented to the Association by Messrs. Corbyn and Co., through Mr. John Moss, and these gentlemen were thanked for their donation.

It was announced that the rooms of the Association would be open on Tuesday and Friday evenings only from 7 to 9 during the spring and summer months; the keys would be obtainable from the Honorary Secretary at any other time.

Mr. Louis Siebold then introduced in an able address the subject for discussion, viz., "Accuracy in dispensing." Messrs. Robinson, Mumbray, Hughes, Westmacott, Slack, Lane, Benger and others afterwards spoke on the subject.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The sixth scientific meeting of the session was held in Anderson's University on the evening of Wednesday, March 22. In the unavoidable absence of the President, Mr. William Greig, Mr. Kinninmont, Vice-President, occupied the chair. After the usual preliminary business, Dr. J. S. Nairne was introduced and delivered a most instructive lecture on "Ancient Medicine and Ancient Pharmacy." The lecture was of a very interesting character, commencing by a reference to mythology and how it is said to have handed the science of medicine down from the gods Saturn, Jupiter, etc., till the time of Æsculapius and after him Hippocrates, who lived 479 years B.C., whose records are amongst the earliest of an authentic kind we have. The special services of such nations as the Hindustani, Arabians, Egyptians, Persians and Chinese were then treated upon, showing how much we were indebted to those for much of our knowledge of the sciences. The works of Aristotle and Philip were then referred to at some length and the lecturer concluded with a brief sketch of the pharmacy of the ancients; want of time, however, prevented him from going into detail, which he reserved for a future lecture. He pointed out, however, that the absurd prescriptions which were frequently quoted in ridicule of past ages belonged to a period much later in the history of the world than that he was referring to. Dr. Nairne deprecated such prescriptions ever being taken as a criterion of what the knowledge of the people was at that time. His opinion was that in many things they were as far ahead of us as we are at the present time, and if we have progressed at all it is in simplicity, as the number of medicines in ancient pharmacopœias is much in excess of those in the B. P. The lecture was listened to with the utmost attention, and at the close Dr. Nairn was awarded a most cordial vote of thanks.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

The following papers are announced for the next meeting, Thursday, April 6:—"Note on the action of Sulphuric Acid and Naphthaline," by Mr. Grove and Dr. Stenhouse; "Notes from the Laboratory of the Yorkshire College of Science," by Professor Thorpe; "On Systematic Nomenclature," by Dr. Armstrong; "On the Manufacture of Sulphuric Acid on the Large Scale," experimentally illustrated, by Dr. Messel and Mr. Squire; "On the Action of Certain Metallic Chlorides on Benzene, Toluene and Naphthalene at High Temperatures," by Mr. Watson Smith.

NEWCASTLE-UPON-TYNE CHEMICAL SOCIETY.

At the General Meeting in the theatre of the College of Physical Science, on February 24th, 1876, the President, Mr. John Pattinson, said that since the last meeting he had made some further experiments upon gas burners, and had embodied them in an additional note which he would read, as follows:—

ADDITIONAL NOTE ON GAS BURNERS.

In the short paper I had the honour of reading before you at the last meeting of this Society,* my object was chiefly to point out the inferior character of many of the gas burners in very general use in Newcastle. Since then I have tested a number of new burners made by various makers, and with the view of helping gas consumers to select those burners best adapted to develop the light-giving properties of Newcastle gas, I now give the results I have obtained in Tables Nos. 1, 2, and 3, at the end. The whole of the burners were tested with gas which gave a light equal to 15 standard sperm candles when tested by the standard Sugg-Letheby Argand burner used for testing the gas in Newcastle. As in my first experiments, the Argand burners still give the best results. Sugg's improved London Argand and Silber's Argand give results identical with each other when using a chimney 7 inches high and 1⅝ inches in diameter. When consuming 5 cubic feet of gas per hour, they each produce a light equal to 18·0 candles. When consuming 5½ cubic feet per hour, they each produce a light equal to 21·4 candles, which, when calculated into the consumption of 5 cubic feet per hour, is equal to 19·45 candles. The Silber Argand was tested with chimneys of various heights, with the general result that the shorter the chimney the less the gas which could be consumed, and the less the light produced per cubic foot of gas.

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* A description of this Poison Cabinet has already appeared in the present series of the *Pharmaceutical Journal*, vol. i., p. 870.

* See before, p. 776.

The results of the testing of flat-flame burners are given in Tables Nos. 2 and 3. The importance of allowing the gas to issue from these burners at as low a pressure as possible compatible with producing the required spreading of the flame was alluded to in my last paper. In most of the flat-flame burners experimented with, this condition is sought to be obtained by making the area of the orifice at the point of ignition larger than the orifice admitting the gas into the burner; by this means the initial pressure of the gas in the mains is very much reduced in passing through the burner, and the gas issues at a comparatively low pressure. This is the case in Sugg's "Winsor," "Lowe," and "Clegg" burners, and in Silber's and Brönner's batwing burners. In Bray's batwing and fishtail burners, the same result is obtained by placing a piece of textile fabric inside the burner. If the pressure were uniform in the mains this arrangement would be all that is required to obtain a regular and uniform amount of light from a burner; but this is not the case, for the pressure is constantly varying. In the daytime the pressure on the main at the Gas Works is about 1½ inches, and during the night about 3 inches or 3½ inches. In various parts of the town the pressure in the main varies from half-an-inch to about 4 inches, according to the locality and the number of lights burning in the town. As the amount of gas passing through an orifice of a certain size varies with the pressure, we have, consequently, very varying amounts of gas consumed in burners of this description, unless the inequality of pressure of the gas in the mains is corrected by the use of a governor or regulator placed between the main and the burners. Sugg's "Christiania" burner is fitted with such a regulator, and it will be seen that, for pressures varying from 1 to 2 inches the consumption of gas is nearly uniform. All the flat-flame burners have been tested at ½ inch, 1 inch, 1½ inch, and 2 inch pressure, and it will be seen that, with the exception of the "Christiania" burner, the consumption of gas is very variable at different pressures; the same burner, for instance Silber's C burner, consuming 2·1 cubic feet at ½ inch pressure, and 4·8 cubic feet at 2 inch pressure. Some of the burners give results exceeding 15 candles per 5 cubic feet of gas per hour. These are Sugg's No. 7 "Christiania," No. 7 "Winsor," No. 8 "Clegg" burners, Silber's E burner, and Bray's No. 9 batwing. Some of the others come very near to this high yield of light. Silber's D burner gives 14·83 candles, Brönner's No. 5 burner 14·5 candles. In fact all the batwing burners give very good results in relation to the amount of gas consumed, especially in the larger ones or the highest numbers of each series. Bray's batwings and some of the others cannot well be used with glass globes or "moons," owing to the manner in which the flames spread out at the higher pressures. Of the batwing burners, taking the amount of light produced into consideration, as well as the shape of the flame and the low price at which the burner is sold, I am inclined to prefer the Sugg's "Clegg" burner to any of the others. Where cheapness is of consideration, some of the other burners may be preferred.

Of the fishtail burners, the lower numbers of Bray's series are quite unsuited for burning common coal gas, Nos. 3 to 5 giving at best lights only equal to from 4½ to about 10 candles per 5 cubic feet of gas consumed. Nos. 7 and 8 give lights equal to 13 and 13·46 candles respectively, with a consumption of about 5 cubic feet per hour. These last are very good burners, and can be used with glass globes where many of the batwings cannot be used. The cheapness of this burner is also very much in its favour.

There are, no doubt, other good burners made besides those mentioned by me, but I can only speak of those which have come under my notice.

In most cases the burners tested were selected by myself from the stock in the hands of the various agents of the makers in Newcastle.

Allusion has been made to the use and importance of having a governor to correct the inequalities of pressure in the main. For Argand burners this is almost indispensable on account of the smoky flame often produced when an increase of pressure occurs; but with flat-flame burners the saving of gas—very often amounting to one-third the quantity otherwise used—will very soon compensate for the cost of this apparatus. The discomfort arising from variations of pressure—the decrease of the light or the sudden flaring which often occurs—are also entirely avoided. Very good forms of governors are made by Messrs. D. Bruce Peebles, and Co., of Edinburgh; by Mr. Sugg of London; and Mr. Busch, of Oldham, in sizes to suit any number of lights. I have recently had an opportunity of testing some of these, made by each of these makers, at pressures varying from ½ inch to 2½ inches, and find that the variation of amount of gas allowed to pass at all these pressures does not exceed two or three tenths of a cubic foot per hour. In all probability there are other equally efficient governors made by other makers which I have had no opportunity of examining.

It is not generally known what a very large proportion of light is obstructed by the glass globes or moons so frequently used over gas flames. From experiments, all made with a light equal to fifteen standard candles, I find the following results:—

	Illuminating power.	Percentage of light lost.
Naked flame	15·00	......
Clear glass globe	12·80	14·65
Ground glass globe	11·40	24·00
Opal globe	9·00	40·00
Another opal globe	8·16	45·60
Do. do.	8·00	46·70
Do. do.	6·64	55·90
Do. do.	8·00	46·70
Do. do.	7·48	50·10

The advantage arising from the use of these moons is that they diffuse and soften the glare of the naked light, which is sometimes oppressive to the eyes. Of the opal globes the dead white semi-opaque one should be avoided. A very good form of globe is that with a wide opening at the bottom, which allows a considerable amount of light to be reflected downwards from the white surface of the inside of the globe.

Since the above paper was written, Messrs. Geo. Bray and Co. have brought out a new form of burner, which they call "Bray's Special" burner. I have tested two sizes of the "fishtail" form of this burner, and have added the results in No. 3 table. It will be seen that the results, in one case at any rate, are better than in the ordinary Bray's fishtail burner, and almost equal to the results obtained with the best batwings. I cannot say, however, that the shape of the flame has any advantage over some of the best forms of batwings. It is possible that the fishtail burner may remain longer in good order without having to be cleaned.

Table No. 1.—Argand Burners.

	Chimney.	Cubic Ft. used per Hour.	Pressure in Inches.	Illuminating Power.	Illuminating Power per 5 Cu. Ft
Sugg Letheby Standard......	7 in. × 2 in.	5·0	0·40	15·00	15·00
Silber's Argand......	4½ ,, × 1⅝ ,,	3·9	0·40	11·60	14·87
Do.	5 ,, × 1⅝ ,,	4·3	0·55	13·88	16·14
Do.	5½ ,, × 1⅝ ,,	4·7	0·60	15·20	16·38
Do.	6 ,, × 1⅝ ,,	4·9	0·70	16·20	16·53
Do.	7 ,, × 1⅝ ,,	5·4	0·80	19·60	18·15
Do.	10 ,, × 1⅝ ,,	6·9	1·35	24·40	17·70
Do.	7 ,, × 1⅝ ,,	5·0	0·75	17·36	17·36
Another Silber's Argand..	7 ,, × 1⅝ ,,	5·0	0·80	18·00	18·00
Do.	7 ,, × 1⅝ ,,	5·5	0·85	21·40	19·45
Sugg's Improved London Argand	7 ,, × 1⅝ ,,	5·0	0·80	18·00	18·00
Do.	7 ,, × 1⅝ ,,	5·5	0·90	21·40	19·45

Table No. 2.—Batwing Burners.

KIND OF BURNER.	½-INCH PRESSURE.			1-INCH PRESSURE.			1½-INCHES PRESSURE.			2 INCHES PRESSURE.		
	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.
Sugg's "Christiania" Burner, with pressure regulator ... No. 5	2·7	6·72	12·44	4·0	10·60	13·25	4·5	11·84	13·15	4·6	12·00	13·05
Do. No. 6	2·7	6·72	12·44	3·4	8·92	13·12	3·3	8·80	13·33	3·6	9·12	12·66
Do. No. 7	3·3	9·00	13.64	4·8	14·60	15·21	5·0	15·40	15·40	4·7	14·40	15·32
Sugg's "Winsor" Burner, with screw regulator ... ... No. 3	2·5	5·20	10·40	3·6	8·40	11·66	4·6	10·20	11·09	5·5	11·00	10·00
Do. No. 4	2·6	6·20	11·93	3·6	9·60	13·33	4·7	12·40	13·20	5·2	13·60	13·08
Do. No. 5	3·2	8·40	13·12	5·1	15·00	14·71	6·5	18·20	14·00	7·5	20·80	13·87
Do. No. 6	3·8	7·44	9·79	4·8	13·00	13·54	6·1	17·20	14·10	7·1	20·40	14·36
Do. No. 7	3·9	10·60	13·59	6·0	17·00	14·17	7·3	22·40	15·34	8·2	24·80	15·12
Sugg's "Lowe" Burner, No. 3	2·3	5·04	10·96	3·8	8·40	11·05	4·5	9·40	10·44	5·5	10·16	9·24
Do. No. 4	2·2	5·20	11·82	3·2	8·00	12·50	4·2	9·80	11·66	5·0	11·60	11.60
Do. No. 5	2·5	6·40	12·80	4·1	11·28	13·75	5·3	14·48	13·66	6·1	6·60	13·61
Sugg's "Clegg" Burner, No. 4	2·9	7·00	12·07	4·3	10·80	12·56	5·3	13·60	12·83	6·3	15·40	12·22
Do. No. 5	3·1	7·32	11·81	4·4	10·40	11·82	5·6	13·60	12·14	6·6	15·60	11·82
Do. No. 6	3·2	8·60	13·44	5·0	12·80	12·80	6·5	17·00	13·08	7·5	19·00	12·66
Do. No. 7	3·3	8·40	12·73	5·1	14·40	14·12	6·2	17·60	14·19	7·5	21·00	14·00
Do. No. 8	3·3	8·80	13·33	5·0	14·60	14·60	6·1	18·40	15·08	7·5	22·40	14·93
Silber's Burner ... A	..	...	...	2·0	5·20	13·00	...	...	...	3·0	6·80	11·33
Do. ... B	2·1	4·60	10·95	3·2	8·00	12·50	4·0	10·08	12·60	4·8	12·00	12·50
Do. ... C	2·1	5·40	12·86	3·6	8·60	11·94	3·9	11·00	14·10	4.8	12·80	13·33
Do. ... D	2·7	7·20	13·33	4·2	11·80	14·05	5·0	14·40	14·40	5·8	17·20	14·83
Do. ... E	3·4	9·28	13·65	4·8	13·80	14·38	5·7	17·00	14·91	6·8	20·80	15·29
Brönner's Burner ... No. 2	...	...	...	2·3	6·00	13·05	3·1	8·20	13·23	3·6	9·40	13·06
Do. ... No. 2½	...	...	...	2·7	7·00	12·96	3·3	8·80	13·33	3·8	10·40	13·68
Do. ... No. 3	2·1	5·00	11·90	3·2	9·40	14·68	4·0	11·12	13·90	4·7	13·60	14·47
Do. ... No. 3½	2·1	5·20	12·38	3·2	8·80	13·75	4·3	12·40	14·42	4·9	14·00	14·29
Do. ... No. 4	2·2	5·20	11·82	3·5	9·40	13·43	4·3	11·80	13·72	5·0	14·40	14·40
Do. ... No. 4½	2·5	6·56	13·12	4·0	10·00	12·50	4·8	12·80	13·33	5·2	14·40	13·85
Do. ... No. 5	3·1	7·56	12·19	4·0	11·60	14·50	5·5	15·00	13·63	5·9	15·00	12·71
Bray's Burner ... No. 6	3·5	9·00	12·86	5·1	12·80	12·55	6·7	16·00	11·94	8·0	19·20	12·00
Do. ... No. 8	3·6	9·00	12·50	5·4	13·80	12·77	6·6	17·20	10·03	7·9	20·40	12·91
Do. ... No. 9	3·0	8·00	13·33	5·0	14·40	14·40	6·3	19·20	15·23	7·6	22·52	14·81

Table No. 3.—Fishtail Burners.

KIND OF BURNER.	½-INCH PRESSURE.			1 INCH PRESSURE.			1½ INCH PRESSURE.			2 INCHES PRESSURE.		
	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubio Feet.	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.	Cubic Feet of Gas used.	Illuminating Power.	Illuminating Power per 5 Cubic Feet.
Bray's No. 3	2·5	3·00	6·00	3·8	4·40	5·79	4·5	4·80	5·33	5·5	4·90	4·46
Do. No. 4	3·0	5·04	8·40	4·0	6·08	7·60	5·0	7·20	7·20	6·0	7·60	6·33
Do. No. 5	3·1	5·40	8·71	4·2	7·12	8·48	5·6	8·60	7·68	6·7	10·40	7·76
Do. No. 6	3·1	6·40	10·32	4·8	9·48	9·87	6·0	10·00	8·33	7·0	12·00	8·57
Do. No. 7	3·4	8·00	11·77	5·0	13·00	13·00	6·3	15·20	12·06	7·5	14·80	9·86
Do. No. 8	3·4	8·80	12·94	5·2	14·00	13·46	6·8	17·60	12·94	8·0	21·00	13·13
Bray's "Special," smaller size...	2·8	6·48	11·57	4·0	10·20	12·75	5·0	12·60	12·60	6·1	14·88	12·20
Do. larger size	3·8	10·32	13·58	5·2	15·12	14·54	6·8	20·00	14·71	7·8	23·20	14·87

A member asked the difference of cost in these governors. He thought that would be of some consequence.

The President said the sizes and prices were very various, depending of course upon the number of lights used. Sugg's prices varied from about 15*s.* for two lights to about £2 for thirty or forty lights. Peebles' were somewhat cheaper: for three lights, 13*s.* 6*d.*, and for forty lights, £1 14*s.* He did not know the price of Busch's governor.

The paper was illustrated, as was the previous one, by the burners mentioned at work.

A unanimous vote of thanks was accorded to the President.

Parliamentary and Law Proceedings.

ALLEGED ADULTERATION OF BUTTER.

On Thursday, March 23, at the Bow Street Police Court, Mr. Flowers heard a summons brought against Sarah Westmoreland, of New Street, Covent Garden, provision dealer, for selling a "substance or commodity called butter," which upon subsequent analysation was found to have been mixed with salt and water. Mr. Dangerfield appeared on behalf of the Vestry of St. Martin's-in-the-Fields; and Mr. C. F. Gill represented the defendant.

William Cooke, on being examined, deposed that he was an inspector of nuisances. On Tuesday, February 15 last, he went into defendant's shop and asked for a pound of butter; and upon being served with the same he paid 1*s.* 8*d.* He said at the time that it was to be analysed. On March 2, having previously given a portion to the public analyst for the Poplar district, he received a letter from that gentleman certifying the result of his analysis. Witness had on a previous occasion summoned the defendant, but there was no conviction in the case. He did not know much about butter, and could not say whether there were two or three kinds of butter sold by the trade. Knew that there was salt butter, but he did not know that there was best butter. All he knew was that he bought a pound of butter.

Mr. Gill said that the butter in question was tub butter.

Witness: He bought the butter on February 15, but the summons was not taken out until March 13. He could not account for the delay; what he did was to carry out the orders of the Vestry. The sample of butter was given to Professor Anderson to analyse on February 15, and he (witness) received the analyst's certificate on March 2.

Mr. Anderson was called and examined by Mr. Dangerfield. Witness said that he was professor of chemistry at King's College, Birmingham, and analyst for the district of Poplar, the district of Paddington, and the parish of St. Martin's-in-the-Fields. At the period mentioned by the last witness, he received one-third of the pound of butter in question, and analysed it on February 16. The butter was mixed with salt and water. The amount of water mixed with it was 12·88 per cent.—it was the mean of two experiments, the first 13·39 per cent., and the second 12·37 per cent., the mean of which was 12·88 per cent., which was largely in excess of what it ought to be. During the past quarter of a century he had had great experience in examining fatty matters. Having made the two experiments he had no doubt that his statement as to the result was correct.

Cross-examined by Mr. Gill, witness said that water and salt were both present in the butter, but the adulterant was water. He knew the names of the different kinds of butter sold in the trade—there were best fresh butter and best butter. In butter that was not adulterated there should be from 3 per cent. to 5 per cent. of water; he found that proportion in pure butter. He had reported to the Vestry the case of adulteration in question, but he made no report about salt. The summons alleging that the butter was adulterated with water and salt was incorrect—the only adulteration was water. The proper amount of water in 100 parts of butter would be from 3 per cent. to 5 per cent. The amount of water in different descriptions of butter varied according to the manner in which it was stirred in. In genuine butter, the quantity of water being about 5 per cent., of the remaining ninety-five parts there would be from one to three of curd, and the other ninety-two parts would be fatty matter. There ought to be more than 92 per cent. of fatty matter in pure butter. If there was only 80 per cent. of fatty matter in any butter it would not be pure. Mr. Wanklyn, on being examined before a Committee of the House of Commons on the question, had made a mistake. Witness had recently analysed some whisky. His evidence had been disputed by the Customs in that case. He was perfectly right, but there was some informality. The proper amount of fat in butter should be 90 per cent. or more. If there were only 80 per cent. it would not be pure; neither would it be pure if there were 85 per cent. of fatty matter. There were two methods of arriving at a knowledge of the proper amount of water—one was by volume, and the other by drying at a proper temperature. If more than from 3 to 5 per cent. of water was found in butter the remainder was added. Water had to be dried in a bath. He would undertake to say that there was less than 12 per cent. of water in the making of any butter. A dealer buying butter of a merchant had the means of ascertaining the quantity of water which it contained by sending it to the analyst. There was more water in salt than in fresh butter. Butter with only 86 per cent. of fat in it he did not consider genuine butter—he called it adulterated. His opinion in such a case would be that the water had been added. Besides the whisky case he had made no other analysis upon which a different opinion had been expressed by other analysts. He could not say that he had examined a sample of coffee of Messrs. Phythian's, and, reporting on the analysis to his inquirers, said that in the coffee there was a "substance of an oily character not usually found in real coffee." He did not know whether Dr. Hassall had examined the sample. As to the opinions of Mr. Wanklyn and Dr. Hassall, witness observed that he thought he was placed in an invidious position when asked his views of those gentlemen's opinions.

Mr. Dangerfield objected to the reference that was being made to the opinions of absent persons.

Witness continued: He could not remember examining any coffee of Messrs. Phythian's. Samples given him to analyse were given under ciphers. In arriving at the quantity of water in butter by drying it at a heat of 212° a certain amount of volatile matter would not escape. He should take care that nothing but water escaped. Anything over 5 per cent. of water in fresh, or 10 per cent. in salt butter, would be adulterated.

Edward Midwinter was then examined by Mr. Gill, and said that he was an analyst at the Medical School of the London Hospital, and had had experience in the analysation of butter. A sample of the butter in question was submitted to him on February 17, and it had upon it the seal of St. Martin's-in-the-Fields. The result of his analysis was as follows:—Water, 13·44 per cent.; salt, 0·83 per cent.; caseous matter, 0·67 per cent.; and pure butter-fat, 85·06 per cent. It was not an adulterated butter. Salt butter with 12 per cent. of water was not adulterated. He had analysed a great number of butters, and he had seldom found them with as little as 5 per cent. of water—they ranged from 5 per cent. to 20 per cent. The butter of the defendant was below rather than above the average. It would be impossible to state whether or not water was added. A person could only infer it from the fact of the existence of an excessively high percentage of water; and in the butter in question such was not the case. He was clearly of opinion that it was not adulterated.

Cross-examined by Mr. Dangerfield: Witness said that he had held no appointment as analyst. He had received an education in chemistry at the Royal College of Chemistry; and had been the assistant of Dr. Letheby at the London Hospital for upwards of seven years, and had conducted a great number of analyses during that time. He had never before given evidence with regard to the adulteration of butter. Having again given the result of his analysis,

Mr. Flowers said, You think it is butter?

Witness: I am certain that it is. He continued: Although he had not given evidence with regard to the adulteration of butter, he had tested gas-meters, analysed Indian maize and baking powder, and given evidence with regard to them. In some of the cases there were, and in others there were not, convictions resulting from his evidence.

Mr. Flowers observed that the first analyst might be quite right, and the last witness completely wrong; but where two gentlemen who understood the matter said that it was butter, and where there was such a conflict between them, he did not think that he ought to convict. It could not be proved that the water had been added. For 1*s.* 8*d.* per pound he was unable to obtain pure butter.

John Goodman was then examined by Mr. Gill, and said that he was shopman to the defendant, and had had considerable experience in the butter trade. There were three kinds of butter—the best salt, the best mild, and the best fresh butter. The best salt and the best mild were 1*s*. 8*d*. per pound, and the best fresh was 2*s*. per pound. Those were the present prices. The butter sold to the inspector was the best salt. Witness knew Cooke quite well.

Cross-examined by Mr. Dangerfield: There was less salt in the best mild than in the best salt butter. It was the best salt which the inspector purchased.

William Bourne (traveller to Messrs. Keble), on being examined by Mr. Gill, said that he had had thirty-eight years' experience in selling butter. What he understood by the best butter was the best Dorset or tub butter. The amount of salt in butter depended upon the county in which it was manufactured. The price of the best Dorset was 1*s*. 8*d*., and of the best fresh butter 2*s*. per lb. Great quantities came from Ireland at this period of the year, and it was much salter than other butter.

Cross-examined by Mr. Dangerfield: The quantity of salt varied in different counties.

Mr. Flowers remarked that, with regard to cheese, a person could not get Stilton cheese everywhere; it was not all pasture that would produce it. If it were not denied that the article in question was butter, he did not think that he ought to convict.

Mr. Dangerfield considered that in the present case the weight of the evidence which had been given should be taken into consideration. He apprehended that the testimony which had been very fairly and honestly given by Professor Anderson was entitled to a little more consideration than that given in support of the defence, and that the weight of the testimony was on his (Mr. Dangerfield's) side. The statute was thrust upon them. The Vestry were by law required to appoint an analyst, and they were thus bound to do so. If they did not appoint one it was done for them. They had appointed one of considerable experience, and against whose evidence given that day he did not think the evidence of the other side ought to weigh.

Mr. Flowers: The other side say that they are quite willing to call in a third person for the purpose of again analysing the butter.

Mr. Gill: We say distinctly that it is butter, and that this is not a case of adulteration.

Mr. Flowers: I think this is not a case where it would be safe for me to convict. I will not give any opinion myself as to the butter. Both gentlemen are competent persons, no doubt; but I have before me the fact that it is butter. I think this is not a case where you can balance the weight of the evidence which has been given, and give one side the benefit of the doubt.

Mr. Gill: In the interest of the defendant and also of the trade generally, we would much rather have it referred to a third person.

Mr. Flowers: I think it would be safer to do that in another case. I think I must dismiss the summons.—*Abridged from a Report in the Grocer.*

A New Difficulty in the Sale of Food and Drugs Act.

At Westminster Police Court, on Friday, March 24, Henry Fielder, milk dealer, of 15, Lower Simmond Street, Chelsea, was charged with selling adulterated milk. It appeared that some milk purchased at the defendant's shop on the 2nd inst. was found by Dr. Barclay, food analyst to the parish, to contain at least 26 per cent. of water. The milk was worse than when the defendant was prosecuted a year and a half ago for the same offence. The defendant declared that he sold the milk as he received it. Mr. Arnold asked the sanitary inspector whether he purchased the milk solely to have it analysed. The inspector replied in the affirmative. Mr. Arnold observed that a serious difficulty presented itself. By the words of the 6th section of the Act the sale must be to the prejudice of the purchaser, which this purchase clearly was not. In his opinion the section must apply to the purposes of consumption. He would take time to consider the point. The Act of Parliament was strangely worded—not a very unusual thing. The Legislature meant a different thing to what they had expressed, but they had not said what they meant.—*Times.*

Death from an Opiate.

An inquest was held at Leake Church End, near Boston, on Tuesday, before W. Clegg, Esq., coroner, on the body of Annie Torgoose, aged 34 years. From the evidence it appeared that on the preceding day the effects of Mr. Jos. Hockley, grocer and draper, were sold by auction, and the deceased (a sister of Mrs. Hockley) attended for the purpose of buying in some of the furniture. She arrived about 10 o'clock, and purchased of Mrs. Robinson (who has succeeded to Hockley's shop) a shilling bottle of laudanum, labelled "Opiate Tincture." During the day the deceased became very much excited and hysterical and she was seen by the servant girl, Eliza Williams, to take two small doses of the drug out of a wine-glass. Afterwards she called for a tumbler and cold water and took another dose, and was about to take a third when Mr. Hockley, at the suggestion of the servant, took the bottle from her. In the course of half an hour she became insensible, and Dr. Atkinson, who was in the neighbourhood, was immediately in attendance. Emetics and the stomach pump, with galvanism and other means, were tried to get rid of the effects of the poison, but the unfortunate woman died in about twelve hours. The jury found a verdict "that Annie Torgoose died from the effects of an opiate tincture, self administered, but without any intention to destroy her own life." The inquiry before the coroner lasted nearly four hours, there being several painful rumours in connection with the death, but the jury were unanimously of opinion that there was no reasonable ground for suspicion, and that the entire circumstance came under the definition of misadventure.—*Stamford Mercury.*

Poisoning by Laudanum.

On Wednesday, the 15th March, an inquest was held, before C. C. Lewis, jun., Esq., deputy-coroner, at Epping, upon the body of Mr. J. W. Hipsey, chemist and druggist, who died on Monday afternoon, under the following circumstances.

Mr. Edwin Wilson, brother-in-law to deceased, stated, that on Saturday and Sunday last the deceased was very strange and excitable. He called several times at his house, and each time wanted beer to drink. He last saw him at the Cock about ten on Sunday night. On Monday saw him several times in an unconscious state. In answer to further questions, witness said he had heard deceased often say he would soon die or should not live long. He had also had some heavy losses in business. Did not know that he was in the habit of taking laudanum to induce sleep. He was reported to have taken something of the sort some time since; he was of very intemperate habits.

Esther Cordell said she was domestic servant to the deceased. On Sunday he dined about two, and then went out, and returned again about eleven at night. She was waiting up for him. He sat down and began to cry, and said, "I am a most unhappy man and most miserable." She left him and a few minutes after she heard him go quickly into the shop and light the gas. She also heard the bottles or glasses shake. He was away about five minutes; he came into the parlour and sat down on the sofa, and asked her to give him a pillow to lay his head on. He said she would not see him alive in the morning.

William Windley, porter, said he saw deceased on Monday, and was with him until the time of his death. He was unconscious, never rallied, and only once or twice spoke so that he could understand what he said.

Thomas E. Rowlands, chemist, Ubberston, Surrey, said: The deceased, about nine years since, took the business in Epping of me. I came to Epping on Friday, and called upon him and had some conversation with him, which was not of an unpleasant nature—rather the reverse. On Saturday I did not see him, but as he was out I served in the shop until closing time, and did not afterwards see him until called on Monday about 8 A.M., when I went in and saw him in a stupor. Mr. Fowler was with him. I went into the shop, and saw the glass measure produced. It contains some fluid, which I think is laudanum. It is not an ordinary laudanum measure. Could not tell how long it might be since the measure was used. The deceased had not had notice to quit.

Mr. Trevor Fowler, surgeon, said he was called to see the deceased about 7.30. Had not previously attended him professionally, but from his personal appearance he thought that some such poison as laudanum had been taken. He went into the shop to get an emetic, and there saw the glass produced, which contained laudanum. He afterwards found that the bottle containing that drug had recently been shifted. He had made a *post-mortem* examination of the body. The cause of death was coma, caused by intemperance and the taking of a narcotic poison—probably laudanum. The Coroner having summed up the evidence, the jury, after consulting for some time, returned a verdict "That the deceased, J. W. Hipsey, came by his death by taking an overdose of laudanum whilst labouring under temporary insanity."—*Essex Weekly News.*

EXTRAORDINARY CASE OF ACCIDENTAL POISONING.

A young woman named Elizabeth Little has died under somewhat peculiar circumstances at Old Kirkstead, in the parish of Yarrow, Selkirk, on Sunday. She was 21 years of age, and on Saturday was suffering from a severe attack of toothache. In the hope of relieving the pain, she thought of applying a drop of Cuff's fly oil, used for killing vermin on sheep. She was alone in the house, and placing herself before a looking-glass, began to drop the oil from a bottle on to the diseased tooth. While doing so she happened to cough, and this shaking her hand, part of the contents of the bottle was discharged into her mouth, and involuntarily swallowed. Immediately thereafter she began to suffer from a burning pain in the stomach, and died in about twenty-four hours afterwards, medical aid failing to give her the slightest relief. The Procurator-Fiscal made an investigation into the circumstances on Monday evening.—*Scotsman.*

Review.

ANNUAIRE DE LA PHARMACIE FRANÇAISE ET ÉTRANGERE, 1875. Redigé par le Dr. C. Méhu. Paris. 1876.

In 1863 there appeared, under the title of *Annuaire pharmaceutique*, the first of a series of volumes, which had for their professed object to make French pharmacy better known in order that it might be appreciated as it merits. This and the two following volumes were edited by Professor Reveil. Upon the death of the learned professor three years afterwards, the *Annuaire pharmaceutique* passed under the care of M. Parisel, the *Année pharmaceutique*, which that gentleman had previously edited being incorporated with it. In 1872, it underwent another change and Dr. Méhu became editor, but with the volume for 1874 Messrs. Baillière, the publishers appear to have decided to discontinue its publication. This being the case, Dr. Quesneville, to whom the scientific world is indebted for the *Moniteur Scientifique*, requested Dr. Méhu to edit, under the title *Annuaire de la Pharmacie française*, a work having the same general plan as the *Annuaire pharmaceutique.* We have now the pleasure of welcoming the first volume of the new French Year-Book and we wish it heartily every success.

In the Year-Book of the British Pharmaceutical Conference, except such reference as may be made in the presidential address, very little is said with respect to political matters. This is not, however, the case with the little book before us, for the opening section contains the decrees, etc., for the regulation of pharmacy, issued by the President of the Republic during the year. These are curiously illustrative of the part which the State takes in pharmaceutical education in France. Thus there is a decree relative to the studies necessary to obtain the diploma of pharmacist of the 2nd class; another respecting the mode of nominating officials in the secondary schools of pharmacy, and so on. There is also a decree issued by the Federal Council of Germany, in March last, respecting pharmaceutical examinations, which leads to a deprecatory comparison of the cost of obtaining diplomas in the two countries. Dr. Méhu is not, however, always envious of his neighbours' privileges, for the account of a conviction at Berlin of a person holding a diploma of the "University of Philadelphia," is the occasion of a sarcastic reference to "la Prusse, qui se pique de donner des leçons de hauté moralité professionnelle aux autres nations," which appears scarcely in place in such a book.

The technical portion consists of a considerable number of mostly short abstracts of papers that have appeared in Europe and America during the year, on subjects more or less allied to pharmacy. These manifest care in their selection, and appear fairly to represent the gist of the original articles. In a very few cases papers are reproduced *in extenso.* They are distributed under the following headings :—Mineral and Organic Chemistry, Animal Chemistry, Pharmacy, Physics, Toxicology, Natural History and Materia Medica, Hygiene and Therapeutics, Adulterations, Tests and Estimations, Industrial Applications. These titles suggest certain directions in which the French pharmacist travels further than his English brother.

With respect to the arrangement of the abstracts we think there is room for improvement. Thus, for instance, the cinchona alkaloids and their salts are separated into at least three different groups, for no apparent reason except that in one case the salicylate and phenate of quinine follow salicylic acid ; in another place a list of laureates of the Paris School is inserted between a note on a tincture of opium and some statistics of Russian pharmacy.

We are glad to notice that Dr. Méhu does not endorse the disingenuous ignoring of work that had been previously done in this country, manifested in connection with a recent prize award by the French Academy of Sciences. With respect to the active principle of jaborandi, he says "It is to Mr. Gerrard, of University College Hospital, London, that we owe the discovery of pilocarpine and some of its crystalline salts. It was in the *Pharmaceutical Journal* that he published his first results."

We suppose that the four books mentioned are hardly seriously intended to represent the "Bibliography" of the year, and we think this section might judiciously have been omitted ; but it may have been inserted to shadow forth what is intended to be further developed another year. Appended to the volume is a reprint of Joulie's "Memoir on the Citro-Uranic Method for the Estimation of Phosphates in Manures," a method which has been recommended by a committee of the French Society of Agriculturists.

Obituary.

Notice has been received of the death of the following :—

On the 12th of March, 1876, Mr. William Higgott Hodson, Chemist and Druggist, of Burton-on-Trent. Aged 42 years.

On the 13th of March, 1876, Mr. John William Hipsey, Chemist and Druggist, of Epping. Aged 34 years.

On the 15th of March, 1876, Mr. George Henderson Whitehouse, Chemist and Druggist, of Bradford, Yorkshire. Aged 41 years.

On the 24th of March, 1876, Mr. James Billinton, Chemist and Druggist, of Wakefield, Yorkshire. Aged 59 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

A PROPOSAL FOR THE INTRODUCTION OF INDIA-RUBBER SHEETING INTO THE PHARMACOPŒIA AS A THERAPEUTICAL AGENT.

Sir,—I believe that my most proper course in advocating any addition to the Pharmacopœia is to lay it in the first instance before pharmaceutists. If a remedy is not officinal, or in other words if it is not kept in shops, it cannot be readily or indeed commonly prescribed, and I have to speak of a remedy the importance of which both as regards its efficacy in suitable cases and the commonness of cases to which it is suitable, demands that it should be of ready and general avail.

It is scarcely a drug in the ordinary sense of the word, but then there are already in the Pharmacopœia certain materia medica of which the same thing may be said, for example, cotton-wool and gutta-percha. It may be objected perhaps that the ultimate destination of cotton-wool is the preparation of elastic collodion and that the gutta-percha is designed for the composition of mustard-paper. However, both in their simple and in their composite condition cotton-wool and gutta-percha are alike largely used as remedies for acting locally on the skin in the form of solid layers or films applied to its surface, and it is in this capacity that the remedy I desire to recommend is found to be of service.

On a previous occasion, many years ago, I had the honour of reading before the Pharmaceutical Society a paper advocating the use of an ointment made with the yellow oxide of mercury as a preferable preparation to the red oxide of mercury in the treatment of skin diseases and for ophthalmic use and in consequence of that paper the yellow oxide of mercury is now included in the preparations of the Pharmacopœia. The means by which this came to pass were a little out of the direct course, but it is nevertheless unquestionable that the Society proved itself an efficient medium in attaining the object that was sought. The paper in question was (shortly after its publication in the *Pharmaceutical Journal*) copied into various French and German medical periodicals, and the remedy was re-imported about nine months after as "Pagenstaecker's eye ointment," under which name it soon became very popular with ophthalmic surgeons in this country, and owing doubtless to their influence it has been officially adopted. The chief of the two purposes for which I originally recommended it, that is to say, its use as a skin ointment, however, has not, so far as I know, been so widely adopted, possibly because it failed to achieve in this capacity the advantages of a German endorsement, or rather, as I might say, a German appropriation; but I have nevertheless found the official acknowledgement of the preparation in this country a very great convenience in prescribing it, as I have since been able to do with the knowledge that it can be made up without delay by any pharmaceutist. I have therefore no fault to find with the devious route by which it found its way into the Pharmacopœia.

Unlike the other remedy, the one of which I have now to speak is not an original conception of my own—the device is that of Dr. Colson of Beauvais in France, but it has been tested in Vienna, in Paris, and in Glasgow, and more recently in London by myself.

It would be out of place for me to enter here into any detail as to what particular eruptions I have found to be benefitted by it.

It will suffice for me to state here that its availability for the treatment of cutaneous disease has amply proved itself in my experience to be quite as extensive as the availability of any of the more largely prescribed applications that are used for that purpose. In short that it is a means which if rightly appreciated ought to be in extensive demand as *per se* a therapeutical agent, and not as at present, a material which occupies only a very subservient rank as an indirect medical convenience in various ways. I may add, that its power of ameliorating in a permanent manner certain common forms of obstinate skin disease is very remarkable for so apparently an inert agent; thus I have seen cases of a severe kind which had lasted for many months, complete cured in from two to three weeks by its agency, unhelped any other means. I have recently recorded two such cas in the *British Medical Journal.* As to the practical way supplying such a material it is expedient for private u that it should be obtainable prepared in various shapes, so to be adapted for the treatment of different regions, thus the form of socks for the feet, of gloves for the hands, ca for the head, masks for the face, drawers for the lower e tremities, shirts or shifts for the body, strips to be slipp on and kept in position by means of elastic bands attache for the upper lip, or for the ears, etc., and although it wou not answer for a variety of this kind to be commonly ke in stock by pharmaceutical chemists generally, they mig readily be kept in stock by a few London "druggists sundr men," and the description of such stock quoted in their list that the articles could readily be ordered at short notic However, for hospital use, where economy is a first cons deration, the necessary articles can be roughly constructe without much trouble out of the material in the breadt and in all cases where economy presses the same course ma be pursued. The material required is that which is known the waterproofing trade as vulcanized indiarubber bed shee ing No. 2, or a better quality known as No. 1 or where finer material is desired the vulcanized india-rubber sprea on the fabric known as jacconet.

I should not forget to say that it is the smooth or rubb side and not the cloth side that should be worn next t skin. With this precaution and the proviso of a daily ab tion the wearing of such underclothing is perfectly comp tible with cleanliness, comfort, and health.

It might be supposed that a suit of this material woul occasion great distress and oppression to the wearer, and admit that it is quite natural to suppose that it would be s but in practice this by no means proves to be the case. have caused patients to wear complete suits of it night a day for a month without any discomfort being experience by them other than that if they exerted themselves at a actively a moderately profuse perspiration was the resul But the effects even of moderately active exercise are not all trying under such conditions. I have found that m patients so treated find no difficulty in taking regular wal ing exercise, and I may remind you that Boyton's swi across the straits of Dover was performed under the sam essential conditions. It might be objected that the expens of such a material would interfere with its general utilit that is to say, would place it beyond the reach of those limited means. The cost of a Boyton dress (which is abou £16 I believe) would make this objection appear rather formidable one, but such articles of wear as I have referre to require only to be manufactured in quantity to rende the cost of them a very trivial one. Indiarubber gloves, f example, are commonly sold at the price of about 5*s*., an articles of wear of much larger size but of simpler shape ca probably be supplied for not much more than that sum. O the other hand, it is a sufficiently well known fact th chronic diseases of the skin are apt to be extremely obstina under treatment, and that very often they require no sma expenditure in the matter of drugs before they finally yiel to treatment. If, therefore, there exists a fair expectatio in the mind of the medical attendant, that in any particula case an expenditure of a few shillings in the purchase of a article of the kind will suffice for the complete treatment the disease, there are probably but few patients who wi hesitate to make the necessary outlay; but as I started b saying, this cannot happen unless the articles can be gene rally and easily obtained, and that at a moderate and reason able cost, and this prime condition can, as I take it, only b secured by the article becoming, in pharmaceutical phras officinal although as yet it is not official.

BALMANNO SQUIRE, M.B. Lond.
Surgeon to the British Hospital
for Diseases of the Skin.

THE ONUS OF PROOF.

Sir,—The British Parliament in 1875 passed a statut called the "Shipping Act," and under its provisions person is about to be placed on his trial before a Liverpo jury on certain charges in contravention of that Act.

Mr. Justice Brett in his charge to the grand jury at th Liverpool assizes on Thursday last spoke as follows:—

"Now the last case to which I shall call your attentio is one which gives me very considerable trouble. A perso s charged under the statute passed in 1875 with a crime; e is charged with a misdemeanour, in that a ship, of which he was the managing owner, was sent to sea unseaworthy, nd so unseaworthy as to be dangerous to life. Now, according to the old law, if any person who was responsible or a ship did knowingly send the ship to sea in a condition uch as is described, the old law would to my mind, if firmly administered, have been ample to meet the case of uch a person, who would, if the crew were lost, have been guilty of manslaughter. But Parliament, in 1875, passed a tatute which was called the Shipping Act, I believe. Now, n that statute is this section, under which this person will e charged:—'Every person who sends a ship to sea in uch an unseaworthy state that the life of any person vould be likely to be thereby endangered shall be guilty f misdemeanour.' If it had in it the word 'knowingly,' hat would be according to the ordinary principles of the aw; but the word 'knowingly' is left out, and therefore t stands thus:—'Every person who sends a ship to sea, vhich ship is unseaworthy, and so unseaworthy that life hall be endangered, shall be guilty of a misdemeanour.' But then it goes further, and it says 'and the managing owner,'—distinguishing him from the person who sent the hip to sea—'and the managing owner of any British ship o sent to sea from any port in the United Kingdom shall e guilty of a misdemeanour, unless he prove that he used ll reasonable means to insure her being sent to sea in a eaworthy state, or prove that her going to sea in such n unseaworthy state was under the circumstances reasonble and justifiable; and, for the purpose of giving such roof, such person'—that is the person accused of the crime —'may give evidence in the same manner as any other vitness.' Now, however, it has been thought right to egislate in a way which is contrary to all received views of English criminal law. The criminal law of this country as been so tender of every person accused of crime that itherto it has required, not that the jury should try vhether a man is simply guilty or not guilty, but the uestion has always been whether those who prosecute in England a person for a crime could satisfy twelve men that e was guilty of that crime, the whole burden of proof, herefore, lying on those who prosecuted. But here the urden of proof is altered; and the moment it is proved hat the ship has gone to sea, as a fact, the managing owner, lthough he might be at the other end of England, is called pon to prove—the jury is not to consider whether the prosecution have proved that he is guilty, but he is called pon to prove that he is innocent. But there is more than hat. There is something which, when one first sees it, I hink will bear a strange appearance. There will be seen or the first time in the history of this country, from the eginning of the history of this country until now—for nyself, I confess I shall shudder when I first see the experiment tried—a man standing in that dock charged as a riminal; and I may see, if he feels himself otherwise efenceless, the book handed to him and see him sworn—uch a thing as never yet was seen—and I may see the ounsel get up and cross-examine the prisoner who stands n the dock. I have nothing more to say about it, because he legislature has passed such a statute; but I confess that he first time I see that it will make me shudder to think f the change which has come upon the administration of the riminal law of this country. I shall be obliged to permit it, but shall do so with the greatest possible reluctance. Gentlemen, he direction which I have to give you is this: if you find s a fact that the ship was unseaworthy so as to be dangerous to life, and if you find as a matter of fact that the erson charged was the managing owner, you have nothing nore, according to this law, to ask yourselves, but you ave to find a bill against that man, upon which he will e charged with a criminal offence."

The grand jury were then dismissed to their duties, and hortly afterwards, several true bills having been found, he trial of prisoners was proceeded with.

In reading over this charge, my thoughts naturally reverted to a law somewhat analogous in some of its bearings vhich was also passed in the year 1875. I allude to the 'Sale of Food and Drugs Act," wherein the vendor of an rticle may innocently render himself amenable to a criminal charge.

Now, sir, I think it will be apparent to every one that the ble critique of Mr. Justice Brett on the Shipping Act of 1875 s equally applicable to "The Sale of Food and Drugs Act" of he same year. When the latter bill was introduced by Mr. Sclater-Booth in February, 1875, the word "knowingly" was inserted twice in the 3rd and twice in the 4th sections, also once in the 6th and twice in the 7th sections, with the view of protecting innocent or unintentional breakers of the law. But during its subsequent progress through Parliament the word "knowingly" was banished from every section, notwithstanding the strong representations of a deputation from the Council of the Pharmaceutical Society of the desirability of retaining the word as a protection to any tradesman who might unconsciously have made himself liable to the letter of the law. It was said by those who objected to the retention of the word that if the prosecution were required to prove a guilty knowledge on the part of the seller the Act would be useless. Thereupon the Government gave way, and instead of the prosecution proving its case, "according to all received views of English criminal law," the proof of innocency now devolves upon the accused. I call attention to this matter from the evident anomaly of the principle involved in the two recent Acts of Parliament with past legislation.

The Shipping Act has been the means of eliciting the above condemnation by Mr. Justice Brett, and it is to be hoped that it will not be forgotten if at any future time a tradesman is called upon to prove his innocence of a criminal charge, under "The Sale of Food and Drugs Act."

J. S.

Liverpool, March 25, 1876.

THE CONVICTION UNDER THE PHARMACY ACT AT GLASGOW.

Sir,—It is somewhat gratifying to notice that at length the authorities are bestirring themselves with respect to the evasions of the Pharmacy Act in this city, and that one prosecution has been undertaken with success. I do not know whether any more cases are in progress, but fondly hope that the Council will not on this occasion be satisfied with one, or even two, succcessful prosecutions, but that they will go on until the whole of the evaders are compelled to qualify themselves in the proper manner, for no one here wishes that they be driven out of the business altogether, but that they (most of whom are young intelligent fellows), would rouse themselves from their torpor, and with that courage which characterizes all true Scotchmen, go forward to their studies boldly and overcome their little difficulties. It is with such a view I hope that the Registrar on behalf of the Council is induced to take any such strong measures as prosecution, and I have no doubt it will have its effect in the long run, at the same time I do not think that the agent in this present prosecution (Mr. Aitkin) has done his duty in the matter. It is not, I take it, to be his place to make any show of leniency. If the judge in the case chooses to take a mild view of the case, good and well, but it should not go forth on the authority of the officials acting on behalf of the Society that "they have no desire to be oppressive." It is not a question of oppression at all, it is a question of legal duty incumbent upon the Society, and with such a statement going forth as is published in the Journal to-day, it will only tend to make bad worse! What is a £5 to some of them?—a mere fleabite! They just laugh at it. I trust that, if another case is undertaken, that Mr. Aitkin will take the opportunity of letting the public, through the court, know exactly the position in which the Society stands concerning these infringers of the Act. It is their bounden duty to prosecute, and no question of oppression can possibly be at their door.

ANTI-SHAM.

Glasgow, 25 *March,* 1876.

Sir,—Your correspondent "Ph.D." in using my initials as his text for his philippic against the Pharmacy Act falls into one or two blunders in endeavouring to set me right. His assumption that whenever the Society attempts to root out the weeds of the trade it only causes a fresh and enlarged crop is totally fallacious, or at any rate demands some wider proofs than those he has given to make it credible.

Even in Glasgow it is but lately that there has been a rush of unregistered men into the trade. And that only because the Society has been acting in a sleepy and unenergetic manner.

Had more energy been shown, the disease of opening shop without being registered would have been far less virulent than it is; and even now the Society has only to exert itself to effect a radical cure.

It is all very well to indulge in gleeful imagery of deft postillions driving gracefully, six-in-hand, through Acts of Parliament. However, when we see that the would-be druggist's stud consists but of some broken-winded old hack of a medical man the performance gets tragical and calls for the ending.

As to the members subscribing for the mere sake of the Journal, if "Ph.D." would use his arithmetical faculties, having previously discovered the price of the Journal, he will find that any member by buying it at his stationers will effect a considerable saving. And I cannot but think that such a class of men as druggists, who know so well the value of coin, would purchase in the cheapest market. The fact remains, members link themselves with the Society because they approve of its mission, and look to it to protect the legitimate members of the trade by the use of the powers entrusted to it by parliament. And were the Society more active in exterminating the ignorance and quackery that cling to the skirts of the trade its roll of membership would be longer.

Regarding the class who in their puerility are said to pay double the required amount for titles, I know nothing, and can only suspect them to be the product of a wild imagination.

However, "Ph.D." appears to forget that even the time-honoured title of Chemist and Druggist, and the right of using it, is given by the Pharmaceutical Society as the badge of a certain amount of education and skill; and that it is because some men are so wilful as to refuse to take it, or so ignorant that they can't, and yet are so selfish as to demand all the benefits accruing from it, and so anxious to palm themselves as such upon the public under the guise of a Medical Hall, that this discussion arose.

The old piteous cry of hordes of unhappy youths and bearded men flying from the business on account of the examinations, begins to pall strongly, or at most not to receive a smile.

I, for one, look upon the Pharmacy Act as a splendid winnower, and although the air should be thick with clouds of chaff departing it gives me no fear or trouble. It is weak to babble that the future cannot give such pharmaceutical wheat as the past—the ages but ripen humanity.

And even if the ranks of the trade begin to be thinned below the normal, the law of supply and demand is in constant operation righting the defect. Whenever proper remuneration and human hours of labour are held out, the trade will be filled with a more intelligent class than ever the past possessed.

It is moonshine to say if the Society had restricted their examinations nothing would have been heard of unregistered men. The same class who now endeavour to elude the present examinations, would have tried to elude any; a fundamental lack of mental and moral stamina is the failing.

The object of the Pharmacy Act, and the designs of the examinations is a good and worthy one. It demands that the members of our craft be scientifically educated as regards this business, while it sets a veto against any or every ignorant huckster dealing in wares that are dangerous to the public. It will, and is, raising the status of the trade, ameliorations are setting in, and one vast stride of improvement will be when the Council of the Society gathers courage to sweep from the trade either with the Act of 1868, or with an amended one, such a body of men as they who by toadyism to some weak-minded registered druggist, or some despicable "arrangement" with a medical man, shield themselves from the law.

"Ph.D.'s" letter but adds proof, if such were needed, to the low state of morality amongst a certain body of druggists in Glasgow, but I hope vigorous measures will ere long enable us to look back on such as the driftweed of a bygone age.

24th March, 1876. J. G.

PATENT MEDICINES.

Sir,—I have read with considerable interest your remarks, and also the letters of one or two correspondents, on the proposed legislation in reference to patent medicines, making it compulsory to state on the labels, or otherwise make known the active ingredients contained therein, such being poisons within the meaning of the Act of 1868. I have, however, failed to see who are going to be benefitted by such government interference, and I am also sorry I cannot agree with you in seeing what a boon the Poison Act has been to the public. It is true a man contemplating suicide cannot purchase strychnine except under certain regulations, but he can buy any quantity of tinct. opii., and thereby destroy his life, so that in some respects the Act is quite an anomaly. I am the proprietor of one or two patent medicines for which I have a very good sale, and which I think are appreciated for their remedial value, but if they are taken in improper doses they are poisonous. Am I therefore to be compelled to label them "poison," dangerous, or some such alarming word, simply because a careless person might at some time take an overdose? Why what would become of the sale of them? Of course cease to exist. Such legislation would be also very unfair; as I would ask has not the discoverer of a remedy for any given disease as much claim to protection and benefit from such discovery as the inventor of a particular shaped bottle or piece of machinery? Proprietors of patent medicines have vested interests which must be respected; but the fact is the trade is already harassed by over-legislation, what with the Poisons Act and the Adulteration Acts, and if the Pharmaceutica Society can do nothing better for us than such things a these, how can we wonder at so many holding themselve aloof from it? J. B. M.

R. Esam.—Apply for a syllabus of the examination t the Secretary at Apothecaries' Hall.

"*Enitar.*"—It is principally the aqueous portion of th acetic acid, which is not taken up by the ether. See *Pharm Journ.* [3], vol. i., p. 501.

A Country Chemist.—Yes. It will always become so few hours after it has been dispensed.

G. B. G.—The salts are not soluble to the extent ordere in spirit of full strength.

A. S. B.—Dissolve in hydrochloric acid, precipitate wit cold solution of carbonate of soda, and well wash the pre cipitate.

"*Sov.*"—The provisions of the Act came into force "o and after the 31st day of December, 1868."

"*Spoonfuls.*"—Mr. Bradwall thinks Mr. Learoyd's pro position of a slip label to overcome this difficulty is a admirable one, and suggests that the label should be worde as follows:—"Medicine should be measured with a graduate glass, or an old-fashioned spoon; modern tea and table spoons vary considerably, and are usually too large."

"*Priceless.*"—The information may easily be obtaine of any local bookseller.

Lac.—Eight ozs. of bleached lac dissolved in a quart o rectified spirit or wood naphtha.

W. J. S.—We do not think that any ill result woul follow.

B. H. W.—We cannot say whether it would be legal consult the authorities at Apothecaries' Hall.

J. W. L.—Such a mill as you require could probably b obtained of Mr. Savage, of Eastcheap, or any other respect able mill maker.

W. Wilton.—We believe phosphorus pills, B. P., ar generally dispensed with the addition of a little powdere soap to make them soluble, as Professor Redwood ha suggested, not sent out in water. We do not think there any danger in sending them by post.

A Country M.P.S.—The clear supernatant portion wi appear like the infusion. There will be a sediment of un dissolved phosphate of iron, which at first will be bluis and afterwards probably turn to a dirty white.

J. F. Ask.—*Marine Glue.*—Digest one part of india rubber (cut small) in twelve parts of mineral naphtha in covered vessel, with heat and agitation, and when solutio is complete, add twenty parts of powdered shellac an continue the heat till the mass becomes liquid.

W. H. Key.—We think the seeds might be obtained fro Mr. Bull, of Chelsea.

W. Bird.—Notice, accompanied by certificate of age an testimonials from previous employers or masters as t capability, industry, and general conduct, must be sent t the Secretary on or before the 1st of June. No fee has t be paid.

S. Bradbury and Co.—The course you contemplate woul no doubt recommend itself to the trade if communicate through the medium of a circular or advertisement.

COMMUNICATIONS, LETTERS, etc., have been received fro Mr. Bradwall, Mr. Whitfield, Mr. Pollard, J. W. L., A. F A. C., Alpha, Pil. Hydrarg.

NOTE ON AN OINTMENT CONTAINING CALOMEL, HYDROCYANIC ACID, AND ACETATE OF LEAD.*

BY T. H. POWELL AND J. BAYNE, F.C.S.

The reaction which we record in this paper, although met with but very rarely in the daily routine of dispensing, is nevertheless of considerable interest, and merits more attention than it has yet received. The ointment in question had the following composition :—

℞. Hydrarg. Subchloridi . . .	ʒi.
Plumbi Acetat.	℈ii.
Glycerini	℥ii.
Acid. Hydrocyan. dil. . .	℥ii. (B. P.)
Adipis	℥i

M. ft. Unguentum.

When mixed, instead of being white, as had been anticipated, it was of a deep black colour, and on making a few experiments it was found that on adding the hydrocyanic acid to the calomel, a clear liquid and blackish grey powder resulted, which powder became a deep black on the subsequent addition of the acetate of lead. It was first necessary therefore to ascertain what action hydrocyanic acid had on calomel, and then what further decomposition took place when the acetate of lead was added. Among the tests for calomel in the British Pharmacopœia it is mentioned that contact with hydrocyanic acid darkens its colour; no information beyond this could be found in any of the pharmaceutical text books at hand, nor did it seem to be known that they were incompatible.

Scheele seems to have been the first to investigate this reaction, and he gives his opinion that metallic mercury results and a liquid which contains cyanide of mercury and hydrochloric acid.

There is next a notice in the *Journal de Pharmacie*, for 1829 (vol. 15, p. 523), by M. Regimbeau, a young pharmacist who independently corroborates Scheele's result. A *résumé* may prove of interest. He observed when making a linctus containing calomel and emulsion of bitter almonds, that the liquid gradually assumed a grey colour, and in a short time deposited a dark powder. Suspecting this was due to the presence of prussic acid he suspended calomel in water by means of a mucilage of tragacanth and then added the acid, obtaining the same result as with the bitter almond emulsion. On mentioning this to the Assistant Professor of Pharmacy at Montpellier, he was told that the same thing had been observed in making some calomel biscuits flavoured with bitter almonds, and he adds that the metallic mercury appears in the form of very brilliant globules, easily discernible under a lens.

To this paper, however, is appended an editorial note by Soubeiran, which runs as follows :—"The chemical phenomena that take place in this reaction are much more complicated than the author seems to think. If a single experiment I have made on this subject does not deceive me, the supernatant liquid is very acid and contains hydrocyanic acid, hydrochloric acid, bichloride and bicyanide of mercury. As for the grey powder its nature is still unknown to me, but it does not contain metallic mercury. Although derived from calomel, finely divided by the action of water, this powder has a very crystalline structure. Microscopically examined, a black powder is seen, and a large quantity of small shining crystals. These have been mistaken for metallic mercury. Heated, the powder seemed to give off a little gas and a sublimate possessing the physical properties of calomel, and there remained a small quantity of a black powder, which seemed to be carbon. Potash did not free ammonia, nor hydrochloric acid prussic acid."

On referring to Gmelin's handbook, we found that the difference of opinion did not cease here. One observer says, "all the calomel is not decomposed even when an excess of prussic acid is present;" another that "the resulting liquid contains sal ammoniac, and that the black powder sublimes above 150° C., the sublimate consisting of calomel and metallic mercury, while a carbonaceous substance is left behind;" and lastly in Muter's 'Chemistry,' metallic mercury and bichloride of mercury are said to result. The experiments the authors have made appear to throw additional light upon this subject, and to clear up to some extent this conflict of opinion. When calomel is acted upon by prussic acid, there results a heavy blackish-grey precipitate—spangled with crystals if a crystalline calomel be used, a dead blackish-grey if the calomel be in a very fine powder—and a clear supernatant liquid, smelling strongly of prussic acid and giving a precipitate of mercuric iodide with the iodo-cyanide of mercury and potassium. On exposing this to the cold till all trace of hydrocyanic acid has disappeared, there is left a liquid having an acid reaction, giving a curdy white precipitate with nitrate of silver insoluble in boiling nitric acid, and with iodide of potassium a precipitate of mercuric iodide; on gently heating, hydrocyanic acid is evolved, and when it ceases to be given off the resulting liquid is found to contain free hydrochloric acid and bichloride of mercury. The black precipitate, thrown upon a filter, is washed till all trace of cyanide of mercury is removed, and then dried at the heat of a water bath; it gradually loses its dark colour until, when quite dry, it is a light grey. This dry powder yields on heating a sublimate consisting of metallic mercury and calomel, and probably a brick-red residue remains behind. If the calomel used be also sublimed a slight blackening may take place, and a similar residue will probably be obtained, which proves to be oxide of iron.

What is it then, if Scheele's theory be correct, which arrests the action? for free hydrocyanic acid is always found to be present. It will be found that if the clear supernatant liquid previously spoken of be poured off upon a second portion of calomel, no reduction takes place, and we have come to the conclusion that this must be caused by the presence of the free hydrochloric acid. This is shown to be the case by treating calomel with successive portions of hydrocyanic acid, and washing the black precipitate after each separate application till bicyanide of mercury ceases to be formed, when a grey powder remains, which on drying proves to be metallic mercury. It will also be found that a mixture of three parts of dilute hydrochloric acid and seven parts of hydrocyanic acid, B.P., does not darken calomel. Sulphuric and nitric acid act in the same way, but less powerfully, while glacial acetic acid must be present in the proportion of about four volumes to one volume of prussic acid, B. P., to secure a like result.

This probably explains the part played in the decomposition by the acetate of lead, which abstracts the chlorine of the hydrochloric acid with the liberation of free acetic acid; thus, allowing a further reduction of the calomel. We may add that white precipitate is not blackened by prussic acid, but is slowly dissolved by it, the resulting liquid containing bicyanide of mercury and chloride of ammonium.

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, April 5, 1876.

The authors think then that Scheele's theory is probably the true one, but with this reservation, that complete decomposition does not take place unless the hydrocyanic acid be largely in excess, and that in any case free hydrocyanic acid will be found to be present when decomposition ceases.

[*The discussion on this paper is printed at p.* 818.]

LINIMENTUM SAPONIS OF THE BRITISH PHARMACOPŒIA, WITH SPECIAL REFERENCE TO ITS EMPLOYMENT IN HOSPITAL PHARMACY.*

BY W. WILLMOTT.

A late eminent prelate of the established church, to whom was applied the epithet "saponaceous," was wont to say, in explanation of the term as applied to himself, that he supposed it to refer to his being able to come clean-handed out of any difficulty in which he was concerned.

I hope, in the following remarks, to come with equal success out of the treatment of a subject which has already received attention at the hands of able pharmacists.

I need scarcely say that the preparation known as "soap liniment" has successfully borne the test of long tried experience. "*Quod primum est verum est*" is true of many things pharmaceutical, and I shall not, I feel sure, be thought to be assailing a time-honoured prescription in my humble desire to point out the way of rendering it more accessible and efficient where circumstances deny to it the exact composition to which the sanction of authority has been accorded.

In the Pharmacopœias of 1824 and 1836 the liniment was presented to us as a soft gelatinous mass. To the conscientious pharmacist this at once suggested a difficulty which it was not easy to overcome. It arose from an alteration which had been made in the spirit of rosemary from the strength of proof spirit to that of rectified spirit, which caused the gelatinization of the soap when dissolved in it by the aid of heat. Complaints were made and suggestions offered to remedy this defect, and accordingly in the next Pharmacopœia, that of 1851, the soap was reduced in quantity and water was added to the spirit. This, however, did not prove effectual. In all the Pharmacopœias the colleges had ordered the soap *to be dissolved*. This seemed sufficiently correct, otherwise a smaller quantity might have been named for the purpose intended. The expressions used to indicate this intention were as follows:—Ph. 1746, "*dum solutus sit*;" Ph. 1788, "*donec solvatur*;" Ph. 1809, "*macera balneo arenæ donec liquetur*;" Ph. 1836, "*macera leni calore donec liquetur*;" and Ph. 1851, "*macera subinde agitans donec liquentur*." It was abundantly clear, therefore, that the soap was intended to be dissolved, and it was this circumstance rather than the exact proportions of the ingredients composing the liniment which, in reality, was the cause of the trouble referred to. Here I ought to say that we are indebted to the researches of the late Mr. Deane for an elucidation of the whole subject. He found that the gelatinization was due to the presence of margarate of soda, which was dissolved from the soap when the temperature was above 70° Fahrenheit. He, therefore, recommended that in the process of making the liniment this temperature should not be exceeded. Accordingly, on the appearance of the British Pharmacopœia in 1864 we find this provision introduced, though the error respecting the solution of the soap is perpetuated.* "Digest" (say the instructions appended to the formula in this work) "at a temperature not exceeding 70°, with occasional agitation until all are dissolved." This was very misleading, since "at a temperature not exceeding 70°" the soap resisted all efforts, however extended in duration, to bring it to this condition. It was not, therefore, until the publication of the revised edition in 1867 that this error was rectified, and the directions rendered clear and free from all ambiguity. We are now instructed as follows:—"Mix the water with the spirit, and add the oil of rosemary, the soap, and the camphor. Macerate for seven days at a temperature not exceeding 70°, with occasional agitation, and filter."

These directions are very explicit, and it is now clearly understood that so much of the soap only shall be dissolved as the spirit will take up at a temperature not exceeding 70°, the remainder being regarded as waste of a necessary character belonging to the process. Prepared in this way we have a liniment which is perfectly clear and bright, and being free from any tendency to thicken or gelatinize, except at unusually low temperatures, is admirable in every way.†

If, however, in my capacity as Hospital Dispenser, I were to take exception to this form, it would be in two important respects. (1). The waste occasioned by the undissolved soap; and (2). The length of time required, namely seven days, to complete the process. The loss of the soap may seem a trivial matter when making a pint or a gallon of the liniment, but where 50 or 100 gallons have to be prepared (and this is by no means an excessive quantity where patients are numbered by thousands), the waste thus occasioned ought not, I think, to pass unheeded. We may usefully estimate the extent of this waste under the circumstances mentioned. It will be observed that the Pharmacopœia directs the soap to be "cut small," an injunction which though somewhat indefinite could hardly be expressed otherwise. That a difference in the size of the pieces when "cut small" should more or less affect the result will not be surprising, inasmuch as the greater the surface of the soap exposed to the action of the solvent, the greater relatively will be the quantity dissolved.‡ If, then, the 2½ ozs. (*i.e.*, the quantity ordered for one pint) be cut into 13,000 pieces (and this is not a simple guess) there will be dissolved in the 20 fl. ozs. of liniment, after seven days' maceration, about seven tenths of the whole quantity, equivalent to 38 grs. in each fluid ounce; the remaining three-tenths being left undissolved. But if, on the other hand, the division extends only to 500 pieces, which may fairly be taken as the size indicated by the Pharmacopœia, the quantity taken up at the end of the process will not exceed six tenths, or equivalent to 29·35 grs. in each fluid ounce; in this case the remaining four tenths or rather more (*i.e.*, nearly half) being left undissolved. The waste, therefore, of Pharmacopœia hard soap in preparing 100 gallons of this liniment (making all needful allowance for difference of weighing, and moisture etc.), may, *mutatis mutandis*, be fairly set down as 750 ounces, or over 46 lbs., and where economy is of paramount importance, as it is in most of our London hospitals, such waste should, if possible, be avoided. Now the question arises, can the Pharmacopœia form be dealt with alike to the saving of time and the prevention of waste, the liniment remaining as effectual as before in the specialities of hospital practice? It is true that if we disregard the instructions given and employ heat to dissolve the soap, gelatinization of the liniment occurs at comparatively low temperatures; but it is noticeable that this decreases as we weaken the spirit to a certain point. From this point continuing the same process the gelatinization again appears until, in using water only as in using spirit only, we have the same congealed mass which is so troublesome to encounter. In the proportion of proof spirit, or better still equal parts of each spirit and water, the margarate of soda no longer gelatinizes the fluid but is precipitated in a flocculent form. Taking advantage of this circumstance, and being prepared to sacrifice the necessary amount of spirit, we have only to submit our liniment, after solution by heat, to a temperature a little below freezing for one or two hours and then filter. Thus prepared it will remain bright and clear, and in respect of any tendency to congeal will scarcely be distinguishable from the Pharmacopœia preparation. The same result may be insured if we are prepared to part with a portion of our soap, in which case the whole of the spirit may be retained. By reducing the proportion to two-fifths of the quantity ordered (and this it will be remembered is but little less than is taken up below 70°) we obtain, on exposure to the cold as in the former case, the separation of the greater portion of the gelatinizing substance, which, having been filtered out, no further trouble will be experienced.* The sacrifice of a portion of the soap or a portion of the spirit may be attended with disadvantages or the reverse, and some difference of opinion on these points may be entertained; but the question is, perhaps, rather of a medical than a pharmaceutical character, and it must be understood that I do not propose these modifications as a readily available solution of the problem where large quantities of ingredients have to be dealt with. They are simply given to show that something at least may be done in this direction. We have another alternative in the use of a different kind of soap which shall be a pure oleate of soda dissolving readily when added to the water and spirit. Almond oil and castor oil soaps have both been proposed as fulfilling these conditions, and it remains to be seen whether at some future period they can be rendered available for the purpose. In the meantime as our inquiry has especial reference to hospital needs, it will be interesting to observe how the question is regarded by those medical authorities who, in the Pharmacopœias of their respective institutions, have taken note of this preparation. In the following table I give the formulæ of the hospitals mentioned, the quantities of each ingredient being estimated as near as need be for one pint of liniment:—

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* Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, April 5, 1876.

* This error is still present in the minds of many pharmacists, who not unfrequently overlook the important alteration in the instructions now given. Hence an impression prevails that, as formerly, there is "a difficulty" connected with this preparation.

† B.P. soap liniment gelatinizes completely at 15° below freezing point.

‡ To so great an extent does this obtain that if the soap be reduced to very fine particles sufficient will be taken up *below* 70° to gelatinize the liniment at 35°. It is consequently of importance that it should be *cut into pieces* as directed, and not, to save time and labour, powdered or broken up in a mortar.

Hospitals.	Soap,	Camphor.	Spirit.	Water.	Remarks.
Guy's	3 ozs. (soft)	1 oz.	16 fl.ozs.		Contains no water. Ol. Origan. 2 fl. drms. to pint.
Gt. Northern.	2½ ozs. (soft)	1 oz.	2 fl. ozs.	16 fl.ozs. (boiling)	Water "boiling." Camphor not dissolved. Contains no essential oil.
London.	3 ozs. (soft)	6 drs.	3 fl.ozs.	15 fl.ozs.	Ol. Tereb. 4¼ fl drms. to pint.
St. Bartholomew's.	3 ozs. (soft)		2 fl.ozs.	15 fl.ozs. (boiling)	Contains no Camphor. Ol. Tereb. 7½ fl. drms., Ol. Marjoram ½ fl. drm. and Sol. Ammon. 5 fl. drms. to pint. "Boiling" water.
Middlesex.	2 ozs. (soft)			20 fl.ozs. (boiling)	Consists of soft soap and boiling distilled water only.

It will be observed that in each case *potash or soft soap* is the kind employed,* and whilst we have all spirit and no water at Guy's we are reduced to all water and no spirit at Middlesex. Here, then, we have medical authority for the use of soft soap in combination with spirit in varying proportions even to omitting it altogether. As we can scarcely think that medical men would willingly sacrifice the good of their patients to economy, or for the sake of pharmaceutical convenience, it is open to us to infer that the *litera scripta* of the Pharmacopœia need not always be strictly followed. On the other hand, the hard soap and the rectified spirit from long usage will doubtless hold their own in the Council and Colleges of the future. The fear entertained that the use of potash soap may be productive of ill results when applied in the weakened form of an embrocation scarcely seems borne out in practice.

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* In the modifications here proposed the formulæ would stand thus:—

(I.)

℞ Sapo. Dur. . . . . 2 ozs.
(To be thoroughly dried and powdered.)
Camphor. . . . . 1¼ oz.
Ol. Rosmar. . . . . 3 fl. drms.
Sp. Rect.
Aq. Destill. . . . . āā 10 fl. ozs.

(II.)

℞ Sapo. Dur. . . . . 1 oz.
(To be thoroughly dried and powdered.)
Camphor. . . . . 1¼ oz.
Ol. Rosmar. . . . . 3 fl. drms.
Sp. Rect. . . . . 18 fl. ozs.
Aq. Destill. . . . . 2 fl. ozs.

Add the oil of rosemary, the soap, and the camphor, to the water and the spirit previously mixed, and dissolve by the heat of a water-bath. Then expose to a temperature a little below freezing for two hours, with occasional agitation, and filter.

* Other considerations apart, soft soap from its ready solubility and its freedom from all tendency to gelatinize, meets the difficulty we have been considering most completely.

In hospital pharmacy it is customary to use the commercial kind with methylated spirit. The objection to the employment of the former—namely, that it contains a large quantity of uncombined alkali, may be removed to a great extent by the method of manipulation adopted. It is not unusual, I believe, to commence by dissolving the soap in hot or boiling water. This is objectionable, as well as troublesome, and should be avoided as likely to impart to the liniment properties of an irritating character. The following form will, I think, be found to give satisfactory results where, on medical authority, the Pharmacopœia instructions are departed from* :—

℞ Sapo. Moll. (free from Caustic Potash	1 lb.
Camphor.	8 ozs.
Ol. Rosmar.	2 fl. ozs.
Sp. Rect.	5 pts.
Aq. Destill.	3 pts.

Mix the camphor and oil of rosemary with the spirit, and then add the soap. Stir occasionally during twenty-four hours, and strain or filter. Afterwards add the distilled water and mix.

The spirit rapidly disintegrates the soap and dissolves the neutral portion only, so that the irritating alkaline matter which would be taken up by boiling water is absent from the preparation. The liniment is clear and free from sediment, and remains so at all temperatures.

Should this combination be thought to differ to too great an extent from the recognized formula, the specialities of our position will, I trust, be deemed sufficient justification for the adoption of those ready methods which the needs of hospital pharmacy would appear to require. If, as now, we cannot at all times accept the Pharmacopœia as our "standard and guide," it is satisfactory to know of this work that, apart from its many excellencies, it sets up no Procrustes law, but itself proclaims that in the discussions of those who read it and ponder it lies the true road to its perfection.

[*The discussion on this paper is printed at p.* 819.]

PHOSPHATE SYRUPS; WITH SPECIAL REFERENCE TO THE NATURE, CAUSE, AND PREVENTION OF CERTAIN PRECIPITATES WHICH FORM THEREIN.†

BY W. L. HOWIE, F.C.S.

Since the marked success gained by the "chemical food" introduced by the late Professor Edward Parrish, of Philadelphia, syrups containing metallic and other phosphates have become an item of considerable importance to every pharmacist, and on account of the unstable character of the combination their manufacture has received a large share of attention. Notwithstanding what has been done by the contributors of the many papers which have from time to time appeared in our Journal, it would seem that we are not yet thoroughly acquainted with the rationale of certain decompositions which take place in phosphate syrups, and I have thought that we might devote an evening, not unprofitably, to the consideration of the cause and prevention of these changes. The subject has so grown under my hands, becoming involved with relative matters of much interest, that besides being compelled to ask the major part of your time this evening for its consideration, I must also crave the indulgence of the older members, for the sake of those who are yet students, if I seem to dwell on detail which may have become quite familiar to their riper experience. It is my intention not so much to bring forward new formulæ for the preparation of these syrups as to consider the rationale of the processes of preparation, and discuss the best methods by which discoloration and the formation of troublesome precipitates may be prevented, as well as to consider of what these precipitates consist, and to what fault of formula, process, ingredient, or storage, their appearance may be attributed.

To take compound syrup of phosphates, as introduced by Parrish. We find not infrequently, especially in cold weather, that it deposits a slightly lustrous precipitate, sometimes so bulky as to perfectly solidify the syrup. This precipitate which is the one we shall first consider, appears to the naked eye to be granular or crystalline, and under the microscope is found to consist entirely of minute, detached prisms, with double oblique bases, which make a most beautiful object viewed by polarized light.

When it is separated and purified by recrystallization, we have grape sugar, of which it is found entirely to consist.

In seeking for the cause of this deposition of grape sugar, which in appearance, that is bulk, is the most formidable of the precipitates we have to encounter, though in reality it is least to be feared, as it is very easily remedied, we have but to consider the action of free acid on cane sugar, and the relative solubility of the two saccharines. As is well known, cane sugar in solution is converted into grape by the presence of certain acids, which action is accelerated by heat; and in Parrish's original formula, with which some pharmacists still work, the quantity of sugar specified is in excess of what could be safely held in solution, were even but a moderate portion converted into grape. It will thus be rightly inferred that the most simple method of preventing the formation of this precipitate is not to load the syrup with sugar. There are, however, other points to which I would direct your attention. The application of heat to the acid syrup is highly objectionable, since the formation of grape sugar then and there takes place, to an extent which it might take many months' exposure to the ordinary temperature of the air to accomplish, and when it is remembered that hydrochloric is perhaps the most powerful of all the acids in this property of converting cane into grape sugar, though recommended by Parrish and others, its addition for this reason may be considered most injurious. It has been stated in its favour that a syrup, in which part of the phosphoric acid has been replaced by hydrochloric, has a less biting taste, is more mild and agreeable to the palate, and that this acid is useful in preventing subsequent precipitation of the phosphates. That it has these advantages is, I think, open to question, and without doubt a syrup which will not precipitate phosphates, unless after long exposure, and which has a mild and pleasantly acid taste, may be made by using tribasic phosphoric acid alone.

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* We have here an approach to the *depth of colour* which, in medicinal compounds, is so much appreciated by the public, and which seems to be regarded, by the hospital patient more especially, as an indication of efficiency and strength.

† Read at an evening meeting of the North British Branch of the Pharmaceutical Society of Great Britain, March 30, 1876.

With the view of more definitely determining the relative action of the two acids on cane sugar, I prepared a simple syrup of nearly double B. P. strength, and added ten per cent., by measure, of the acids; the hydrochloric acid of sp. gr. 1·16, and the phosphoric of sp. gr. 1·5, and to a third specimen, phosphoric acid of sp. gr. 1·75. In both the latter instances the results were almost identical.

A few minute crystals of cane sugar had begun to form before the addition of the acid, on account of the concentrated state of the syrup, and in that to which the hydrochloric acid was added these crystals almost immediately dissolved, showing that the usual and characteristic change of the crystallizable cane sugar or sucrose, $C_{12}H_{22}O_{11}$, into uncrystallizable inverted sugar or lævulose, $C_6H_{12}O_6$, had almost immediately taken place; a yellow tint was also quickly communicated to the syrup. The change in course of time advanced till grape sugar (dextrose), $C_6H_{12}O_6,H_2O$, formed in such abundance as to separate in crystals, and in two months from mixing had solidified the syrup, the tint having become much deeper meantime. Yet, still further, the change advanced till in six months more it was found that the crystals had partially disappeared and blackening taken place, which final phase is due to the formation of caramel, or more correctly ulmin and ulmic acid, an examination of the black mass beneath the microscope revealing the fact that it consists of colourless, half-dissolved crystals in a dense dark brown medium. On the other hand, the syrup to which phosphoric acid had been added remained almost unchanged in appearance for some weeks, the minute crystals of cane sugar before alluded to taking that time to disappear; then it acquired a slightly yellowish tint which did not much increase with time, and at the end of eight months it showed no more change to the eye than did the other almost immediately on mixing it with the hydrochloric acid. In twelve months, however, on the approach of colder weather a few warty tufts of sugar appeared on the sides of the bottle which have since increased in abundance, though even now, sixteen months from the time of mixing, though the tint is dark, no signs of blackening are observable as with the hydrochloric acid. These experiments I think prove that hydrochloric acid in solution of cane sugar promotes in a very marked degree this change which it is our aim to hinder.

In the formula for compound syrup of phosphates given in the last edition of Parrish's 'Pharmacy,' the quantity of sugar ordered is two pounds eight ounces (troy) for twenty-three fluid ounces of phosphate solution. This quantity of sugar is about equal to thirty-five ounces avoirdupois; and taking into consideration the relative solubility of cane and grape sugar,—a permanent syrup of the former demanding half its weight of water, while the latter takes three times that proportion to effect a solution,—this proportion, thirty-five ounces of sugar to twenty-three ounces of phosphate solution, though less sugar by nearly five ounces than was ordered in the original formula, has been found in practice to slightly exceed what can be safely employed. To ensure permanence the specific gravity of the finished syrup should not exceed 1·33. The samples of Squire's "Parrish" which I have tested, have been under this, never exceeding 1·32, which is a good density. Some years ago, however, the specific gravity was considerably higher.

To restore syrup in which this precipitate has formed, it is only necessary to reduce the density so that the syrup shall contain water enough to retain the whole of the sugar in solution. The syrup containing the precipitate should be exposed, in close vessels, to such a temperature, carefully moderated, as will thoroughly redissolve the sugar, and then a solution containing four grains ferrous phosphate and sixteen grains tricalcic phosphate in each fluid ounce of aqueous phosphoric acid should be added in such quantity as the original amount of the precipitate and the circumstances we have just been considering will suggest, and though then somewhat thinner, that is poorer in sugar, it will not have been impoverished of its active ingredients.

It has been suggested that the higher density of the syrup may be retained and reprecipitation prevented by another process. Taking advantage of the power of changing sugar possessed by acids, it is found that by exposing the syrup in close vessels (to prevent access of atmospheric oxygen, for a reason which I shall by and by refer to), to a temperature approaching 160° F. for some considerable time, the grape sugar is redissolved and rendered uncrystallizable, so that the syrup has the same appearance, as far as density is concerned, as when originally prepared; but I have found by experiment that the grape sugar slowly reacquires its power of crystallizing, so that though a syrup thus treated may keep unchanged a few months, it ultimately begins to deposit sugar, which deposit goes on increasing till it has attained its original bulk.

Before passing from this part of our subject, it would not be out of place to mention that the quality of the sugar has much influence on the readiness with which it crystallizes, and that sugar from beetroot, now so abundant in our markets, should be avoided, not because beet sugar, when pure, is different from cane, but because the commercial article is more liable to be contaminated with saline and other impurities existing in the beet juice.

The sugar of the sugar-cane and beetroot being chemically identical, we have to look to the impurities characteristic of each as a means of distinguishing readily the one from the other. Cane sugar when raw has, in a very marked degree, a peculiarly pleasant saccharine flavour, which we notice also in ordinary golden syrup and treacle, and this flavour can almost always be identified both by taste and smell, even in the most highly refined. On the other hand, raw beetroot sugar has a distinct saline taste, caused by the abundance of potash salts, which are only got quit of by careful recrystallization, and the odour is distinctly offensive, readily developed by rubbing a little in the palm of the hand, and is said to be due to the presence of fusel oil and other products of fermentation and decomposition of the saccharine liquor, when acted on by chemicals (as lime and sulphurous acid) used in the manufacture for purifying and whitening the sugar. This characteristic taste and smell is yet more marked in beet molasses, which is so offensive as to be wholly unfit for human consumption, and is used largely on the continent and has lately been introduced into this country for fattening cattle. It is also quite preceptible in the low class loaf-sugar known as "Dutch crushed," and in this specimen of soft crystallized sugar it is very marked, and I think you will have no difficulty in at once identifying the pure valerianic odour, which may be considered as the result of oxidation by the action of lime and potash on the fusel oil, according to the process given in the earlier editions of Fownes for the preparation of valerianic acid. This offensive smell has, however, been entirely got rid of by some refiners, Say's Paris loaf comparing not so unfavourably with the highest class cane sugars as sent out in loaves by Martineau of London, and in crystals by Finzel of Bristol and others. Beet sugar, however, even when refined, may be distinguished by a trained palate by the absence of what I have termed the saccharine flavour of the cane as well as by the small lustreless crystal of some varieties. Confectioners and others who desiderate a powerfully sweetening and non-crystalliizng sugar, invariably prefer cane as being much superior in these essentials. In impure sugars known in the market as "soft," or "moist," there is always a degree of impurity which dealers know promotes a fermentative change which rapidly reduces the quality of the sugar, and when it is also remembered that an aqueous solution of even the purest sugar undergoes, in course of time, a change into grape, it will be seen how important it is that the use of these inferior qualities, containing in themselves fermentative germs, should be avoided in phosphate syrups.

Another precipitate, quite different in appearance and properties from that we have just been considering, gives annoyance in syrups which contain ferrous phosphate. This precipitate is small in bulk, greyish white in colour, and generally amorphous.

It appears first as a slight cloudiness which ultimately disappears, the precipitate having settled to the bottom as a thin grey layer though sometimes it may have a delicate pink tinge due to the presence of a trace of manganese.

On being washed and dried this grey powder is found to be tasteless and insoluble in water, soluble in hydrochloric and sulphuric acids; the caustic alkalies change it to brown, and a crystal of phosphate of soda added with heat slowly dissolves the brown powder, forming a solution in which yellow prussiate of potash gives a blue precipitate, when hydrochloric acid is added to excess. Under the blowpipe it fuses to a grey or black bead; it is in fact a combination of iron and phosphoric acid, the metal being in the ferric, or what is commonly known as the triad state (Fe''').

In seeking a cause for the formation of this precipitate, it may assist us if we consider the composition of ferrous and ferric phosphates, the latter being $Fe'''_2P_2O_8$, and the former $Fe''_3P_2O_8$; the ferrous salt containing one atom more of the metallic base than the ferric, and to accomplish the conversion of two molecules to the triad state in a solution containing phosphoric acid, three atoms of oxygen are required to dehydrogenize the acid, thus:—

$$2(Fe''_3P_2O_8)+2(H_3PO_4)+3O=3(Fe'''_2P_2O_8)+3(H_2O)$$

You will notice from that equation two important points, that oxygen must be introduced to accomplish the conversion, and that a portion of phosphoric acid which before existed in a free state, for the purpose of holding the ferrous phosphate in solution, combines to form the ferric salt which is less soluble than ferrous phosphate, and leaves the syrup with less free acid for the purpose of keeping it in solution. Unless, therefore, the phosphoric acid is greatly in excess we would expect that this change would result in the precipitation of the newly-formed salt, which actually does take place.

Mr. T. B. Groves* took the trouble to analyse this precipitate, and found it "closely corresponding with Fe_2O_3,PO_5+Aq," old notation, the acid being a little in excess, or converted to the new notation with which we have been dealing, $Fe_2P_2O_8+Aq$, which result is sufficiently distinct to entirely bear out the theory of its formation in phosphate syrups which I have just stated.

It should be noted that though dried "ferrous phosphate" is slate blue in colour, the ferric salt is dirty white.

To examine the exact results of this decomposition we will take the formula for syrupus ferri phosphatis, as given in the British Pharmacopœia. In that formula we have, say, 96 grains ferrous phosphate, held in solution by 5½ ounces of dilute phosphoric acid. This quantity of ferrous salt is found to require 26·28 grains H_3PO_4 to convert it into ferric orthophosphate, which 26·28 grains H_3PO_4 represent 3·21 fluid drachms of dilute phosphoric acid, a loss insignificant as explaining of itself the decomposition of phosphate, especially when we bear in mind that only a small portion of the salt changed from the ferrous to the ferric state is sufficient to produce a precipitate; we must therefore refer the cause to the greater insolubility of the ferric salt as compared with the ferrous. The other point to which I directed your attention was the introduction of oxygen to combine with the hydrogen of the phosphoric acid so that the acidulous radical PO_4 might be free to unite with the iron, and I think I am not beyond the mark when I state that it is the oxygen, from whatever source derived, which is entirely the cause of this deposition of ferric phosphate. The atmosphere is the great oxidizer, and we can readily account for the formation of this precipitate, when we consider the process by which the iron phosphate is prepared, the time required in washing and the proneness of the salt to absorb oxygen; or, to speak more correctly, the energy with which oxygen decomposes ferrous phosphate. It must be borne in mind, that though in syrup, excess of acid being present, we consider that none of the oxygen absorbed goes to form the new salt, supposing it to be ferric or the phosphate $Fe_2P_2O_8$, with the characters of which the precipitate closely agrees, its action being to combine with the basic hydrogen of the phosphoric acid as before stated; yet in the case of still moist ferrous phosphate, no free acid being present, the oxygen is absorbed by and combines with the precipitate, forming a basic phosphate. Phosphate of iron, B.P., when overheated in drying, becomes fawn coloured, approaching the foxy red tint of ferric hydrate.

We may consider for illustration that the decomposition takes place thus—

$$2(Fe_3P_2O_8)+O_3=Fe_2P_2O_8+Fe_2O_3,Fe_2P_2O_8$$

I might here call your attention to some facts which have come under my notice in this investigation, and though not directly concerning the preparation of the syrups from official formulæ, are of much interest.

Ferri phorphas, B.P. (erroneously called ferrous phosphate), one would imagine from its preparation would chiefly consist of ferrous salt; but this is not the case. The B. P. standard requires only 44·75 per cent. of that salt, the greater part in washing and drying having assumed the ferric state, and it would seem from several estimations which I have made that even the B. P. standard, moderate as it is, is beyond the reach of some makers. Of six commercial samples, two only were of standard composition, the ratio being as follows:—B. P., 44·75 per cent.; No. 1, 46 per cent.; No. 2, 46 per cent.; No. 3, 38·7 per cent.; No. 4, 36 per cent.; No. 5, 34·3 per cent.; No. 6, 20·7 per cent. The last as low as 20·7 per cent., or less than half the quantity of dyad iron it ought to contain. This is of importance from a therapeutic point of view, as it is a recognized property of certain ferrous salts that they are more easily assimilated, and act more powerfully than ferric; but it is with the chemical peculiarities only we have at present to do, and the inference I would have you draw from what has just been stated is, that ferri phosphas, B. P., of commerce, though frequently recommended for the preparation of these syrups, is quite unsuited for that purpose, it being impossible to dry the salt in the way of ordinary manufacture without a great proportion being converted into a ferric phosphate. The B. P. standard of quality can readily be exceeded with rapid and proper manipulation, as in this specimen, 20 grains of which take 330 grain measures of volumetric solution of bichromate of potash for conversion instead of 250, and is equal to 59 per cent. of ferrous phosphate.

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* *Pharmaceutical Journal*, vol. xi., second series, p. 138.

To return to the syrup. On estimating the quantity of changed phosphate necessary to produce this ferric precipitate, it is found to be exceedingly small, so that to prevent it entirely the greatest care in preparation and storing is necessary. The first source of oxygen is of course the water in which the iron and soda salts are dissolved; this water, and likewise that used to wash the precipitate, should be well boiled to expel dissolved oxygen; the sulphate of iron should be pure and free from ferric oxide, the clear crystals only of the phosphate of soda selected, and the whole operation conducted as rapidly as possible, the soda being poured into the iron solution and the resulting precipitate washed by decantation, which is easy if certain precautions which I shall by and by specify are attended to. The presence of a sulphate in the syrup (from imperfect washing of the phosphate) will not produce the ferric precipitate; but a nitrate, chlorate, or such oxidizing salt will do so in a short time, therefore, any possible contamination with such a salt should be studiously guarded against.

Regarding the several processes for the preparation of the iron phosphate we may first consider Parrish's formula, and in laying before you now the results arrived at after numerous experiments, I am not unmindful of a paper read at the March meeting of the Society in London, by Mr. Rees Price, in which he forestalls me in publication in one or two conclusions, and states his own method of obviating waste of phosphate in the B. P. processes; but our conclusions, though somewhat parallel, have been arrived at by methods differing so considerably that I think it better to lay before you my results as written several months ago, but which the nomadic character of my occupation has prevented me reading at an earlier date. Parrish's formula, then, orders ten drachms sulphate of iron and twelve drachms phosphate of soda. In these quantities the metal and phosphoric radical occur almost in such proportions as would form diferrous phosphate, $Fe''_2H_2P_2O_8$ (which may have been the theory of the framer), but as triferrous phosphate is produced the excess of phosphate of soda serves only to further precipitate the iron salt, which, however, is in great part still held in solution by the sulphuric acid set free as shown in the equation—

$$3(Fe''SO_4) + 2(Na_2HPO_4) \\ = Fe''_3P_2O_8 + 2(Na_2SO_4) + H_2SO_4.$$

This free sulphuric acid, unless neutralized, prevents the precipitation of the ferrous phosphate, and though a definite weight of ferrous sulphate be employed, yet from this and other causes, the iron which finds its way into the syrup is too often an unknown quantity. In proof of this, from the supernatant liquor of ten drachms sulphate of iron, and twelve drachms phosphate of soda (the quantities in Parrish's formula) and equal to 257 grains triferrous phosphate, I recovered 77 grains, showing a waste of 30 per cent.

The B. P. process for the preparation of ferri phosphas is apparently more perfect; an equivalent of acetate of soda being added which is decomposed by the free sulphuric acid just alluded to, and acetic acid liberated in which, according to the text books, the phosphate is insoluble. This in practice is found not to be the case. From the supernatant liquor of the quantity given in the Pharmacopœia formula for ferri phosphas, the iron in which ought, theoretically, to yield 563 grains, $Fe''_3P_2O_8$, I recovered 125 grains, equal to a loss of 22 per cent. It should be noted, however, that bulk of liquids, temperature, and mode of mixing influence to some extent the waste by these processes.

It was suggested by Schweitzer, in 1860, to use carbonate of soda instead of acetate, carbonic acid escaping on the decomposition taking place. I find it best to add gradually with constant stirring the carbonate solution to the previously mixed iron and soda liquors, and this seems to be the best, at least the most practical and economical process. From the B. P. quantity, again, but having substituted 260 grains bicarbonate of soda for one ounce acetate, the quantity of iron found in the mother liquor was only equal to 4·29 grains $Fe''_3P_2O_8$, or a percentage loss of 0·76, which is scarcely worth reckoning and is due to the fact that the phosphate is soluble to a small extent in aqueous solution of carbonic acid.

Solution of ammonia has also been recommended, and is added carefully to the mixed iron and soda solutions till the liquor is neutral, but ammonia requires to be used with great caution, as, if in excess, it abstracts the acid from the phosphate, and the result, on the slightest exposure, is more or less contaminated with a basic salt. The only superiority of this method is, that by it almost the last trace of iron can be thrown down, which, considering the usually unsatisfactory precipitate, is a questionable advantage.

Mr. Price's suggestion of greatly increasing the quantity of phosphate of soda used, and discarding the acetate altogether, seems to be a good, though certainly not an economical, method, and like the carbonate process just stated, by it we can reckon on producing a tolerably exact quantity of phosphate from a certain weight of ferrous sulphate.

In precipitating ferrous phosphate it is necessary to observe several precautions in order to get a satisfactory product, and as the operation requires some exactness, I shall endeavour to state as precisely as possible what I consider the causes, which, as all who have had much experience in the preparation of this article know, lead to such confusing results; at one time, a bulky precipitate being obtained, and at another the same chemicals and seemingly the same manipulation resulting in a dense white phosphate, which, while moist, may perhaps not occupy more than one-tenth the bulk of the former.

When the iron and soda salts are dissolved in cold water, and mixed still cold, the precipitate is at once greenish and gelatinous, and practically will not subside unless after long standing. A phosphate thus prepared must therefore be washed on a filter.

When the solutions before mixing are brought almost to the boiling point (above 180° F.), a dirty white precipitate is thrown down, and when the soda has been nearly added, the whole may solidify into a stiff pasty mass, even when a considerable quantity of water has been used for solution. The mixture in a short time becomes again liquid, but the precipitate is bulky, and to some extent gelatinous, and will not at once wash by subsidence.

If again the temperature of the solutions previous to mixing be about 130° F., and the soda very gradually poured into the iron with constant stirring, the precipitate formed will be nearly white, the true colour of recent ferrous phosphate, and when the precipitation is complete the phosphate will subside in two or three minutes, and can be thoroughly washed by decantation in little more than half an hour. It may then be thrown upon a calico filter and easily deprived of the rest of the water by pressure with the hand or in a screw-press, very little of the phosphate passing through the cloth, and the whole operation being conducted so rapidly the white colour of the phosphate will scarcely have changed. There should be at least one gallon of water for every pound of sulphate of iron, an equal quantity being used for the soda; it should be boiled some time (to expel oxygen) and the salts dissolved in it while still nearly boiling, which will reduce the temperature to about 130° F., on noting which the precipitation may be at once proceeded with. I am not prepared to state the extremes of temperature within which this granular or curdy precipitate may be obtained, but it seems quite safe from 100° to 135° F. It is most satisfactory in being readily soluble in the acid, and as it is easily dried, this method is specially suitable for the preparation of the B. P. ferri phosphas, there being little difficulty in turning out a dry phosphate of over 50 per cent. ferrous salt, which I have found almost impossible working at other temperatures.

But further attention to certain minutiæ is necessary to ensure a perfectly satisfactory result. It is in the preparation of the dry ferri phosphas that the advantage of pouring the soda into the iron becomes apparent, as a higher ferrous percentage is thus obtained than when the order of mixing is reversed. This is especially noticeable when carbonate of soda is used. For example, the result of pouring the iron into the mixed soda solutions gave a greenish precipitate, containing 32 per cent. ferrous salt; while prepared as before stated, by adding the phosphate of soda to the iron, and then the bicarbonate, the product showed 51 per cent. of ferrous phosphate. This proneness to oxidize is evidently not caused by the precipitation of carbonate of iron with the phosphate; but the precipitate being thrown down from an alkaline solution is doubtless due to the formation of a basic phosphate even less stable than the ordinary salt. I think bicarbonate of soda is to be preferred to the neutral carbonate, as it can more easily be had pure, and as it contains no water of crystallization the equivalent is much less, and it is, considering this, the least costly of the two salts. It has a further advantage, that there is not the same risk of damaging the phosphate should a slight excess be added, it being best to precipitate phosphate of iron from an acid solution; and commercial carbonate of soda not infrequently is contaminated with the caustic alkali.

It will be seen, on considering what has just been stated, that to produce a certain quantity of phosphate of iron of definite composition, considerable care must be taken that the material be neither changed nor lost; and if we remember that there have been few formulæ more modified than Parrish's, it is not astonishing to find in "chemical food," as commonly met with, a considerable diversity of iron strength.

The result of the estimations of nine samples I put before you, and the figures are at least interesting if they are not reassuring.

Perfect Syrup supposed to contain 1 *grain Ferrous Phosphate per fluid drachm.*

	Specific gravity.	Fluid percentage of HCl, sp. gr. 1·16.	Direct volumetric indication of $Fe_3.P_2O_8$.	Total Iron (actual weight) calculated as $Fe_3P_2O_8$.	Phosphate of Lime. (Indefinite.)
1	1·306	0·685	0·648 gr. per fld. dr	·425 gr. per fld dr	0·82 gr. per fl. dr
2	1·325	0·384	0·648 ,, ,, ,, ,,	·469 ,, ,, ,, ,,	1·65 ,, ,, ,,
3	1·324	2·198	0·469 ,, ,, ,, ,,	·290 ,, ,, ,, ,,	0·66 ,, ,, ,,
4	1·320	none.	0·514 ,, ,, ,, ,,	·447 ,, ,, ,, ,,	1·37 ,, ,, ,,
5	1·324	3·396	0·738 ,, ,, ,, ,,	·492 ,, ,, ,, ,,	0·58 ,, ,, ,,
6	1·332	0·850	1·118 ,, ,, ,, ,,	·984 ,, ,, ,, ,,	2·20 ,, ,, ,,
7	1·330	none.	0·760 ,, ,, ,, ,,	·514 ,, ,, ,, ,,	1·11 ,, ,, ,,
8	1·310	1·370	0·478 ,, ,, ,, ,,	·447 ,, ,, ,, ,,	1·12 ,, ,, ,,
9	1·330	none.	0·895 ,, ,, ,, ,,	·602 ,, ,, ,, ,,	1·10 ,, ,, ,,

The direct volumetric indication of $Fe_3P_2O_8$ in the first iron column is with solution of bichromate of potash in the usual way, having previously acidulated the syrup (1 oz.) with one fluid drachm phosphoric acid, sp. gr. 1·5, and it will be seen from the table that the results of this direct estimation are entirely unsatisfactory, there being a great variation between this indication of the syrup and the true quantity of iron present. This is due to the reducing action of the grape sugar on the bichromate, it acting the part of the ferrous salt in the estimation. It will be observed that the variation is by no means constant. No. 8 shows an increase on account of the sugar of about 7 per cent., while No. 7 is too high by 47 per cent. The cause of this is that cane sugar does not reduce the bichromate, but invert and grape sugar do so at once, and from the discrepancy in the indications we can, to some extent, trace the history of the syrups. Hydrochloric acid rapidly changes cane sugar, as I have already shown, and in some of the syrups containing that acid we find a considerable difference between the figures in the two columns. No. 8 is evidently a very new syrup which has been prepared without heat, while No. 7 no doubt has sustained exposure to a high temperature, during which the phosphoric acid has inverted a quantity of the sugar.

Prolonged exposure to the action of the acid in the cold would have the same effect, but I judge that this No. 7 syrup is not old, because of the absence of the ferric precipitate which would have shown itself had such been the case. No. 6 is evidently a syrup made, not according to Parrish's published formula, but upon the basis of the generally accepted statement of strength to which it very nearly approaches.

All contained tribasic phosphoric acid only, in none could the monobasic or glacial acid be detected, and the syrup which is known as the "genuine" or "original" contained no hydrochloric acid. It will further be seen on reference to the table that the syrups, with one exception, do not approach the strength commonly supposed. Squire states in his 'Companion' that Parrish's Chemical Food "contains in every fluid drachm, 1 grain phosphate of iron and 2½ grains phosphate of lime," and Parrish's own words, as given in his 'Practical Pharmacy,' are "each teaspoonful contains about 2½ grains phosphate of calcium and 1 grain phosphate of iron;" and in another part of the same work he states that "a teaspoonful is equal to 1 fluid drachm." But between the product of his formula and these statements there is a glaring discrepancy, which is confirmed on examination of the syrup sent out in this country under the guarantee of his name.

In Parrish's formula there are ordered 10 drachms sulphate of iron, which would produce 257·5 grains triferrous phosphate were none wasted in the process, and we may consider the finished syrup to measure 45 fluid ounces, or 360 fluid drachms. It is clear that 257·5 grains ferrous phosphate in 360 fluid drachms cannot possibly give more than ·715 grain per fluid drachm, and if we deduct 77 grains waste as before shown, we have almost exactly half a grain (·501) per fluid drachm, which even exceeds the quantity I have found in the guaranteed syrup. The lime strength again is wrongly stated. Twelve drachms phosphate of calcium, equal 720 grains, in 360 fluid drachms of syrup is exactly 2 grains per fluid drachm, so that to say that Parrish's syrup contains ½ grain ferrous phosphate and 2 grains tricalcic phosphate per fluid drachm, would state the strength in precise language, and more nearly accord with fact.

To obtain with certainty this definite iron strength without waste of material, I would recommend the substitution of the following for the 10 drachms sulphate of iron and 12 drachms phosphate of soda at present in the formula :—

Sulphate of Iron	7½ drachms
Phosphate of Soda	6½ drachms
Bicarbonate of Soda . . .	1½ drachms

proceeding with the precipitation according to the structions already given. These quantities for 45 fluid ounces of finished product will result in a syrup containing ½ grain phosphate per fluid drachm, or the same strength as produced by Parrish's wasteful formula.

The figures in the second iron column, representing the total iron, were arrived at by a somewhat intricate and laborious process and the iron weighed as peroxide, but since completing most of these analyses, I have adopted a simpler and I think also more accurate method. I take one fluid ounce of the syrup, and dilute with 4 ounces of water, precipitate with ammonium sulphide, collect and wash the precipitate, which contains, besides all the iron as ferrous sulphide, greater part of the lime. This black precipitate, when quite freed from sugar, is treated with dilute hydrochloric acid and the solution boiled in a flask till the sulphuretted hydrogen is completely expelled, taking care to prevent oxidation afterwards. The liquor will contain all the iron as ferrous chloride and when cool may be estimated with the volumetric bichromate, taking the precaution to first prove the absence of ferric salt with sulphocyanate of potassium. Each 28 grain-measures (27·93 exactly) required indicate 1 grain ferrous phosphate per fluid ounce of syrup.

It may be instructive to our younger students to trace the iron through this process, which I shall endeavour to do in a few words. In the syrup it exists both as ferric and ferrous phosphates, though in greater part the latter, both of which salts are precipitated as ferrous sulphide by the sulphydrate of ammonium, the former accompanied with separation of sulphur, thus—

$$Fe_2P_2O_8+4(AmHS)=2(FeS)+2(Am_2HPO_4)+H_2S+S$$

while with the ferrous salt sulphuretted hydrogen only is set free—

$$Fe_3P_2O_8+4(AmHS)=3(FeS)+2(Am_2HPO_4)+H_2S.$$

The sugar is then washed away, and the precipitate treated with dilute hydrochloric acid, which dissolves the sulphide with evolution of sulphuretted hydrogen. Thus—

$$FeS+2\,(HCl)=FeCl_2+H_2S,$$

which H_2S again reduces to the ferrous state any sulphide that may have become oxidized in the exposure of washing. But the sulphuretted hydrogen has the property of reducing the bichromate, and would affect our calculation; it must, therefore, be expelled by boiling, not in an open basin, in which the ferrous chloride might become changed to the ferric salt, and in the opposite direction vitiate our estimate, but carefully in a small flask nearly full. Entire expulsion of the sulphuretted hydrogen will be indicated when the escaping vapour ceases to blacken sugar of lead paper, and the bichromate solution may now be run in from the burette.

The reaction of ferric salts with sulphocyanate of potassium is very delicate. The iron liquor, which at first will give no colour, gives a distinct red with a single drop of each in a plate after five grain measures of the bichromate have been added. Sulphuric acid would be preferable for dissolving the ferrous sulphide, in respect that ferrous sulphate is less liable to peroxidize by exposure than chloride; but hydrochloric acid has the greater advantage of readily dissolving all the lime, and likewise almost discharges the pink colour of the cochineal, which is carried with the precipitate, and which would interfere with the delicacy of the reaction with the sulphocyanate.

The lime column I append to the table simply to show the variation in strength, and the figures are not to be taken as indicating exactly the full quantity of lime in the syrup, which is difficult to separate completely from solutions containing sugar, and for the more exact estimation of which I have not had time at my disposal. The precipitates were obtained with ammonia, and allowance made for the iron, and the quantities are under what I consider the syrups contained.

A process for the preparation of phosphate syrups, which in results as far as freedom from ferric contamination is concerned is superior to the old method of dissolving the precipitated phosphate, was put forward lately by Mr. H. W. Jones.* The process consists in dissolving pure metallic iron in phosphoric acid to saturation, and estimating volumetrically, then reducing to standard strength, and adding a proper proportion of phosphoric acid. The estimation in this process I find to be quite unnecessary, as the exact quantity of iron and acid may be at once put together, and if the metal be the best charcoal wire or plate the amount of impurity is so small as scarcely to be worth reckoning. If the iron be in the form of filings it will dissolve in a mixture of equal parts of acid, sp. gr. 1·5, and water in about five hours, while the smallest wire (No. 36) will take at least as many days. Some authorities hold that diferrous phosphate, $Fe_2H_2P_2O_8$, is formed by this process, but others (see 'Watt's Dictionary,' vol. iv., p. 564) state that it is the triferrous salt. A formula for syrupus ferri phosphatis, B.P., on this basis would be—

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* *Pharm. Journ.*, 3rd series, vol. v., page 541.

Iron	38 grains.
Phosphoric Acid sp. gr. 1·5 .	6 fluid drachms.
Water	6 fluid drachms.
Syrup	8½ fluid ounces.

Mix the phosphoric acid with the water, and dissolve the iron in the mixture, plugging the mouth of the flask with cotton, then filter, and add to the syrup. Contains one grain ferrous phosphate in each fluid drachm.

The advantages of this process are that the phosphate solution may be prepared entirely out of contact with the air except during the short time occupied in filtration. As the simple syrup is prepared by heat there is left little chance of access of oxygen, and if the product be at once put into bottles and sealed, it will be found to keep perfectly free, both from precipitate and colour for almost an unlimited time. One specimen, over a year old, has no precipitate, and the tint is so slight as to be invisible by gas light.

Ordinary iron is unsuitable, as it contains besides a large percentage of carbon (as graphite), a quantity of sulphur, derived chiefly from the coal used in smelting, which communicates an offensive smell to the solution. Swedish or Norwegian iron, smelted with charcoal, and known as "charcoal iron" is most suitable for such purposes.

It would be an improvement in Parrish's process if the phosphate solution were prepared in so concentrated a state that a sufficient quantity of water could be reserved to dissolve the sugar to which, when cold, the phosphate solution would be added; yet in practice this is somewhat troublesome, and the alternative plan of dissolving the roughly powdered sugar in the cold phosphate solution by mixing and subsequent percolation if necessary is usually followed.

If I have not already exhausted your patience, I would make but one more allusion to this iron precipitate before passing on to shortly consider our third and last. I stated that it is generally deposited in an amorphous condition, though sometimes evidence of a crystalline structure is evinced by its forming a cake at the bottom of the bottle and also by a roughish granular appearance on the sides. I have examined many precipitates under the microscope, and have found the regular hexagonal plates, to be the characteristic crystalline form, and am pleased to be able to show you the crystals under the microscope, which you will have an opportunity of examining at the close of the meeting.

When the syrup contained no hydrochloric acid and no great excess of phosphoric the precipitate was invariably amorphous, but where hydrochloric acid was in considerable excess I found the irregular crystals developed to a large size which being transparent do not make much appearance in the syrup when precipitated, while the amorphous deposit from its opacity is, when even in very small quantity, only too visible. With excess of phosphoric acid again, though I found the crystals in some cases so exceedingly minute as to be with difficulty made out with a $\frac{1}{8}$ inch objective, in other samples they have attained a comparatively large size; when the vitreous lustre and mathematical exactness of the hexagon makes them a most beautiful object with the higher powers.

Another crystalline form of iron phosphate is occasionally met with in ferri phosphas, B. P. It takes the form of rhomboidal plates, sometimes so exceedingly minute as to pass through filter paper. My attention was first directed to them by observing, when dissolving certain phosphates in dilute acid, a transient silky, lustrous appearance exhibited by the solution when agitated. The crystals may be examined by placing a minute drop of dilute hydrochloric acid on the microscope slide, and adding as much of the phosphate as may be lifted in the eye of a sewing needle; the acid dissolves most rapidly the amorphous portion of the phosphate, and if the slide be placed quickly beneath the instrument, the crystals will be found to shine out at once. In these crystals we have the key to the superiority of the white granular phosphate precipitated at 130° F. On examination it is found to consist almost entirely of minute crystalline granules or clusters of prisms interspersed with rhomboids. When, however, the precipitate is at first gelatinous, as when made at other temperatures, either higher or lower, after some hours it granulates, but the crystallization taking place much more slowly, we have larger crystals and chiefly rhomboids We can thus understand how by making certain of the formation of this crystalline the phosphate can be much more easily washed, and is less prone to oxidation than the bulky amorphous precipitate will be.

We pass now to the third precipitate, which consists of phosphate of quinine and occurs in Easton's syrup. It usually appears a few days after making, and though occasionally attaching itself to the sides of the vessel, in which position the characteristic tufts of radiating acicular crystals can easily be made out, it often shows itself in the body of the syrup, not unlike vegetable humus, or little flocks of cotton wool floating about. This crystallization once commenced may go on till the syrup is entirely solidified, and though the crystals may be redissolved by heat, yet after a time they invariably again separate, even when a quantity of phosphoric acid is added. In the diagram you have the appearance of this precipitate under the microscope; being lifted from the syrup on the end of a glass rod, the radiating character of the arrangement is lost, and we have merely a confused bundle of minute needles.

The cause of this separation of quinine is somewhat obscure. It seems never to form in a syrup, which is quickly made, and neither the quinine solution nor the syrup exposed as in filtration. It has struck me as curious that some pharmacists, whose process for making this syrup is simply "mix and shake," are "never troubled with it, and can't understand how any one should be;" and several others, whose recognized aim is to send out articles in speckless perfection, not unfrequently are annoyed to find their care result in such an unsightly product. Of the several samples shown, some of which I prepared specially for illustration, all that have crystallized were filtered through paper, either before or after mixing the phosphate solution with the syrup. In syrups prepared without the exposure of filtration, I have never known this precipitate to form.

The best method of rectifying this separation is to expose the syrup to as low a temperature as possible, to permit the crystallization to proceed to its utmost limit, then separate the precipitate on a calico filter, in which, with pressure, it can be well freed from the syrup. This pasty mass is then treated with a little water, in which it is soluble, and a small quantity of citric acid added, to prevent precipitation of any ferric salt; then the quinia precipitated with ammonia, washed, dissolved in phosphoric acid, and added to the syrup, which meantime has been carefully and as rapidly as possible filtered through paper. Without reprecipitation it seems almost impossible to keep the quinine in solution.

The lime in compound phosphate syrup gives no trouble when once dissolved, and the syrup not subsequently heated, this salt being less soluble in hot than in cold sugar solution; but tricalcic phosphate of commerce, besides containing a large percentage of water, is sometimes difficultly soluble. To overcome this character of phosphate from bones, it has been recommended to prepare it by saturating hydrochloric acid with quicklime, and adding this liquor of chloride of calcium to solution of phosphate of soda. The phosphate thus produced is, however, the dicalcic $Ca_2H_2P_2O_8$, though boiling the precipitate in the supernatant liquor converts it, in part, into the tricalcic salt. The production of the latter seems to be better attained, as stated by Warington,* by pouring the calcium chloride gradually into solution of disodic phosphate, to which an equivalent of ammonia (or soda) has been added, taking care to keep the alkaline phosphate in excess during precipitation. The decomposition may be thus represented:—

$$3\,(CaCl_2) + 2\,(Na_2HPO_4) + 2\,(AmHO)$$
$$= Ca_3P_2O_8 + 4)NaCl) + 2\,(AmCl) + 2\,(H_2O).$$

If phosphate of soda and potash instead of carbonates were ordered in Parrish's formula it would tend to the perfection of the product.

The acid which is now almost universally used instead of the monobasic or glacial is the tribasic, it being akin to the tribasic salts to be held in solution, besides having greater solvent power. It is met with of sp. gr. 1·5 and 1·75, and the former should have a percentage of P_2O_5, nearly 50 per cent. by weight, which is easily remembered. But though the density be correct, the acid strength is sometimes not up to the standard; alkaline phosphates are the usual important impurities. Ammonia can readily be detected by dropping a piece of caustic potash into a test tube containing the suspected acid; the volatile alkali can then be dentified by holding a piece of moistened turmeric paper in the vapour which rises from the violent reaction. Soda may be separated by boiling excess of chalk with the acid and evaporating the iltrate.

I have failed to detect ammonia in samples of commercial acid, but a small percentage of soda I have found not uncommon. This residue from 250 grains of 1·5 acid, consisting chiefly of soda, would represent 4·3 per cent. monosodic phosphate NaH_2PO_4 in which state it exists in the acid.

Glacial phosphoric acid in Parrish's syrup may be detected by dropping a little into solution of albumen. Should the syrup be in excess no precipitate is formed.

Nitrate of silver added to Parrish's syrup for the detection of hydrochloric acid produces no precipitate unless that acid be present; the free phosphoric acid of the syrup preventing the precipitation of the phosphate of silver formed. The precipitate of chloride of silver is insoluble in nitric acid.

The samples of the "genuine" syrup I have examined contain no hydrochloric acid and it is somewhat astonishing to find this acid so frequently occurring in the specimens submitted to examination and which I think are fairly representative samples.

We come at last to the final change that I mean to touch upon and which I shall do but shortly, that is, the discoloration. In Parrish's syrup the cochineal disguises any moderate brown tint, but in Easton's and B.P. phosphate of iron syrup it gives considerable annoyance. Nitric acid in the phosphoric acid and acetic acid from the acetate of soda have each been charged as responsible for this change, but we must again turn to the atmosphere as the chief cause. If the syrup be carefully prepared and at once bottled and sealed, it would seem to keep almost colourless for a very long time; but exposure to the air is quickly followed by a brown colour appearing on the surface and rapidly extending downwards through the whole bulk. This has been referred by some to the formation of caramel, and the experiments with the large percentage of acid and strong syrup would seem to favour this theory, which is further borne out by the fact that part of the colour is discharged by filtration through animal charcoal. But the greater depth of tint unless in very old syrups is due to a yet undefined change which takes place in the iron salt and is brought about by the action of atmospheric oxygen no doubt in somewhat the same manner as noticed in alluding to the basic salt formed in the dry phosphate.

The proper preventive is to secure all syrups containing ferrous phosphate in such a way as to exclude atmospheric air. And as to a remedy, as no practical one has yet been suggested, this may be referred as a fit subject for the exercise of the ingenuity of some pharmacist of the future.

It has been suggested that the solution of phosphate should be kept separate from the syrup and mixed as wanted, and this in some quarters has met with considerable favour. But unless the solution be kept carefully in closed vessels, it is even more liable to become per-oxidized in this form than when mixed with the syrup, and when per-oxidation has taken place to any extent the ferric precipitate is sure to form in a few days after mixing the iron liquor with the syrup.

In laying before you the results of these experiments and observations, lengthy and prolix as I fear you may consider them, I trust they may be of some practical value, I feel that I have been only pottering on the very borders of the subject, that what I have done has but the more strongly impressed me with the extent of what has yet to be decided, and that there exists in these phosphates a rich and tempting field, well worthy the attention of the most ambitious labourer.

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* *Journal Chemical Society*, 1873, p. 983.

BROMIDES AND HYDROBROMATES.*

BY CHARLES BULLOCK.

When bromine is united direct with the caustic alkalies it plays the same part as iodine and chlorine, forming five parts of bromide and one of bromate.

The most important of the bromide compounds is the potassium salt. By the United States Pharmacopœia bromide of iron is first formed, and the ferrous bromide decomposed by carbonate of potassium. The British Pharmacopœia directs its preparation by the union of bromine with caustic potash. The bromate formed during the process is reduced to bromide by subsequent calcination of the product with charcoal.

Of the two processes, the British offers the advantage of avoidance of a tedious washing of the precipitated carbonate of iron, and a long evaporation.

The bromide of potassium, now so extensively in use, is made by the manufacturers on a large scale by the process of the British Pharmacopœia.

The alkaline bromides, other than of potassium and sodium, can readily be prepared by the process of Ferdinand F. Mayer, described in his paper "On Alkaline Iodides and Bromides," published in the *American Journal of Pharmacy*, 1862, vol. xxxiv., p. 289. The action of ferric iodide and bromide with alkaline carbonates, whether the carbonates are soluble or insoluble, gives rise to alkaline iodides and bromides; while the presence of an excess of iron causes the reduction of the oxygen acids (if formed). The products are free from iodates and bromates. I have repeatedly used the process of Mr. Mayer with success and satisfaction.

In the preparation of bromides of iron, zinc and cadmium, there is no difficulty experienced, bromine uniting, as it does directly, with these metals. In the case of cadmium the union of the elements is slow, and time has to be allowed to perfect the process.

Bromide of ammonium is directed by the United States Pharmacopœia to be prepared by decomposition of ferrous bromide of ammonia water. Mr. Charles Rice, in the *American Journal of Pharmacy* for 1873, vol. xlv., p. 249, describes a process for the preparation of this salt by the decomposition of bromide of potassium by sulphate of ammonia. The sulphate of potassium formed is rendered more insoluble by the addition of alcohol. The process described Dr. Wilson H. Pile for making this salt, published in the 'Proceedings of the American Pharmaceutical Association for 1874,' p. 434, affords a ready method for its production. The author states that no bromide of nitrogen is formed, and that the product is free from bromate.

For the *extemporaneous* preparation of bromides, there is no process more satisfactory than the decomposition of bromide of barium by a sulphate of the base desired, when that sulphate is soluble. Bromide of barium is readily prepared by the process of Mr. Mayer, before alluded to.

It is desirable, however, to utilize some bromine salt in common use for this purpose. Bromide of potassium offers this advantage; and, if the bromide to be obtained is soluble in dilute alcohol, the product will be almost entirely free from impurity. The process is based on the sparing solubility of sulphate of potassium in dilute alcohol, one fluid ounce of dilute alcohol taking up only 1·02 grains, equal to about 0·25 per cent. of sulphate.

The literature of the bromides of the organic bases is very scant, and experiments had to be made to determine their character, with the following results:—

Hydrobromate of cinchona crystallizes in prismatic needles. 100 parts of water, at 70° F., take up 5·6 parts of the salt. It is sparingly soluble in alcohol, and dissolves readily in dilute alcohol.

Hydrobromate of morphia crystallizes in prismatic needles. 100 parts of water, at 70° F., take up 9 parts of the salt. It is sparingly soluble in alcohol, and dissolves readily in dilute alcohol.

Hydrobromate of quinia crystallizes in prismatic needles, having a disposition to arrange themselves in rosettes. 100 parts of water, at 70° F., take up 2·1 parts of the salt. It is sparingly soluble in alcohol, and dissolves readily in dilute alcohol.

Bihydrobromate of quinia crystallizes in cubical plates. 100 parts of water, at 70° F., take up 33·7 parts of the salt. It is sparingly soluble in alcohol, and dissolves readily in dilute alcohol.

Hydrobromate of strychnia crystallizes in prismatic needles. 100 parts of water, at 70° F., take up 3·2 parts of the salt. It is sparingly soluble in alcohol, and dissolves readily in dilute alcohol.

All of the aforementioned bromides of the organic bases being soluble in dilute alcohol, the following formulas for their manufacture yielded satisfactory results:—

Hydrobromate of Cinchonia.

℞.—Cinchoniæ Sulph. . . .	36·6 grains.
Potassii Bromid. . . .	11·7 „

Dissolve the cinchoniæ sulph. in one fluid ounce of warm alcohol, and the bromide of potassium in one fluid drachm of water. Mix the solutions; filter from the precipitated sulphate of potassium; add one and a half fluid ounces of water to the alcoholic filtrate, evaporate, and crystallize.

Hydrobromate of Quinia.

℞.—Quiniæ Sulph.	43·6 grains.
Potassii Bromid. . . .	11·7 „

Dissolve the quiniæ sulph. in one fluid ounce of warm alcohol, and the bromide of potassium in one fluid drachm of water. Mix the solutions; filter from the precipitated sulphate of potassium; add two fluid ounces of water, evaporate, and crystallize.

Bihydrobromate of Quinia.

℞.—Quiniæ Sulph.	43·6 grains.
Potassii Bromid.	23·4 „
Acid. Sulph. Dil. (U. S. P.) .	gtt. xxxv.

Dissolve the quiniæ sulph. in half a fluid ounce of water, to which the dilute sulphuric acid had previously been added, and the bromide of potassium in one fluid drachm of water. Mix the solutions; add one fluid ounce of alcohol; filter from the precipitated sulphate of potassium, evaporate to six drachms, and crystallize.

Hydrobromate of Morphia.

℞.—Morphiæ Sulph. . . .	32·5 grains.
Potassii Bromid. . . .	11·7 „

Dissolve the morphiæ sulph. in one fluid drachm of warm water, and the bromide of potassium in one fluid drachm of water. Mix the solutions; add half a fluid ounce of alcohol; filter from the precipitated sulphate of potassium, evaporate, and crystallize.

Hydrobromate of Strychnia.

℞.—Strychniæ Sulph. . . .	45·0 grains.
Potassii Bromid. . . .	11·7 „

Dissolve the strychniæ sulph. in a mixture of one fluid ounce of water and two fluid drachms of alcohol, and the bromide of potassium in one fluid drachm of water. Mix the solutions; add one fluid ounce of alcohol; filter from the precipitated sulphate of potassium; add one fluid ounce of water to the alcoholic filtrate, evaporate, and crystallize.

The term "bromide," applied to bromine combinations with organic bases, is of doubtful propriety, as the alkaloids neutralize hydrobromic acid without displacement of the hydrogen of the acid. The resulting salts are more correctly termed *hydrobromates*.

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* From the 'Proceedings of the American Pharmaceutical Association,' vol. xxiii.

The Pharmaceutical Journal.

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SATURDAY, APRIL 8, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W.* *Envelopes indorsed "Pharm. Journ."*

IGNORED SERVICES.

ALTHOUGH the Financial Statement of the Pharmaceutical Society for the year 1875 has not yet been published, enough appears in our report of the discussion upon it at the Council Meeting last Wednesday to justify an allusion to one item; we refer to the expenditure included under the head of law expenses. In this respect there appears to have been a considerable increase upon the expenditure of last year, and, as the TREASURER pertinently remarked, the Council must look forward to a considerable outlay in this direction in the future. For not only is the Council expected, and willingly fulfils the expectation, to oppose any obnoxious measures brought before Parliament, but it is also "constantly called upon to protect the trade against infringement of the Pharmacy Act, the Society never being recouped anything like the costs." We would add that upon the Society also falls the whole expense of keeping the Register, and we commend this and the remarks of the TREASURER of the Pharmaceutical Society to the consideration of the gentlemen who appear to think they can best serve the cause of Pharmacy by a paper bombardment of those who have been sparing neither of time nor money in the active service of the whole body.

The history of a measure that was read a third time and passed in the House of Commons on Tuesday last, supplies an apposite illustration of one kind of service which is expected from, and rendered by, the executive of the Pharmaceutical Society, not only to the members, but equally to the much larger number of registered chemists and druggists who never contribute in any way towards the expense of the necessary operations. Early in last session, Sir JOHN D. ASTLEY, having failed to convince the Council of the Pharmaceutical Society that it was its duty to attempt to remove one acknowledged evil by the infliction of a greater one, introduced into Parliament a Bill that would have made it illegal to sell the mineral acids, the vitriols, and other similar substances, without the registration of the details of each sale and the signature of the purchaser. The inherent absurdity of the proposal ought almost to have precluded such a measure being read even a first time, but it is quite probable that the ignorance of the members of the House respecting such a matter of detail as the selling of poison, and their more vivid interest in the protection of their horses from being drugged, would have sufficed to allow of the passage of the Bill through the House in a very mischievous form. But the active opposition of the Council of the Pharmaceutical Society was sufficient to prevent the Bill advancing another stage during the whole of the session, and the Bill had to be abandoned without even reaching a second reading. Thus the Society was able to impede this measure, fraught with vexation to the whole body, to an extent that could not well have been effected by any unorganized opposition. Recognizing the necessity of the case, the authors of the Bill introduced it this session simply as a measure making penal the administration of drugs to animals except on the authority of their owner, without referring to the sale of poisons at all, and there being no further ground of opposition it has run through the different stages in less than a month!

Notwithstanding the fact that the Pharmaceutical Society increases in numbers every year, the question, "What is it doing for us?" is still frequently asked, and sometimes in not very measured language, by persons who have shown no disposition to do anything for themselves. We have therefore thought it worth while to call attention to the fact that the Society does spend a considerable sum of money every year in fighting the battles of the whole body of registered chemists and druggists, although a large number of them have hitherto thought it consistent to accept the service, without supplying a share of the labour or expense.

A LINK BETWEEN VANILLA AND ASSAFŒTIDA.

ANOTHER instance of the meeting of extremes has been furnished in course of the extremely interesting investigations upon vanillin undertaken by Herr TIEMANN. It has been found that by the action of acetic anhydride upon the sodium salt of vanillin a coumarin-like body is produced, which has been named vanillin-coumarin. This body when boiled with caustic potash is converted into an acid identical with the ferulic acid obtained from assafœtida. Herr TIEMANN considers that these results show that ferulic acid, which has the composition $C_{10}H_{10}O_4$, must be considered as hydroxylized methoxylized cinnamic acid, or methyl-caffeic acid, and that most probably it is the acid corresponding to coniferyl-alcohol.

DEATH OF M. BALARD.

THE death of M. BALARD, the discoverer of bromine, is announced by the Paris correspondent of the *British Medical Journal.* M. BALARD was born in 1802, and commenced the business of life as a pharmacien. At the time of his death he was a Member of the Academy of Sciences and Professor of Chemistry in the College of France.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, April 5, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present.—Messrs. Atherton, Betty, Browne, Cracknell, Frazer, Greenish, Hampson, Owen, Rimmington, Robbins, Sandford, Savage, Schacht, Shaw, Sutton, and Williams.

The minutes of the previous meeting were read and confirmed.

THE LATE MR. TAIT.

Before entering on the regular business,

The PRESIDENT drew the attention of the Council to the loss which the Society had sustained by the death of Mr. Tait. He had long been connected with the Society, and had shown great interest in its proceedings. Latterly he had filled the responsible position of Chairman of the Board of Examiners in Edinburgh. He was an excellent botanist, and very thorough in every respect, and his death could not but be a severe loss to the Society.

NOMINATIONS FOR COUNCIL AND AUDITORS.

The SECRETARY reported that there had been 25 nominations to fill the 14 vacant seats on the Council, and the following 16 nominees had signified their willingness to accept office if elected.

Atherton, John Henry, Long Row, Nottingham.
Atkins, Samuel Ralph, Market Place, Salisbury.
Baildon, Henry C., 73, Princes Street, Edinburgh.
Bottle, Alexander, 37, Townwall Street, Dover.
Cracknell, Charles, 217, Edgware Road, W.
Frazer, Daniel, 113, Buchanan Street, Glasgow.
Greenish, Thomas, 20, New Street, Dorset Square, N.W.
Hills, Thomas Hyde, 338, Oxford Street, W.
Mackay, John, 119, George Street, Edinburgh.
Owen, John, 51, Holloway Road, N.
Roach, Pope, 8, St. James's Street, S.W.
Sandford, George Webb, 47, Piccadilly, W.
Savage, William Dawson, 4, Park Road East, Brighton.
Schacht, George Frederick, 7, Regent's Place, Clifton.
Shaw, John, 24, Great George Place, Liverpool.
Williams, John, 16, Cross Street, Hatton Garden, E.C.

The following nine nominees declined to accept office if elected:—

Andrews, Fredk., 23, Leinster Terrace, Hyde Park, W.
Barker, Wm. Robert, 143, New Bond Street, W.
Clark, Walter Beales, 15, Belvoir Street, Leicester.
Constance, Edward, 37, Leadenhall Street, E.C.
Darby, Stephen, 40, Leadenhall Street, E.C.
Guyer, James Brett, 11, Strand, Torquay,
Howden, Robert, 78, Gracechurch Street, E.C.
Morson, Thos., 124, Southampton Row, W.C.
Sutton, Francis, Bank Plain, Norwich.

The Secretary also reported that the following five members had been nominated for election as Auditors, and had declared their willingness to accept office if elected:—

Barron, Frederick, 2, Bush Lane, Cannon Street, E.C.
Hodgkinson, William, 127, Aldersgate Street, E.C.
Horner, Edward, 20, Bucklersbury, E.C.
Squire, William, 5, Coleman Street, E.C.
Stacey, Samuel Lloyd, 300, Holborn, W.C.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

Bulgin, William	Gravesend.
Coleman, Alfred	Kensington.
Newhill, John William	Pimlico.
Thompson, Charles	Bedworth.

Chemists and Druggists.

Cubitt, Charles	Norwich.
Jones, William	Corwen.
Shields, Joseph	Alsager.
Solly, Stephen Francis	Dorking.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations and being in business on their own account were elected "Associates in Business" of the Society:—

Minor.

Bamfield, John	Bristol.
Baynham, William Bevan	London.
Booth, William Grounds	Manchester.
Brown, John Ephraim	Meltham.
Darby, Samuel Aldred	Colchester.
Fletcher, Ashby Brackstone	Totton.
Gwatkin, James Ross	Brighton.
Hammond, William Henry	Hull.
Hill, Walter	Chippenham.
Makinson, Thomas	Southport.
Sprake, David Lewis	Accrington.
Webb, Frederick Brooks	Southminster.
White, William Charles	Southsea.

Modified.

Bunker, James	London,
Cadby, Samuel Kittle	Margate.
Coley, Samuel James	Stroud.
Colledge, William Robert	Blyth.
Fowls, Jabez	Southport.
Jones, William Cadwaladr	London.

ASSOCIATES.

The following having passed their respective examinations were elected "Associates" of the Society.

Minor.

Dimmock, Augustus Frederick	London.
Foulsham, Henry Botwright	Ipswich.
Key, George Brown	St. Andrews.
Nicholson, Walter Joseph	York.
Ronchetti, Thomas Angelo	Stockton.
Stephenson, George Herbert	Hull.
Weedon, Joseph	Crawley.

Modified.

Kitchen, James	Glasgow.
Powers, Thomas	Birmingham.
Ridgway, Thomas Eyton	Liverpool.
Wallace, William	Glasgow.
Widdowson, Richard	Nottingham.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination were elected "Apprentices or Students" of the Society:—

Armstrong, Benjamin, jun.	Newcastle-on-Tyne.
Baker, Walter Robert	London.
Brown, Walker	Retford.
Bucher, William Henry	Crediton.
Craske, Thomas Augustus	Tunbridge Wells.
Currie, Alexander	Portsoy.
Davies, John Fred.	Hay.
Jones, Thomas	Tenby.
Linney, William Wycliffe	Ashton-under-Lyne.
Marshall, John	Coatbridge.
Palmer, Charles Edward	Ely.
Parkes, George James Robert	Tipton.
Power, Joseph	Stockton-on-Tees.
Richardson, Frederick William	Hull.
Thomas, John	Aberystwith.
Webb, William Henry	Hereford.
Woolcott, John Newton	Sidmouth.

Several individuals were restored to their former status in the Society upon payment of the current year's subscription and a fine.

The name of William Neale, of 21, George Street, Woolwich, was restored to the Register of Chemists and Druggists.

Honorary Members.

The Secretary stated that there were two vacancies in the list of Honorary Members. The following names were selected for election next month:—

M. G. Planchon, Professor of Pharmacy, Paris.
Professor Dewar, Cambridge.

Reports of Professors at the End of the First Course.

Professor Redwood's report stated that the number of students who entered his class for the first course was 51, besides the two Bell scholars. The attendance had been regular and good, except towards the end of the course, when a few students having passed their examination had left town. He could speak very favourably of the good conduct of the class in regard to diligence and attention, but from the commencement he had found by the weekly examinations that most of the new members were less prepared by previous study than was usual in former sessions. This had produced an effect on the examination for the bronze medal, only seven of the students having competed, and of these he could speak quite favourably, only of the one who had obtained the highest number of marks, viz., 78, and who he considered entitled to the prize.

The envelope containing the motto of the successful competitor was then opened by the President and found to contain the name of

> Mr. Samuel Newbury, of Westow Street, Upper Norwood, to whom the Bronze Medal was awarded accordingly.

Professor Bentley reported an increase in the number of students to 61, which was 20 per cent. more than last year. He bore testimony to the good conduct, diligence, and progress of the students, the weekly examinations being well attended and appreciated. There were 22 competitors for the bronze medal, many of whom highly distinguished themselves, as would be seen by the detailed report annexed showing the number of marks awarded to each. The highest number was 83, and two others had obtained 81 and 80 respectively.

The envelope containing the motto of the successful competitor was then opened by the President and found to contain the name of

> Mr. Frederick William Place, of 2, Upper Street, Islington, to whom the Bronze Medal was awarded accordingly.

Reports of Committees.

Finance.

The report of this Committee was read and adopted and various accounts were ordered to be paid.

Auditors' Report.

The Auditors' report and financial statement for the year was presented.

Mr. Shaw said it appeared from the accounts that apart from the special legacy of Mr. Hanbury the current expenditure of the Society had been £43 more than the income. Further, owing to the depreciation written off the value of the library it appeared that it was worth less now than a twelvemonth ago, notwithstanding the large expenditure during the year in new books.

Mr. Schacht asked what was included under the heading "house expenses."

The Secretary read the items from the ledger which mainly consisted of gas, water, coals, and repairs.

Mr. Betty thought the Council must be struck by the financial statement presented and by the heavy expenditure which had taken place, and when it appeared that the Society had barely succeeded in making the two ends meet it might well be asked whether the expenditure for the last year had been in any respect abnormal; if so, he should be much obliged to the Treasurer if he could inform the Council under what heading it might hope to effect a saving. The item for gas, £70, seemed very heavy, and he should like to know if that were the net amount, or whether the Society had anything in rebate from the Professors.

Mr. Williams said he had no means of forming any estimate for the coming year, and he thought it was rather the duty of the Finance Committee, of which he was not a member, to answer the questions. It would perhaps be well if that Committee devoted some time to seeing which of these items had been in excess, if any, and to report to the Council upon the subject.

Mr. Savage thought there were two large items wherein a saving might be effected; one, that of law costs, which last year were £69 and this year £468, showing an excess of £399; and the other was that of the North British Branch, where there had been an extra expenditure last year of £192. Probably that would be reduced in future.

Mr. Williams said there was now a permanent establishment together with an assistant secretary to the North British Branch, so that much saving could not be expected there.

Mr. Robbins said that respecting such a complicated mass of figures the Finance Committee could not be expected to answer questions off hand, but he had no doubt that any such inquiries could be satisfactorily answered at the next meeting. With regard to the gas, it was quite natural that there should have been an increase, because the museum and library had been opened in the evening, and also a conversation room.

Mr. Betty did not call in question the accuracy of the figures, but he considered it would be well if the Finance Committee would make a report as to the anticipated expenditure for the next year.

Mr. Owen said the duty of that Committee, as he understood it, was to examine the accounts presented to them. For much of the expenditure the House Committee was responsible, and on these matters Mr. Betty would possess better information than himself.

Mr. Frazer said the law expenses last year were £193, and this year £385, showing an increase of £192. The premium for the fire insurance had last year been paid for seven years, amounting to upwards of £150.

Mr. Williams remarked that the providing of duplicate specimens for the lectures which was now being carried out involved a large expenditure. The law expenses had been mostly incurred in opposing an obnoxious measure in Parliament, and the Council must look forward to a considerable outlay in this direction in future. It was constantly called upon to protect the trade against infringements of the Act of Parliament, and the Society was never recouped anything like the costs. With regard to the house expenses there was a large establishment, and a great deal of business being carried on, and it might be expected that a considerable expense would be necessarily involved.

Mr. Sandford said the law expenses last year, less the expenses connected with the Irish Pharmacy Bill, were about the average.

Mr. Schacht thought the Council must look to a considerable amount of expenditure in law costs, but it was only proper to look carefully at the outlay, and see if in any way a reduction of expenditure could be effected. There was £255 for house expenses; £259 for repairs and alterations; rent, taxes, and insurance, £640; clerks and servants, £940. These were really gigantic sums, amounting to over £2000, and he could not help thinking there must be a margin for economy somewhere.

Mr. Williams reminded the Council that the amount paid for insurance was for seven years, having in that way saved one year's premium, and this item would not reappear in the accounts for another seven years.

Mr. Shaw said the expenses were considerably less this year than last.

Mr. Robbins said there was no chance of the amount for rent, etc., being reduced, since the premises were worth double the money.

Mr. Hampson thought this discussion would be very useful, but the Council as a whole, rather than any particular Committee must attend to the matter. There was little doubt that the Society would have to spend even more in law expenses, because complaints were continually received of illegitimate trading being carried on. It was difficult to see at once where economy could be introduced, but he hoped an attempt would be made to do so.

Mr. Cracknell said the discussion had hitherto been confined to the question of reducing the expenses, but he thought the Council might also look for an increase of income. The expenses of the examinations had been diminished, and he thought that an increase of income from this source might be looked for.

The Vice-President thought the Finance Committee was very assiduous in attending to its duties, but he did not consider it was called upon to report to the Council why certain items appeared in the accounts. It might, however, be well for the new Council to appoint a committee of ways and means which should consider how their ways might be improved, and also their means. Last year was an exceptional one with reference to the income, as would appear from some figures he had recently taken out, showing that the net income of the Society for the last five years had been, in 1871, £8864; in 1872, £9681; in 1873, £10,729; in 1874, £9409; in 1875, £7634. Last year, therefore, there had been the smallest income for many years. In 1873 the examination and registration fees were £4800; but in last year they had dropped to £2500. He believed the Society had passed through a transition state, and that the income for the current and future years would improve. At the same time, it was no doubt the duty of the Council to look narrowly after the expenditure. A rather expensive matter had been first entered on in the re-arrangement of the museum, and the Council must, therefore, be cautious in voting money.

Mr. Frazer thought there would soon be an increase in the receipts for examination fees.

Mr. Williams remarked that the gross receipts were now reduced by the fact of the Society no longer receiving the lecture fees of the pupils.

Mr. Betty replied that he was quite satisfied with the result of the discussion, and particularly with the information given by the Treasurer and Vice-President.

The report was then unanimously approved and adopted.

Benevolent Fund.

The report of this Committee was read, including recommendations of the following grants:—

£20 to a registered chemist and druggist, aged 76 years; 36 years in business, but he had been obliged to dispose of it from ill-health. His name was also recommended to be placed on the list of approved candidates for an annuity.

£10 to a registered chemist and druggist, suffering from spinal paralysis. Applicant had received three previous grants of the like amount.

£10 to the widow of a member, in bad health and very poor circumstances. Applicant had previously had a grant of £15.

£10 to the daughter of a late member at Southampton (ninth grant).

£10 to one of the unsuccessful candidates at the two last elections for annuities. He had previously had two grants of £10 and one of £15.

Two other cases were referred for further information.

The report and recommendations were received and adopted.

Library, Museum and Laboratory.

This Committee reported that it had held two meetings, one on the 15th ult., when the regulations with regard to the prize competition had been fully considered, and the Committee had resolved that any such extension was undesirable. With regard to the selection of individuals to conduct the examinations, the Committee recommended that the resolution passed on January 6th should be altered, and that the Council should select from time to time two of the examiners, who should set the questions, examine the answers, and report to the Council thereon. The Committee had also considered the question of the device for the Society's proposed medal, and appointed a sub-committee to obtain a design. It had also requested Professor Redwood, the Curator, and the Secretary to select such apparatus as appeared suitable for the Exhibition to be held at South Kensington, and to offer the same to the authorities, in compliance with their invitation. A temporary assistant curator had been selected on the recommendation of Professor Attfield and the Curator.

Professor Redwood had reported that 45 students were attending his class.

Professor Bentley had reported that 50 students were attending his class, being an increase of 10 over last year.

Professor Attfield had reported that 107 students had entered since the commencement of the session, 72 being now at work.

The average attendance in the Library had been:—Day, 32·7; evening, 11·4. Circulation of books, in town, 141; country, to 31 places, 48.

The following books were recommended for addition to the Library:—

General Fund:—

Linnæus' 'Materia Medica, Liber I., De Plantis.'
Borszczow's 'Die Pharmaceutisch-wichtigen Ferulaceen der Aralo-Caspischen Wüste.'
Birdwood's 'On the Genus Boswellia.'
Hanbury's 'On the Species of Garcinia which affords Gamboge in Siam.'
Martius' 'Specimen Materiæ Medicæ Brasiliensis.'
Seemann's 'Popular Nomenclature of the American Flora.'
'Memoir, Correspondence, and Medical and Botanical Papers of W. Wright, M.D.'

Hanbury Fund:—

De Loureiro's 'Flora Cochinchinensis.'
Descourtilz's 'Flore Pittoresque et Médicale des Antilles, Tomes I–VI.'
Gaertner's 'De Fructibus et Seminibus Plantarum.'

The average attendance in the Museum had been, in the morning, 24; evening, 4. A handsome specimen, consisting of a mass of crystals of bichromate of potassium had been presented by Messrs. Greenhough, and Messrs. Corbyn had entrusted to the Curator a cabinet of drugs 133 years old, from which he might select suitable specimens for the Museum. The Materia Medica portion of the catalogue was ready for printing.

At a second meeting on April 4th the Committee had considered the design for the proposed Council Medal, and submitted a design to the Council. They also settled the draft annual report.

Mr. Schacht wished to make one or two observations on the early part of the report referring to the prize examinations. At the last Council meeting this subject was referred back to the same Committee which had settled the preliminary arrangements, and to the meeting of the Committee he had been invited, as had also two gentlemen from the Board of Examiners. He was requested to explain his views on the subject of having more than two centres of examination for these prizes; after which Mr. Carteighe expressed the view taken by the Board of Examiners, and then, any one who was in favour of his (Mr. Schacht's) views, was invited to speak. Not a voice was heard, and of course there was an end of the matter. It seemed rather strange that after the Council had by a fair majority carried this request for a reconsideration there had been only one individual on the

Committee who had a word to say in its favour, and he could not help feeling that it was an unfortunately selected Committee for the purpose. He begged to say that he meant no disrespect to any member of the Committee, the members of which he was sure all gave the matter their best attention, but it so happened that with the exception of the Vice-President and himself, every member was resident in London, and the result was that he was left in the splendid minority of one. The matter was of course settled, but he hoped to be pardoned calling the attention of his provincial colleagues to the circumstances and once more expressing his regret at the decision which had been arrived at.

Mr. Hampson thought it a pity that this question should be re-opened without any necessity. The Council had decided on a certain course almost unanimously, but in deference to Mr. Schacht's opinion it had consented that the matter should be re-considered. There was no question which had been more thoroughly sifted, and he hoped the report would be accepted without any further remark.

Mr. Atherton rather sympathized with Mr. Schacht in this matter, and thought it unfortunate that the question should have been referred to the same Committee which had already decided upon it. Perhaps it would be well for Mr. Schacht to bring the matter forward again in the new Council, and get it referred to a special Committee on which country numbers were more largely represented.

Mr. Shaw, as seconder of the resolution brought forward by Mr. Schacht on the former occasion, thought the decision of the Council to refer the matter on one special point was an indication that the Council desired that its views should be adopted with regard to the competition taking place throughout the country. He was therefore rather surprised at the decision which had been arrived at.

Mr. Sandford said it was in accordance with Mr. Schacht's own proposition that the question had been referred to this Committee, and it was thought Mr. Schacht would be the best able to lay his views before it. The Board of Examiners had given the Council through the Committee most cogent reasons for not altering the number of centres, and those were fully discussed in the Committee which Mr. Schacht attended. The fact of the matter being sent back to the Committee was no evidence that the Council was inclined to alter its decision, but it was an act of courtesy to Mr. Schacht and those who felt with him.

The Vice-President said it was only from a wish to give satisfaction to Mr. Schacht that he had supported the resolution for sending this question back to the Committee. He attended the Committee on purpose to hear his arguments, and prepared to be convinced, but he saw no reason for altering his opinion, and returned to the examination room, in which he was engaged, before the vote was taken.

Mr. Sandford submitted a design which had been obtained from a die sinker, but he wished to slightly improve it in accordance with a better copy he had since obtained of the arms of the Society. The cost of the die would be from £40 to £50; and he also suggested that the die should have movable centre so that the name of the winner might appear on the medal in relief.

The Council then considered the draft report in detail and made certain verbal alterations therein.

The report and recommendations of the Committee were then approved and adopted.

House.

The report of the Committee was received and adopted. It recommended certain slight alterations in the basement of the building.

The Register.

Mr. Hampson, in consequence of a communication from Mr. Reynolds, of Leeds, to the effect that the names of several persons who were dead still appeared on the Register, in Leeds and neighbourhood, said that it appeared that the Secretary sent the list of names to Mr. Reynolds for revision late in the autumn of last year, and that the latter gentleman did not send it back in time for insertion in this year's Register. The question simply arose whether some more effectual means could not be devised for getting replies from local secretaries in time. He would suggest that in future, when the list was sent out, a certain date should be fixed for its return, and that if it was not then received, a reminder giving full time should afterwards be sent.

After some conversation, it was decided that this course should be adopted in future.

The Next Council.

A letter was read from Mr. Hanbury tendering the resignation of his seat on the Council, and it was unanimously resolved that the President should call upon him and endeavour to persuade him to alter his decision.

The Assistant Secretary.

The Vice-President moved that the Assistant Secretary, who had had a severe attack of rheumatic fever, should be accorded leave of absence until the annual meeting, or longer if necessary, and that £20 be voted towards his expenses.

The resolution was seconded by Mr. Greenish and carried unanimously.

A letter was read from Dr. J. Léon Soubeiran saying that the School of Pharmacy at Montpellier, where he is Professor of Pharmacy, possessed the *Pharmaceutical Journal* from its commencement to the year 1870, and asking what would be the cost of the numbers required to complete the set down to the present time.

The President suggested that the numbers should be presented and that the School at Montpellier should be placed on the free list. This was agreed to.

Law and Parliamentary.

This Committee presented a lengthy report, dealing in detail with a number of cases of alleged infringement of the Pharmacy Act. In some cases the provisions of the Act had been complied with, in others the matter had been placed in the hands of the Solicitors, and in others further inquiries had been ordered. In one case, that of Thomas Lambert, the Committee recommended that the Council should authorize the Registrar to remove the name from the Register. The Solicitors had also presented a report of the state of the various cases which had been placed in their hands. The consideration of the Exeter memorial had been again deferred.

The Council confirmed the recommendation with the exception of three cases which were again referred to the Committee.

The name of Thomas Lambert was ordered to be erased from the Register.

Conversazione.

The Committee appointed to arrange for the Conversazione in May reported that it had received a communication from the authorities at South Kensington to the effect that the museum would be at the disposal of the Society on Thursday evening, May the 18th.

It was thereupon resolved that the Annual Meeting and Conversazione be held on that date.

Report of Examinations.

March 1876.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major	3	0	3
Minor	17	6	11
Modified	6	3	3
	26	9	17

Four certificates received in lieu of the Preliminary Examination.

2 College of Preceptors.
1 University of Durham.
1 „ „ Oxford.

The SECRETARY read a memorial from Mr. Edward Mickle, of Liverpool, who had been registered in 1871 as a chemist and druggist, but whose name was afterwards struck off, it having been shown that he was not entitled to be registered without examination. He still, however, continued to carry on business, and complaint having been made, had been proceeded against, and fined. The memorial and several letters bearing on the matter having been read, it was resolved, unanimously, that the prayer of the memorial could not be complied with.

PHARMACEUTICAL MEETING.

Wednesday, April 5, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

The minutes of the preceding meeting were read and confirmed.

The following donations to the Library and Museum were announced, and the thanks of the Society awarded to the donors:—

To the Library.—'Bemerkungen über Rhabarber und Rheum officinale,' 'Ueber die Nachweisung freier Mineralsäuren durch Colchicin,' and 'Zursetzung des weissen Präcipitats durch Jod,' from Professor Flückiger (Author); 'Annual Report of the Board of Regents of the Smithsonian Institution, 1874,' from the Institution; 'Proceedings of the American Pharmaceutical Association, 1875,' from the Association.

To the Museum.—Fine Crystals of Sulphate of Magnesium, by Mr. T. H. H. Hobbs; Specimen of Extract of Monesia, and one of Pure Neutral Soft Soap, by Mr. H. W. Pound; Leaves, Flowers, and Root of *Garrya elliptica*, Leaves and Stalks of *Eriodictyon glutinosum*, Nutgalls of *Quercus virens* from Texas, three kinds of Damiana and Specimens of Raiz del Indico, by Professor Maisch; Specimen of *Coptis Teeta*, by Messrs. Godfrey and Cooke; Specimen of *Oleum Abietis* by Messrs. Cyriax and Farries; Specimen of Cashmere Saffron, by Mr. Rimmington; Specimens of Spurious Cinnamon Bark, of Crystallized Carbonate of Ammonia, and of Bicarbonate of Ammonia, by Mr. Linford; Very fine Specimens of E. I. Rhubarb and Flowers of *Pyrethrum roseum*, by Messrs. Herring and Co.

Professor ATTFIELD called attention to the sample of foreign crystallized glycerine. He stated that up to the present time crystals of glycerine had apparently been obtained only by accident. It appeared to be necessary that the glycerine should be perfectly pure, fairly cold, and subjected to considerable vibration. It was stated by glycerine makers that when once a sample had become crystallized it could be used for the purification of impure glycerine, and that if a crystal was dropped into a slightly impure sample it would grow, the impurities remaining in the mother liquor.

Mr. LINFORD, in reference to the crystals of monocarbonate and bicarbonate of ammonia, said that the article in the Pharmacopœia generally spoken of as sesquicarbonate, was formulated as if it was composed of two molecules of ammonia and three molecules of carbonic acid; but, practically, such a combination was not known. The sesquicarbonate, prepare it how they would, was an indeterminate mixture of monocarbonate and bicarbonate. In the present case, the crystals which were both sublimed, were each contaminated by the other substance, probably to the extent of from 3 to 5 per cent. But he had thought that the sesquicarbonate thus divided into its two elements might be interesting to the members.

Professor ATTFIELD said that some three years ago Dr. Divers, who was now professor of chemistry in Japan, examined the composition of the so-called carbonate of ammonium of pharmacy, and he came to pretty much the same conclusion from analysis as that at which Mr. Linford had arrived from his knowledge of the manufacture of carbonate of ammonium. Volumetric analysis of the commercial salt also showed that a molecule of carbamate of ammonium was associated with one of bicarbonate and not with two of bicarbonate as indicated by the chemical formula given in the British Pharmacopœia.

Mr. LINFORD said that he had carefully worked through Dr. Divers' paper. Where that chemist had experimented upon a few grains he (Mr. Linford) had experimented, with quantities of some cwts., and he had found Dr. Divers' conclusions to be perfectly correct. Dr. Divers pointed out, as a peculiarity, that in the residue of the sublimation of carbonate of ammonia there remained a solution containing an excess of monocarbonate, but that solution, when sublimed in a peculiar vessel, although sublimed out of water, gave a quantity of carbamate. At first he (Mr. Linford) doubted this conclusion, but upon examination he found it to be correct.

Mr. MARTINDALE said that there would be a great commercial advantage in having such an article as Mr. Linford had here shown in the manufacture of smelling salts.

Mr. E. M. HOLMES, referring to the specimens of vegetable materia medica that had been presented, said that the specimen of rhubarb was one of the finest he had seen in the market during the last few years. It was not only of unusual size and excellent quality, but also showed in a remarkable degree the peculiar characteristics of East India rhubarb. With regard to the *Pyrethrum roseum*, he had rarely seen the flowers in the London market, and had been given to understand that the powdered flowers were more effectual as an insecticide than the mixtures often sold under the name of Persian insect powder. The Raiz del Indico was an astringent root, used in Mexico. It had been referred to in the latest number of the *Pharmaceutical Journal*, together with the *Eriodictyon glutinosum*, the leaves of which were used in California as a remedy for chronic bronchitis and other pulmonary complaints. The leaves and flowers sent under the name of *Garrya elliptica* by Professor Maisch, appeared to belong rather to *Garrya Fremontii*, in having the leaves smooth underneath, and not undulated. A living specimen of *Garrya elliptica* was placed upon the table for comparison. *Coptis Teeta* was much used in India and China as a tonic, and was remarkable for containing 8½ per cent. of berberine, which he believed to be the largest amount as yet found in any known root. Oleum abietis was the volatile oil obtained from *Abies pectinata*, and was official a few years ago in the Throat Hospital Pharmacopœia, in the form of inhalation. It had lately been replaced there by the oil derived from *Pinus Pumilio*, the mountain pine. The oleum abietis was of a rather agreeable flavour, and he thought might advantageously replace turpentine for internal administration.

A note was then read on—

AN OINTMENT CONTAINING CALOMEL, HYDROCYANIC ACID, AND ACETATE OF LEAD.

BY T. H. POWELL AND J. BAYNE, F.C.S.

The paper is printed at p. 801, and gave rise to the following discussion:—

Professor ATTFIELD said that the authors had made a clear addition to the knowledge respecting this subject. They had shown most satisfactorily that the long known action between calomel and hydrocyanic acid was arrested by hydrochloric acid. His own experiments certainly confirmed what the authors had said on the subject. Four or five years ago he placed a pound of calomel in two or three pints of hydrocyanic acid. He soon found that the calomel was darkened, but not to any very great extent. He placed the mixture in sunlight and in the dark, and exposed it to various conditions of temperature for two or three years, but he could perceive no increase in the darkening of the colour of the calomel. After a time the bottle got broken, but in such a way that most of the powder at the bottom was saved. This powder he put into another bottle with some more strong hydrocyanic acid. A further darkening to a considerable extent soon took place, but the limit was reached in about a month. It did not then occur to him that hydrochloric acid prevented the continuance of the action. He learnt that fact for the first time from this paper, especially from the portion recording the ingenious experiment which the authors made in putting together three parts of dilute hydrochloric acid, and seven parts of hydrocyanic acid, and getting no reaction. It remained for some one, for the authors he hoped, to carry on the experiment with the object of obtaining nothing but this black substance. In that case some quantitative experiments could be made upon the residue. They could then ascertain whether the black substance was really nothing but mercury. Like the authors and other chemists, he himself had obtained mercury from the powder by heat. That was evidence, to some extent, that mercury was there, but it was not conclusive, as the mercury might result from the decomposition of the dark substance.

Mr. **Powell** said that he and Mr. Bayne had experimented on the residue as recommended by Professor Attfield. The paper showed this in the following passage, 'This is shown to be the case by treating calomel with successive portions of hydrocyanic acid, and washing the black precipitate after each separate application, till bicyanide of mercury ceased to be formed, when a grey powder remains, which on drying proves to be metallic mercury."

Professor **Attfield** said that the authors by sublimation obtained metallic mercury from the grey powder, but that did not prove that what they had in the residue was nothing but metallic mercury. A very little more work of a quantitative character was necessary and he hoped that Messrs. Powell and Bayne would complete the investigation.

Mr. **Williams** asked whether the prussic acid was specially prepared, as the presence of a mineral acid might affect the result.

Mr. **Powell** said experiments were made with pure prussic acid, and also with the B.P. acid containing about an ounce of hydrochloric acid to 10 pounds.

A paper was then read on

Linimentum Saponis of the British Pharmacopœia, with Special Reference to its Employment in Hospital Pharmacy.

BY W. WILLMOTT.

The paper is printed at p. 802, and gave rise to the following discussion:—

The **President** said that he could not quite agree with Mr. Willmott that pharmacists could do as dispensers did at the hospitals. The former were obliged to conform to the Pharmacopœia, but at the hospitals their own medical men could do as they liked.

Mr. **Umney** said that he had not found much difficulty in making B.P. soap liniment when he had used a special soap prepared for the purpose. When Castille soap was used a great gelatinization took place; but when this special soap was used nearly the whole of it dissolved. It certainly separated at low temperatures, and he had had B.P. liniment returned to him because it had slightly gelatinized, but he, nevertheless, adhered to the Pharmacopœia formula. Most pharmacists knew that properly prepared soap liniment would gelatinize at a temperature approaching the freezing point of water. He had not calculated the number of pieces into which he divided the soap as Mr. Willmott had done; but on making the liniment on a large scale he had reduced a bar of soap to thin shreds by planing it with a carpenter's plane. He should be sorry to deviate so far from the Pharmacopœia as Mr. Willmott had indicated.

Professor **Redwood** said that the paper indicated, first, that the B. P. product was good and unexceptionable; secondly, that the B. P. process was extravagant, inasmuch as there was a loss of soap, and, thirdly, that where greater economy was desirable, as in hospital practice, an equally efficacious product might be obtained by the substitution of soft soap for hard soap. He was not one who was very anxious that they should in all cases economize, as far as possible, the cost of the preparations used in medicine. As a general rule the economy was not necessary, and he was not sure that it was desirable. He would, of course, make an exception in the case of hospital practice, but, for ordinary use, he should look to the efficacy of the product, rather than to its cost. Although the subject had been very judiciously brought before the meeting, he hoped that what had been stated would not induce any of the members to adopt the suggested method of making soap liniment. He believed that at one period there were many persons who made it with soft soap to obviate the gelatinization which took place in the liniment as it used to be made. All excuse for a deviation from the B. P. method had now been removed; and he was not prepared to go so far as Mr. Willmott, in assuming that soft soap might be used with equal advantage in making liniment. The alkalinity of soft soap was far greater than that of hard soap, and although in some instances that alkalinity was due to the presence of carbonated alkali, which would not be taken up by the spirit, yet in many instances it was due to the presence of caustic alkali, which would be taken up by the spirit. In the latter case the liniment would be caustic, whereas they desired to have it neutral. This was a very important consideration when they remembered that the liniment was often applied to inflamed places, which were easily irritated by alkaline preparations. He thought that if they studied the applicability of the liniment under all circumstances they would find that they could not deviate from the instructions given in the British Pharmacopœia.

Mr. **Ingham** said that he had got rid of what some would call extravagance in the use of the soap by having the waste put into a mould and pressed, and then using it for washing, for which it answered well.

Mr. **Gerrard** said that Mr. Willmott had referred to the use of oleate of soda in the preparation of soap liniment. The suggestion was made eighteen months ago in that room by Professor Tichborne, who demonstrated how the liniment might be prepared by mixing oleic acid and carbonate of soda. This formed a neutral oleate, which was perfectly soluble in the spirit, and if any soda was present it remained undissolved. In this method there was no waste of the soap. He had followed Mr. Umney's plan, planing the soap into shavings. Liniment prepared with soap in that form would gelatinize on a cold winter morning, but as the day increased in warmth it re-dissolved. As to the introduction of freezing into the process, he thought that it would be less trouble to macerate the mixture, agitating it occasionally, than to submit it to a temperature below freezing.

Mr. **Martindale** said that he disagreed with Mr. Willmott in deviating from the Pharmacopœia, although the method suggested was very ingenious. He thought that it would be an advantage if the house surgeons of hospitals knew something about the cost of the preparations which they ordered. He had known a pint of soap liniment ordered for an out-patient. There were frequent complaints that when hospital surgeons got into private practice they put their patients to unnecessary expense by ordering extravagant quantities of the preparations that were required. He asked the committee of a hospital with which he was connected whether he should continue making soap liniment with soft soap, according to an extemporized formula which he found in use. He was told to adhere to the Pharmacopœia, but to substitute methylated spirit for rectified spirit. He had never had any difficulty in making B. P. soap liniment. As to the use of oleic acid, that substance, as met with in commerce, had a very disagreeable odour, and the liniment which was made with it, and neutralized by means of either carbonate of soda or caustic alkali, would have a disagreeable odour which would exclude it from general practice.

He thought that the liniment which was prescribed in the Pharmacopœia was a little extravagant with regard to the strength of the spirit. Mr. Willmott had pointed out that when proof spirit was used the whole of the soap was dissolved. Now they did not get the soap dissolved, and the writer of the paper complained of the waste. The soap liniment, as made by London houses, was not like that which was made in the country. Perhaps the country makers had improved of late years. When the Pharmacopœia liniment was rubbed on the skin it evaporated so quickly that it could not be used with any amount of friction, and the country people preferred one which would lather a little rather than one which disappeared as rapidly as that prepared strictly according to the British Pharmacopœia. Perhaps medical authorities might, with advantage, try which sort produced the better therapeutic effect. He agreed with what had been said by one gentleman about the waste soap. When the liniment was made with rectified spirit a considerable amount of palmitate of soda was separated, but when this was pressed in a calico strainer it became very useful in the ordinary scrubbing of hospitals, so that the waste need not be an objection in that instance. Mr. Willmott had given a very ingenious mode of making the liniment, but he (Mr. Martindale) might point out that Mr. Willmott had too little soft soap—only two ounces to 1 pint. That would be equal to only about an ounce of dry hard soap, whereas the Pharmacopœia gave two ounces and a half to the pint. The objection as to time was a disadvantage in some cases in the B. P. method; and, perhaps, in winter, the soap hardly got sufficiently dissolved. Seven days or even more were required to make a good B.P. liniment.

Mr. WILLIAMS remarked that there was a sample of soft soap on the table which had been presented by Mr. Pound. It appeared to be neutral and of a very beautiful kind, such as he had never seen in the market. He would not enter into the question whether soft soap ought or ought not to be used in liniment, but he had an idea that if they could get a neutral soft soap it would make a better preparation than hard soap. Hitherto they had had only a very bad and very alkaline soft soap which was not adapted for the purpose of liniment; but if they could get a beautiful preparation, such as Mr. Pound had given them, it might be worthy the attention of pharmacists whether they should not recommend soft soap instead of hard.

Mr. WILLMOTT in reply, said Mr. Umney had stated that he made large quantities of soap liniment from soap specially prepared, but he did not say what kind of soap it was. His (Mr. Willmott's) experiments were made with the Pharmacopœia soap. If the firm to which Mr. Umey had alluded supplied a soap suitable for liniment it was a material of which he had not had any experience.

Mr. UMNEY asked whether Mr. Willmott made the soap for himself with which his experiments had been made.

Mr. WILLMOTT said that he did not make it himself, but it answered to the Pharmacopœia test. He must repeat that his paper had more especial reference to hospital practice than to private practice. He certainly hoped that his remarks would not lead any gentleman to prepare soap liniment with soft soap except for hospital practice. In defence, however, of using soft soap there was medical authority, as would be seen by the formulæ of the various hospitals. The objection raised by Mr. Gerrard he had anticipated. No doubt it was exceedingly difficult to get a freezing mixture to remain at an even temperature for a lengthened time; but, in the first place, the freezing would not be required in the summer, and in the winter a little ice and salt would be very inexpensive and the trouble would be only of two or three hours' duration; and after all the process would not be so expensive as that of the Pharmacopœia. He did not, however, put forward his preparation as a substitute for the Pharmacopœia liniment, this being all that could be desired. In reference to Mr. Martindale's suggestion that there was not sufficient soap used, it must be remembered that some allowance ought to be made for the soft soap being of a more emollient and lubricating character than hard soap. After all, practice was better than theory, and in practice there was no objection to the preparation. He never heard of a complaint that soft soap liniment had irritating qualities. He had heard there was a custom of keeping two kinds of liniment, one being made with soft soap, and the other according to the Pharmacopœia. The Pharmacopœia liniment would be dispensed when ordered in the prescription, and the soft soap liniment in other cases. In fact, in some parts of London the price to which this preparation was reduced would prevent the Pharmacopœia article being supplied.

Mr. UMNEY said that the soap he had used was professedly an olive oil hard soap. It was mentioned by Mr. Wood some five or six years ago, and his remarks would probably be found recorded in the *Pharmaceutical Journal.* From that time he (Mr. Umney) had been in the habit of using soap of this kind. If Mr. Willmott used the white Castille soap of trade, as ordinarily made, he did not use soap that would strictly stand the test of the British Pharmacopœia. He believed that ordinary Castille soap was made not wholly of olive oil but with other fats.

Mr. WILLMOTT said that the soap which he used was not what was ordinarily called Castille soap, but it was Pharmacopœia hard soap. No doubt Mr. Umney referred to a soap which was made from nearly pure oleine, and which was referred to in the 11th volume of the *Pharmaceutical Journal.* It contained very little stearine, and would no doubt entirely dissolve, and very little would gelatinize out. He did not apprehend that the Pharmacopœia hard soap, as now ordered, was exactly Castille soap. The Castille soap of commerce contained animal fats and should not be used in preparing the B.P. liniment.

At the close of the discussion the President said that this being the last Evening Meeting of the present session, he wished to express his thanks to those gentlemen who had supported him by their attendance, and especially to those to whom the Society was indebted for their valuable papers.

NORTH BRITISH BRANCH.

The seventh meeting of the present session was held in the Society's rooms on Thursday evening, 30th March, Mr. William Gilmour, President of the Branch, in the chair.

A paper on "Phosphate Syrups, with special reference to the nature, cause, and prevention of certain precipitates which form therein," was read by Mr. W. L. Howie, F.C.S.

The paper which was illustrated by experiments, diagrams and microscopic specimens of the different precipitates is printed on p. 802. It gave rise to a very interesting discussion, the publication of a report of which we are compelled from want of space to defer until next week.

The Honorary Secretary announced the following contributions to the library:—'Proceedings of the American Pharmaceutical Association,' for 1875, per Professor Attfield. The 'Pharmacist,' for March, from the Chicago College of Pharmacy. The 'Canadian Pharmaceutical Journal,' for March, from the Ontario College of Pharmacy.

In consequence of the pressure upon our space, owing to the length of the reports of the Society's meetings in London and Edinburgh, we are compelled to postpone the publication of several communications.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. W. D. Savage, Mr. Barclay, Mr. Benger, Dr. Wright, Mr. Ford, Mr. Taylor, Mr. Jackson, Mr. Ireland, J. W., G., A. S., J. G., J. A., Fair Play, Glasgow, Student.

VOLUMETRIC ESTIMATION OF PHENOL OR CARBOLIC ACID.

BY DR. W. F. KOPPESCHAAR.

Hitherto the quantity of phenol in creosote oil has nearly exclusively been estimated by shaking a known volume some time in a graduated tube with a strong solution of caustic potash, and then reading off the volume of hydrocarbons that have gradually separated.

The principle of this method is based on the fact, that phenol in contact with caustic potash (or caustic soda) forms a compound that is soluble in water, as expressed by the following formula:—

$$C_6H_5.OH + KOH = C_6H_5.OK + H_2O$$

Every one who has occupied himself with this estimation will have experienced in the first place how difficult it is to read with any degree of accuracy the column of the almost always darkly coloured hydrocarbons. In the second place the diminution in volume does not give a sure measure for the quantities of phenol, unless a correction is made, for which no constant figure is to be found; besides the presence of water will increase the inaccuracy.

Some time ago, having been engaged in the estimation of the phenol in some ten samples of creosote oil, for the purpose of disinfecting sewers and privies, the method satisfied me so little, that I was led to seek one that would produce better results in practice.

In the 'Berichte der Deutschen chemischen Gesellschaft zu Berlin,' vol. 4, page 770 there is an article by Dr. Landolt on "Bromine Water as a Reagent for Phenol and Allied Compounds." This chemist found by experiment that bromine water still caused a distinct precipitate in a solution of one part of phenol in 43,700 parts of water; but that in a solution of one part of phenol in 54,600 parts of water the reaction was no longer visible.

The precipitate produced when a watery solution of phenol is mixed with an excess of bromine water is exclusively tribromophenol, so that the reaction may be formulated as follows:—

$$C_6H_5.OH + 6Br = C_6H_2Br_3.OH + 3HBr$$

Landolt has found this confirmed by the following experiments:—0·3573 gram of crystallized phenol dissolved in water was mixed with excess of bromine water; the voluminous precipitate, collected on a filter, washed and dried, gave 1·241 gram of tribromophenol. 0·7146 gram phenol, treated in the same way, gave 2·494 grams of the bromine substitute. With these facts we get:—

Found.	Calculated.	In per cents.
326·5	331	98·6
328·1		99·1

From these results, Landolt infers justly, that the method can be used for the quantitative estimation of phenol.

Landolt's method gives indeed very satisfactory results, but it is invariably subject to many difficulties in practice. Tribromophenol is indeed nearly insoluble in water, but it cannot bear a temperature of 100° C. without being decomposed and volatilized. The extremely voluminous precipitate, after being washed, has accordingly to be dried under a shade near a hygroscopic substance until its weight remains constant. With an ordinary quantity this operation requires a few days. The drying is effected more quickly in a partial vacuum, but an air-pump is not always and everywhere at disposal.

Guided by the principle on which Landolt's method is based, after some reflection the idea struck me that the estimation might be made volumetrically in the following way:—Add a known volume of titrated bromine water, which is more than sufficient to change all the phenol present into tribromophenol, then titrate the excess of bromine in the usual manner, by first substituting iodine for it by adding potassic iodide, and then estimating the iodine by means of sodic hyposulphite with starch as the indicator.

The experiments made have answered my expectations. They have been made with slightly coloured No. 1 crystallized phenol of Calvert.

I will here mention that, for all the experiments the same solution was used; it was prepared by dissolving 8 grams of the above mentioned phenol in distilled water to a volume of 2000 c.c.

The first series of experiments were made in the following way:—25 c.c. of phenol solution, containing 0·1 gram of phenol, were mixed in a half-litre flask having a well ground glass stopper, with bromine water to the mark, that is with 475 c.c. Every time, before adding the bromine water for each experiment, 50 c.c. were pipetted into a beaker, into which a sufficient quantity of potassic iodide had previously been put, to estimate the strength of the bromine water that was used. To be certain that the bromine water was strong enough, I had made beforehand a considerable quantity in a large stoppered bottle, had brought this to the requisite strength, and then poured the contents into stoppered bottles of about 600 c.c. capacity.

The solution of sodic hyposulphite perfectly corresponded in volume strength with an iodine solution of 5 grams in the litre. Supposing the phenol to be perfectly pure it can be calculated that the theoretic quantity of bromine is contained in the 475 c.c., if 50 c.c., after decomposing with potassic iodide, require 17·9 c.c. of sodic hyposulphite. As a certain excess of bromine accelerates the formation of tribromophenol, I have always used bromine water of somewhat higher strengths.

The reason that I have chosen such weak bromine water is owing to the fact that otherwise too much bromine would be volatilized during the pouring over, by which an inevitable fault would be rendered still greater, not to mention the diffusion of the bromine in the atmosphere of the laboratory.

The first portions of bromine water do not cause a permanent precipitate on account of the previous formation of mono- and dibromophenol. After some time the precipitate no longer disappears, and as soon as the necessary quantity of bromine has been combined, the tribromophenol can be seen diffused throughout the liquid, which assumes a brown colour, showing that an excess of bromine has been used.

After some time I put 10 c.c. of a solution of potassic iodide, which contained 125 grams in the litre, into a large beaker, added to that the whole contents of the flask, and rinsed it with a little distilled water.

The iodine, set at liberty, which represented the excess of bromine, was then titrated with the above-mentioned solution of sodic hyposulphite only, or with an excess of this titrated back again with iodine of the same volume-strength. The disappearance or the appearance of the blue colour could be very clearly observed with one drop. After the disappearance the tribromophenol had a white colour.

The results of this manner of working are as follows:—

Titre for 50 c.c. Bromine Water.	Phenol Solution.	Added Bromine Water.	Time of Working.	Sodic hyposulphite for the excess of Bromine.	Per cent. of Phenol found.
19·36 c.c.	25 c.c.	457 c.c.	15 minutes	28·7 c.c.	98·8
18·1 "	" "	" "	30 "	11 95 "	98·8
18·9 "	" "	" "	15 "	19 "	99·1
19·5 "	" "	476·8 "	12 hours	22 35 "	101·
19·3 "	" "	475 "	15 minutes	20·4 "	100·6
19·4 "	" "	" "	12 "	20·4 "	101·
18· "	" "	" "	10 "	11· "	98·8
21·98 "	" "	" "	30 "	44·5 "	101·4
21·75 "	" "	" "	15 "	43·1 "	101·
21·96 "	" "	" "	15 "	44·2 "	101·4
22·22 "	" "	" "	45 "	47· "	101·3
19·55 "	" "	" "	30 "	23·6 "	100·1
9·75 "	" "	975 "	30 "	27· "	100·7

The average of these thirteen experiments amounts to 100·3 per cent., which is too high, probably owing to the loss of bromine during the pouring over of the bromine water.

If the smallest value be compared with the greatest, this method proves to leave an uncertainty of about 2·5 per cent. of the whole amount of phenol found.

Though the results obtained have sufficiently satisfied me that, according to this method, I could very well pass to the analysis of the creosote oil; still, I considered whether the method might not be modified in such a manner as (1) to reduce the error of experiment, and (2) to avoid the use of the disagreeably smelling free bromine during the operation.

In this I have succeeded by using the bromine in *statu nascenti*, according to the following formula:—

$$5KBr + KBrO_3 + 6HCl = 6Br + 3H_2O + 6KCl, \text{ or}$$
$$5NaBr + NaBrO_3 + 6HCl = 6Br + 3H_2O + 6NaCl.$$

In these experiments I have found that the bromine in *statu nascenti* reacts on phenol in dilute solutions in the same way as in a free state, so that only tribromophenol is formed and no additional products, of which I was at first afraid.

The mixture of bromide and bromate was prepared by the action of an excess of bromine on the aqueous solutions of caustic alkalies and allowing them to evaporate to dryness. It is a known fact that the bromates can bear a higher temperature than the chlorates without being decomposed, and therefore there is no fear of decomposition on a sand-bath if the temperature is not too high. When dry, the salt mass is well powdered to secure homogeneity.

Theoretically, for the conversion of 0·1 gram of phenol into tribromophenol, 0·7606 gram of the mixture ($5KBr + KBrO_3$), or 0·751 gram of the mixture ($5NaBr + NaBrO_3$) is required. Not having used pure alkalies, however, and seeing that there must be an excess of bromine, I first estimated the quantity of available bromine of both these mixtures by dissolving a known quantity in water, while adding potassic iodide, decomposing with hydrochloric acid, and then titrating the liberated iodine. Decomposition by means of sulphuric acid did not give satisfactory results.

For most of the experiments I made such solutions of both the mixtures that 100 c.c. yielded, after decomposition, the quantity of bromine required for 0·1 gram of phenol. If the degree of purity of the alkali used is known, it is of course not necessary to estimate the quantity of available bromine, but a solution is then instantly made.

The results of the experiments made with the mixture $5KBr + KBrO_3$ are given in the following columns:—

Phenol Solution.	Mixture $5KBr+KBrO_3$.	Hydrochloric Acid.	Time of Working.	Sodic hyposulphite for the excess of Bromine.	Average or most probable Titre.	Per cent. of Phenol found.
25 c.c.	60·05 c.c.	20 c.c. (*)	16 hours	19·5 c.c.	75·2 c.c. for 25 c.c.	99·6
" "	64·95 "	" "	24 "	34·7 "	" " " " "	99·3
" "	100 "	" "	5 "	18 5 "	89·8 c.c. for 50 c.c.	99·5
" "	" "	" "	12 "	18·35 "	" " " " "	99·6
" "	" "	25 "	" "	17·95 "	" " " " "	99·8
" "	" "	5 "	30 mins.	20·9 "	90·9 c.c. for 50 c.c.	99·4
" "	" "	25 "	12 hours	19·3 "	" " " " "	100·3
" "	" "	" "	" "	19·25 "	" " " " "	101·3
" "	" "	" "	30 mins.	20· "	" " " " "	99·9
" "	" "	" "	20 hours	21·3 "	" " " " "	99·1

The last determination I made with the mixture ($5NaBr + NaBrO_3$). The results were as follows:—

Phenol solution.	Mixture $5NaBr+NaBrO_3$	Hydrochloric Acid.	Time of Working.	Sodic hyposulphite for the excess of Bromine.	Average Titre.	Per cent. of Phenol found.
25 c.c.	100 c.c.	5 c.c.	15 mins.	40·7 c.c.	201·35 c.c. for 100 c.c.	99·2
" "	" "	" "	" "	40·2 "	" " " " "	99·3
" "	" "	" "	30 "	40·5 "	" " " " "	99.3
" "	" "	25 " (*)	" "	40·2 "	" " " " "	99·5

All these experiments were performed in the following manner: I first poured the solution of phenol into a bottle of about 250 c.c. capacity, provided with a well ground glass stopper, added to this the solution of the mixture, shook it a little, added at last the hydrochloric acid and then closed the bottle firmly. After having thoroughly brought about the mixing by shaking up, I put the bottle aside.

The hydrochloric acid, used for the decomposition, marked in the column with (*) was diluted; it was about normal (35·46 grams in the litre); the rest was ordinary concentrated acid.

With the use of the diluted acid, not the least change is to be perceived the first minute; it is not before the second minute that the liquid becomes cloudy, which cloudiness then increases very rapidly on account of the formation of white tribromophenol. The excess of bromine does not become visible till after the lapse of about 15 minutes, depending on the degree of concentration and the quantity of hydrochloric acid. With the use of concentrated hydrochloric acid, a formation of bromine and of tribromophenol instantly takes place.

After reacting the above mentioned time the bottle was opened, 5 c.c. of the above mentioned solution of potassic iodide were quickly added, the bottle was again instantly closed and then well shaken. The titration in most of the cases was effected in the bottle itself; only on two occasions I poured the contents into a large beaker, rinsed the bottle twice, and added both those quantities to the fluid in the beaker. The liberated iodine was titrated for all the experiments only with sodic hyposulphite until the blue colour ceased to show itself within a lapse of some minutes. The tribromophenol remained in all the experiments with the same physical qualities as in the estimation by means of bromine water.

If these results be compared with the first, obtained with bromine water, it appears that they come nearer to the truth, while the fault of experiment also becomes considerably less. If the smallest value be compared with the greatest obtained in the series of experiments with the use of the mixture of $5KBr+KBrO_3$, there still remains according to this method an uncertainty of at the most 1·5 per cent. of the whole amount of phenol found. This uncertainty is already much less than 2·5 per cent, while besides this, the experimenter has got rid of the no small trouble of working with free bromine, which exercises on the organism a disagreeable and at the same time obnoxious influence, even if the quantity diffused is not great.

Upon casting a glance, however, at the results obtained with the mixture of $5 NaBr + NaBrO_3$, it is clearly apparent that by this method the uncertainty amounts to less than one half per cent., a result not to be compared to that of the method hitherto usually followed by means of a solution of caustic potash.

Though the time of the reaction with the potassium compounds was generally much longer than with the sodium ones, one cannot help being rather astonished at obtaining a better result with the use of the mixture of $5 NaBr + NaBrO_3$, than with that of $5 KBr + KBrO_3$. According to my judgment the reason for the different results in these two series of experiments is probably to be found in the impurity of the caustic potash I used, which was not the case with the caustic soda. This difference did not only result from the qualitative analysis, but also from the different quantities of available bromine that produced the two perfectly dry mixtures.

My various official occupations have prevented me from convincing myself of this matter by experiment. Perhaps the sulphates exercise here, in presence of free acids and free iodine, a disturbing influence. As caustic soda is in the first place cheaper, and in the second place easier to be prepared fairly pure, there is not the least objection in future to use caustic soda for preparing the mixture of bromide and bromate.

Before formulating my method, I wish to communicate the experiments that have relation to the determination of the titre of both the mixtures, so as especially to be able to observe the influence which is exercised by the diluting and by the quantity of added hydrochloric acid.

Mixture of $5KBr+KBrO_3$	Time after which Potassic Iodide is added and the quantity.	Hydro-chloric Acid.	Time of Working.	Sodic Hypo-sulphite.
25 c.c.	After 12 hours 10 c.c.	10c.c.(*)	16 hours.	75·25 c.c.
,, ,,	,, ,, ,,	,, ,,	,, ,,	75·2 ,,
50 c.c.	After 1 hour 10 c.c.	,, ,,	3 ,,	89·1 ,,
,, ,,	,, ,, ,,	,, ,,	3·5 ,,	89·7 ,,
,, ,,	,, ,, ,,	,, ,,	24 ,,	89·7 ,,
,, ,,	Instantly ,, ,,	,, ,,	10 minutes.	90· ,,
,, ,,	,, ,, ,,	,, ,,	24 hours.	90· ,,
,, ,,	After 10 min. ,,	20 ,,	15 minutes.	89·95 ,,
,, ,,	Instantly ,, 5 ,,	10 ,,	24 hours.	86· ,,
,, ,,	,, ,, 10 ,,	20 ,,	2 minutes.	89·82 ,,
,, ,,	,, ,, ,,	25 ,,	,, ,,	89·55 ,,
,, ,,	Instantly ,, ,,	25 ,,	5 minutes.	90·8 ,,
,, ,,	,, ,, ,,	,, ,,	2 ,,	90·85 ,,
,, ,,	,, ,, ,,	,, ,,	,, ,,	90·85 ,,
,, ,,	,, ,, ,,	,, ,,	,, ,,	90·85 ,,
,, ,,	,, ,, ,,	,, ,,	8 hours.	90.9 ,,
,, ,,	,, ,, ,,	5 ,,	2 minutes.	91·05 ,,
,, ,,	,, ,, ,,	,, ,,	,, ,,	91·1 ,,

Mixture of $5NaBr+NaBrO_3$	Time after which Potassic Iodide is added, and the quantity.	Hydro chloric Acid.	Time of Working.	Sodic Hypo-sulphite.
100 c.c.	Instantly 20 c.c.	10 c.c.	2 minutes.	201·6 c.c.
,, ,,	,, ,, ,,	,, ,,	,, ,,	201·2 ,,
,, ,,	,, ,, ,,	,, ,,	,, ,,	201·3 ,,
,, ,,	,, ,, ,,	,, ,,	,, ,,	201·3 ,,

From all these facts it follows that phenol in liquids which contain no other substances upon which bromine reacts, can be estimated volumetrically with greater accuracy than by shaking with a strong solution of caustic potash, and moreover in a comparatively short time.

Estimation of phenol occurs almost exclusively in the analysis of creosote oil and of non-crystallized hydrated carbolic acid, and it is just for both these mixtures that the volumetric method may render good services.

If a single sample has to be analysed, and if it is not necessary to obtain the greatest possible accuracy, bromine water leads in a shorter time to a wished for result. If the estimation of phenol is often required in any institution, the other method is of course preferable, for once in the possession of a considerable quantity of a titrated solution of $5NaBr+NaBrO_3$, the advantages are threefold: (1) greater accuracy, (2) the use of free bromine is not necessary, while (3) every estimation can be made in a shorter time.

If hydrated carbolic acid is to be analysed, it is only necessary to prepare a dilute solution in water, and to make the estimation with it. For the analysis of creosote oil that contains many hydrocarbons, a weighed quantity has to be dissolved in a litre flask by means of warm water, in order to facilitate the solution of the phenol that is present. In my experience I have perceived that on being allowed to stand some time after cooling, the brown coloured tar products stick to the sides of the flask, and a colourless solution as clear as water can be removed with a pipette. Thick solutions must be filtered.

As is known, creosote oil contains besides phenol some small quantities of creosols and other homologues that are also soluble in water, and by maens of bromine also pass into bromine substitutes. The bromine which is added will consequently act on those substances too, and perhaps in the same way; this, again, will exercise an influence on the result. As, however, the analysis of creosote oil almost always takes place in order to determine the value of disinfectants according to the percentage of phenol, or for the creosoting of wood, and as the creosols play the same part as phenol, the fault committed diminishes thereby considerably; and still more so, because phenol is always found in considerable quantities in the fractional distillation products of coal tar, in proportion with its homologues. As I did not possess a cresol upon the purity of which I could rely, and had not the time to prepare one, I remain uncertain as to whether the method can be also applied to these.

To conclude, I proceed to formulate both methods, and believe it can be done by the following description:—

Volumetric Estimation of Phenol by Means of Bromine Water.

Solutions required.—(1) A solution of sodic hyposulphite, that agrees in volume strength with an iodine solution of five grams in the litre. (2) A filtered solution of starch. (3) Bromine water, contained in stoppered bottles of at least 550 c.c. capacity, and which is of such a strength, that 50 c.c. require, after decomposition with potassic iodide, 18 to 20 c.c of the first mentioned solution of sodic hyposulphite. (4) A solution of potassic iodide that contains 125 grams in the titre

Performance of the Analysis.—Let a clear solution of the sample that is to be analysed be made by dissolving four grams in distilled water to a volume of 1000 c.c.; then remove 25 c.c. of it with a pipette into a half-litre flask provided with a well ground glass stopper, and soon after fill the flask with bromine water to the mark, close the flask carefully and shake it well.

Before adding the bromine water, 50 c.c. of it is to be pipetted into a beaker, in which 5 c.c. of the solution of potassic iodide (No. 4) have been put beforehand, in order to determine the titre.

After the lapse of a quarter of an hour, pour the contents of the flask into a large beaker, containing 10 c.c. of the solution of potassic iodide; rinse twice with a little water, and add this to the liquid in the beaker. Lastly, the liberated iodine is to be titrated with the solution of sodic hyposulphite, the starch not being added until the end. If the blue colour does not return within a couple of minutes the number of cubic centimetres is indicated.

Calculation, expressed in per cents. Phenol.—If for the analysis, 25 c.c. of the solution have been taken, containing 0·1 gram of the sample, 475 c.c. of bromine water have been added, and for the determination of the titre 50 c.c. have been used, and this quantity as well as the excess has been titrated with a solution of sodic hyposulphite that agrees in volume strength with an iodine solution of 5 grams in the litre, then I find it convenient to make use of the formula—

$$(9{\cdot}5\,a - b)\ 0{\cdot}61753,$$

in which a represents the number of cubic centimetres of sodic hyposulphite solution required for the determination of the titre, and b for the excess of bromine. The figure obtained then expresses the percentage of phenol in the examined sample.

Volumetric Estimation of Phenol by Means of a Mixture of Sodic Bromide and Sodic Bromate.

Solutions required.—(1) A solution of sodic hyposulphite that agrees in volume strength with an iodine solution containing 5 grams in the litre.

(2) A solution of $5\ NaBr + NaBrO_3$, of such a strength that 50 c.c., mixed with 10 c.c of the hereafter mentioned solution of potassic iodide, and decomposed by means of 5 c.c. concentrated hydrochloric acid after dilution with about 100 c.c. water, require 86 to 95 c.c. of the first mentioned solution of sodic hyposulphite.

The salt mixture is to be prepared by decomposing a solution of fairly pure caustic soda, free of sulphates, with an excess of bromine, evaporating to dryness, and well rubbing the salt mass thus obtained in a mortar, if the whole quantity is not needed. If a solution of this mixture containing 9 grams in a volume of 100 c.c. be prepared it will generally be too strong, but after titrating it can easily be reduced to its required strength by diluting with water.

(3) A filtered solution of starch.

(4) A solution of potassic iodide containing 125 grams in the litre.

Performance of the Analysis.—When the strength of the mixture $5NaBr + NaBrO_3$ has been determined in the way above described, pour into a well closing stoppered bottle of about 250 c.c. capacity, 25 c.c. of the solution containing 0·1 gram of the sample; add to that 100 c.c. of the titrated solution of the mixture ($5\ NaBr + NaBrO_3$), and last of all 5 c.c. concentrated hydrochloric acid. Instantly close the bottle and shake it. After a quarter of an hour the bottle is opened, 10 c.c. of the solution of potassic iodide (No. 4) are quickly added, the bottle is again closed and well shaken. After having washed off the stopper with water, the liberated iodine in the bottle itself is titrated by means of the first mentioned solution of sodic hyposulphite and starch as the indicator. Here as well as with the titration of of the titre, the starch is not added before the end of the experiment.

Calculation expressed in per cents. Phenol.—If an estimation of phenol has been made according to this method, and 0·1 gram of the sample, 50 c.c. of the mixture ($5\ NaBr + NaBrO_3$), for the determination of the titre, and 100 c.c. of this same solution has been taken for the determination of the phenol, the formula—

$$(2\,a - b)\ 0{\cdot}61753$$

can be used, in which a and b have the same signification as in the preceding formula.

Modification in known cases.—It will be easily understood that it is advisable, if a sample contains very little phenol, to weigh a multiple of 4 grams, and to make a solution of that quantity to the same volume of 1000 c.c., taking care that in 25 c.c. no more than 0·1 gram of pure phenol shall be present.

In cases of this modification only, both the formulas may still be used in the calculation, provided that the figure obtained is made as many times less as the multiple of 4 used in the performance amounts to.

The Hague, Feb. 1876.

THE PREPARATION OF DEXTRINE-MALTOSE (MALT-SUGAR) AND ITS USE IN BREWING.*

BY WM. GEO. VALENTIN, F.C.S.,
Royal College of Chemistry, South Kensington.

The Cantor Lectures on "Fermentation," delivered before the Society of Arts by Professor Williamson, in the year 1872, and the elaborate account given two years ago, on the art of brewing, by Dr. Graham, clearly show that the Society of Arts, and more recently its Chemical Section, has always been true to the objects for which it was founded, viz., for the encouragement of arts, manufactures, and commerce.

I have been asked to bring before the Chemical Section some recent observations and improvements made by myself and my friend, Mr. Cornelius O'Sullivan, who, since leaving the College of Chemistry, and after having spent some time with Dr. Hofmann in Berlin, has been in the employment of Messrs. Bass and Co.

I should have preferred if Mr. O'Sullivan had been able to spare the time to give the Society the benefit of his vast stores of practical and scientific knowledge of the art of brewing, and I should certainly have hesitated to undertake the task of delivering a lecture before the Chemical Section, which comprises so many brewers of great practical and theoretical acquirements, if your secretary had not allowed me to confine myself to the limited subject indicated by the title to this lecture—viz., the "Preparation of Dextrine-Maltose (or Malt-Sugar) and its use in Brewing," to the production of which, on a manufacturing scale, I have of late given much time and attention.

The art of preparing fermented liquids, dating as it does from the remotest times, and met with among various races widely separated from each other, was up to very recent times of a purely empirical character. It is only during the last thirty or forty years that the progress of chemical science left its mark upon this art, as upon so many others. Our great brewers, among whom I would, without fear of encountering the reproach of flattery, single out the great brewing firms of Messrs. Bass and Co., and of Messrs. Allsopp and Sons, availed themselves speedily of the conquests made by pure science which promised to throw light upon their purely empirical processes, and to clear away the mist that hung over some of the chemical changes involved in brewing. Thus it has come to pass that, from the heads of these firms down to the under-brewers, a chemical knowledge was considered the requisite thing, and that we see eminent scientific chemists now superintending the chemical departments of these firms. The progress made in the chemistry of brewing, although at present locked up to a great extent and rendered unavailable to the general public, has been very great. The labours of Pasteur and other scientific investigators have been eagerly examined and applied practically by brewers; and, by following up Pasteur's microscopic researches on ferments, we are promised that, by a careful microscopic examination of the yeast or barm, we may keep disease out of the brewing-house, or arrest its propagation with freshly-brewed beers. It will in like manner be possible to predict whether such beers contain any ferments which will damage or destroy their keeping powers—*i.e.*, whether they carry in themselves the germs of inevitable destruction immediately after brewing.

Considering the great help which pure chemistry at various times has generously rendered to brewers, it may well be thought desirable, in the words of Mr. Robert Warington, F.C.S., who favoured the Chemical Society recently with his great stores of knowledge gained in the manufacture of tartaric and citric acids, in Mr. Lawes' Millwall Laboratory, "that most of the large amount of information which is acquired in the laboratories of our great manufacturing concerns might be published without any injury to the individual manufacturer."

The chemical reactions involved in the manufacture of beer are not very numerous, and are still rather imperfectly understood. The process may be said to have for its object the production of a partially fermented and gradually fermenting liquid, termed beer, from barley, hops, water, and yeast.

In the preparation of wine, the grapes have only to be pressed to obtain the saccharine liquid, which by its fermentation yields wine. The saccharine matter—the grape-sugar—is ready formed. But when wine of barley, or beer, has to be made, nature has not elaborated so much of the process. She gives us the raw material in a different form: the alcohol producing portion of the grain is starch chiefly. It is the object of the maltster and brewer so to act on the grain as to produce beer.

Alcohol results from the vinous fermentation or conversion of grape-sugar or glucose into alcohol and carbonic acid, according to the equation :—

$$\underbrace{C_6 H_{12} O_6}_{\text{Grape Sugar.}} = \underbrace{2 C_2 H_5 HO}_{\text{Alcohol.}} + \underbrace{2 CO_2}_{\text{Carbonic Acid.}}$$

In grapes this sugar results, no doubt, from the slow action of the soluble albuminoid substances contained therein, during the ripening process. The wine which is made from grapes constitutes a more or less completely fermented alcoholic liquid, derived mainly from the grape-sugar, which differs from beer in being a completely fermented liquor, practically without any dextrine, and, with the exception of artificial effervescing wines, such as Champagne, sparkling Moselle, etc., also without carbonic acid.

The process of wine making has, as is well known, undergone considerable changes, especially during the last ten or fifteen years, since chemistry has thrown light upon the changes involved in it. A considerable quantity of good wine is now made by repeated fermentation of the squeezed skins or husks of the grape with some artificially prepared grape-sugar. This is known under the name of "Pétiot's" process. According to another process, called after its originator, "Chaptal," sugar is added with most excellent results, in unfavourable wine years, as a corrective for the increased amount of acid.

Gall proposed to dilute acid wine with water, to the proportions found in wines of good years, and to add the requisite quantity of sugar, to produce the proportions of alcohol and acid contained in wines made during good wine years.

There can be no doubt that all these processes are perfectly legitimate, and, if practised with the proper knowledge and care, can only be beneficial both to the wine-grower and consumer.

Cane-sugar or loaf-sugar is mostly used for such purpose, on account of its greater purity and freedom from nonfermentable constituents, as well as albuminoid substances. Its composition differs from that of grape-sugar $C_6H_{12}O_6$, by containing less water—viz., $C_{12}H_{22}O_{11}$, and during the fermentation it has to be converted into the glucose, called grape-sugar, by the assimilation of water; 86·4 parts of cane-sugar perform, therefore, the same amount of work as 100 parts of pure crystallized grape-sugar.

The stages through which the starch in barley—the grain which is almost exclusively used in this country—passes before it reaches us as the fermented alcoholic extract called beer, are more numerous and probably of a more complicated nature. They may be considered in the following order :—

(1) Malting.
(2) Mashing.
(3) The Fermentation of the Wort.

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* Paper read before the Chemical Section of the Society of Arts and reprinted from the *Journal of the Society of Arts*, March, 24, 1876.

In order to show a *raison d'être* for bringing before you the new substitute for malt, which we have termed "Dextrine-Maltose," or malt-sugar, I shall first dwell upon the composition of malt, and will endeavour to show you that, by a patient study of the constituents contained in malt before and after infusion, in connection with those contained in the fermented beer, much additional insight into the brewing process may be gained.

Composition of Malt.

Chemists gain their knowledge of the composition of matter by certain analytical processes: that knowledge is the more perfect, the more perfect and reliable the analytical processes are which they have to employ. Now we possess pretty accurate methods for the quantitative estimation of moisture, ash, fat, cellular matter, and total albuminoid or nitrogenous matter; but little or no attention has hitherto been paid to the different varieties of albuminoid bodies contained in malt. The isolation and estimation of the starchy matter, or, as I would call it by preference, of the carbohydrates which, without doubt, form the most important constituents of malt, is more difficult, and great errors have been made, as we have to rely mostly upon chemical methods, which are likely to mislead if not carefully checked by other observations, if possible by polariscopic experiments. I give it upon the authority of Mr. O'Sullivan, that of the many analyses of malt which have been published not one can be relied on in this particular respect.

Thus it has always been stated, even by more recent careful inquirers, such as Oudemans, that malt contains dextrine (8 per cent.). O'Sullivan cannot find any dextrine, although he looked most carefully for it by processes which would have yielded it if it had been present in malt. This opinion seems to be shared by other recent investigators—*e.g.*, by Kühnemann,* although the proofs which he adduces are meagre, and do not appear to be sufficient to warrant the conclusions at which he arrives.

Again, the amount of sugar (the variety is never stated) is usually set down at from ·4 to 1 per cent. This, too, O'Sullivan considers absolutely wrong. He finds in malt from 16 to 20 per cent. of a fermentable sugar.

About half of this is due to the transformation of starch, or a carbohydrate of a like character during the malting process. The remainder is ready-formed in barley, and differs from the one produced by malting. O'Sullivan has not yet been able quite satisfactorily to isolate and determine the character of these sugars, but of their existence he is quite convinced.

There is in the starch of barley a carbohydrate of the starch type having a laevo-rotatory action on polarized light. Kühnemann calls this body "sinistrin," but from its general character O'Sullivan is inclined to think the body is inulin. These remarks may appear to some of you perhaps premature, and not sufficiently supported by analytical facts. I had, however, to refer to them in order to render comprehensible the subjoined analyses of malts, which may be taken as typical for most pale malts, although the percentages of albuminoids and soluble carbohydrates are capable, to some extent, of modification by changes in the malting process.

The following table gives the detailed composition of two samples of pale malt:—

	Malt No. 1.		Malt No. 2.	
Starch		44·15		45·13
Other carbohydrates (of which 60 per cent. to 70 per cent. consist of fermentable sugars) Inulin (?) and a small quantity of other bodies soluble in cold water		21·23		19·39
Cellular matter		11·57		10·09
Fat		1·65		1·96
Albuminoids—				
(*a*) Soluble in alcohol of sp. gr., ·820 and in cold water.	·63		·46	
(*b*) Soluble in cold water and at 68° C.	3·23		3·12	
(*c*) Insoluble in cold water, but soluble at 68° to 70° C.	2·37		1·36	
(*d*) Insoluble at 68° to 70° C., but soluble in cold water (albumin proper)	·48		0·37	
(*e*) Insoluble in cold water and at 70° C.	6·38	13·09	8·49	13·89
Ash		2·60		1·92
Water		5·83		7·47
		100·12		99·76

Every item in these analyses has been estimated directly and not by difference. The further elucidation of the carbohydrates other than ordinary starch O'Sullivan reserves, should time allow him, for a communication to the Chemical Society.

I have on another diagram given, for comparison sake, an analysis of the Dutch chemist, Oudemans, hitherto looked upon as among the most reliable analyses of barley and malt.

Table showing composition of barley and malt (Oudemans):—

	Barley, air-dried.	Malt, air-dried.
Dextrine	5·6	8·0
Starch	67·0	58·1
Sugar	none	·5
Cellulose	9·6	14·4
Albuminoids	12·1	13·6
Fat	2·6	2·2
Ash	3·1	3·2
	100·0	100·0

Albuminoid compounds in malt (Oudemans):—

(*a*) Soluble in Alcohol	·34
(*b*) Coagulable by Heat	·45
(*c*) Not Coagulable	2·08
(*d*) Insoluble Albumin	6·23
	9·10

By starting thus with a more clearly defined knowledge of the starch present in malt we shall have less difficulty in tracing the changes which it undergoes during its conversion into beer, and you will be able to judge whether the substitute for it which we can produce on a manufacturing scale and which we have called, not by some fanciful name, but by a name which expresses its proper chemical composition—viz., Dextrine-Maltose—will deserve your serious attention.

(*To be continued.*)

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* *Ber. d. Chem. Ges. Berlin*, viii, 202 and 387.

The Pharmaceutical Journal.

SATURDAY, APRIL 15, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W.* *Envelopes indorsed "Pharm. Journ."*

FIFTY YEARS AGO.

So readily generally does the world appreciate, appropriate, and assimilate the results of scientific discovery, that long before the discoverers pass away it may become difficult to realize that the necessity of to-day was the unknown of yesterday. Only last week we chronicled the death, at the age of seventy-four, of one whose life history is indissolubly connected with the discovery of an element of which, in either the free or combined state, absolutely nothing was known before, but which now plays no inconsiderable part in art, manufacture and medicine; and as the discoverer was a pharmacist and an Honorary Member of the Pharmaceutical Society of Great Britain, his death will not be an unsuitable occasion for recalling in this Journal a few of the details of his work.

Exactly fifty years have passed away since a memoir upon a particular substance contained in sea water, written by ANTOINE JEROME BALARD, "pharmacien et préparateur de chimie à la Faculté des Sciences à Montpellier," made known to the scientific world that in the mother liquors of the salt marshes at Montpellier the author had found a substance which he believed would prove to be a hitherto unknown simple body, and to which, on account of a most manifest physical character, he had given provisionally the name "bromine." At first it was intended that the new substance should be designated "muride," but this name was open to many objections, and it was replaced by the peculiarly appropriate one now in use.

The consideration of BALARD's memoir was entrusted by the French Academy of Sciences to a commission consisting of VAUQUELIN, THENARD, and GAY-LUSSAC, and their report was most flattering. Without committing themselves absolutely to the opinion that bromine would prove to be a new element, they thought it very probable; whilst they described the discovery of bromine as a very important acquisition for chemistry, and one by which the young chemist would enter upon his scientific career in a most honourable manner.

In fact, BALARD's memoir was something more than a bare announcement that he had met with a novel substance; it manifested the true spirit of thorough research. Having noticed that when the ash of sea-weed containing iodine was treated after the addition of starch solution with chlorine water it showed not only a blue, but also a rather intense yellow zone, and that an analogous coloration took place when the mother liquors of "salines" were similarly treated, he did not rest satisfied until he had hunted down the cause, isolated the bromine, and formed with it a considerable proportion of the bromine compounds known at the present day.

As confirmation of this statement, we will briefly recapitulate the subjects of the principal sections of BALARD's memoir, merely premising that LIEBIG, who though a year younger than BALARD was already a Professor at Giessen, reported the same year that he had been able to "vérifier un grand nombre des expériences de M. BALARD, mais je n'ai aperçu aucun phénomène contraire aux conclusions auxquelles M. BALARD a été conduit par ses expériences." Starting with two processes for the extraction of bromine, BALARD described its physical properties. He then showed how, reasoning from analogy, he had prepared the hydrogen compound, hydrobromic acid, and described the potassium ammonia, baryta, magnesia, lead, tin, mercury, silver, gold, and platinum salts. Another section was devoted to the action of bromine upon the metallic oxides and another to bromic acid and its combinations, and lastly the chloride of bromine and the compounds of bromine with iodine, phosphorus, sulphur, and carbon were described.

Although BALARD had early detected the presence of bromine in plants and animals living in sea water and also in a mineral water from the Pyrenees, and had pointed these out as probable sources of bromine, the new element was for a long time obtained chiefly from the mother liquor of sea water evaporated in the preparation of potash salts. The proportion was so small, that the price was necessarily high, and in 1865, when the manufacture of bromine was commenced at Stassfurt, the price had reached 22*s.* 6*d.* per lb. The effect of throwing fifteen to twenty thousand pounds weight annually into the market was to reduce the price in two years to one-fifth.

Recently the manufacture of bromine has attained considerable dimensions in the United States, and it is alleged that enough could be prepared from the bittern of the salt wells in Ohio and Western Virginia to supply the whole consumption, the united product of the existing factories there being estimated at nearly 5000 lbs. of bromine per week!

Whether this be an exaggerated estimate or not, we think enough has been said to illustrate the magnitude of the results initiated by the discovery of the pharmacist who has just passed away.

MR. THOMSON ON DISPENSING.

THE paper which Mr. THOMSON proposed to read at an Evening Meeting of the Pharmaceutical Society was lately read before the Manchester Literary and Philosophical Society, and it has been published in the Proceedings of that Society together with a foot note stating that "The facts contained in this paper were accepted by the Committee of the Pharmaceutical Society of Great Britain to be read before them and subsequently on the day advertised by them for its reading, rejected by the Council." This statement is altogether incorrect, neither was the paper ever accepted by any Committee connected with the Pharmaceutical Society, and, on the contrary, though it happened to have been announced that it would be read at the Evening Meeting, an examination of the paper when it was received led to the conclusion that it was so manifestly unfit for that purpose as to leave no alternative but to reject it.

The reasons for adopting this course were at the time indicated in this Journal, and we should not now have referred to the subject had it not been necessary to correct the misrepresentation of fact which is conveyed in the note appended to the paper in the 'Proceedings of the Manchester Literary and Philosophical Society.'

PHARMACY ACT FOR NEW HAMPSHIRE.

INCLUDED in the 'Proceedings of the American Pharmaceutical Association,' just received, is the text of an Act recently passed for the regulation of pharmacy in New Hampshire. As we are not unfrequently asked for information respecting the legal conditions under which pharmacy is practised in the United States, and as these conditions are independently regulated by the Legislatures of the individual States, it may be useful to indicate the chief points in this new Act, which appears to differ from any of the Acts for other States hitherto noticed in this Journal.

The Act provides for the construction and keeping of a Register of persons who alone are to be entitled to conduct or keep a shop in the State of New Hampshire for the purpose of retailing drugs, medicines, or such chemicals as are used in compounding medicines, or to engage in the business of compounding the prescriptions of physicians and vending medicines, either as proprietor, agent, or assistant. The persons entitled to registration are those who obtain a certificate of qualification from certain commissioners, or who are able to satisfy the commissioners that they had been engaged in conducting an apothecary's business for themselves or others or six months prior to the passing of the Act.

The commissioners, three in number, are to be appointed by the Governor of the State, and are designated "The Commission of Pharmacy and Practical Chemistry." They are eventually to hold office for three years, and before entering upon their duties are to be sworn to impartially examine all persons who desire to engage in the business of apothecaries and druggists, and, if they find them "skilled and learned in pharmacy," to give them certificates of qualification. Each certificate is to be signed by at least two commissioners, and the commissioners are to be "entitled to demand and receive from each applicant for examination, to whom a certificate shall be granted, as aforesaid, the sum of five dollars." It does not appear very clear from this that the commissioners are to be entitled to any fee in the case of failure to obtain a certificate; though as the fees are to be in full payment for the services and expenses of the commissioners there might be some difficulty in persuading them that it was their duty to return the fees, if prepaid, to unsuccessful candidates.

The wide scope of the business thus limited to the registered druggist appears to have dispensed with the necessity for a poison schedule; in fact the word "poison" does not occur once in the Act. Provision is made that the Act is not to be so construed as to interfere with physicians dispensing their own prescriptions or with the sale of proprietary medicines.

PHARMACY IN THE ANTIPODES.

AMONGST the numerous and varied questions that are put to us in our editorial capacity, not the least difficult to answer are those which relate to the temptations which the colonies present to pharmacists. So much depends upon the prospective colonist himself that it is rather difficult to give advice in such a matter. But experience is always valuable, and we are glad to be able to furnish a few particulars supplied by an Associate of the Pharmaceutical Society, writing from Brisbane, New South Wales.

In that colony, our correspondent says, the salaries are not really better than at home, in consequence of the longer hours. He himself commences work at 7 in the morning and continues until 10 at night, except on two nights a week when he is at liberty at 7. Every other Sunday he has to himself. Our correspondent describes his salary as a "very fair" one, but says that he knows several assistants who are not getting more than £70 a year indoors, which is not much for fifteen hours a day. The dispensing prices he considers to differ but very slightly from the best houses at home: 16 oz. mixtures, 4*s.* 6*d.*; 8 oz., 3*s.* 6*d.*; tinctures, 1*s.* per ounce, etc. Taking all together he thinks both employers and assistants are better off in England. A Queensland prescription which our correspondent has sent to us as an average specimen, and which he attributes to one of the first doctors in the colony, is written upon the back of a small scrap of a letter apparently received from a lady patient.

AT the last annual meeting of the New Hampshire Pharmaceutical Association, held last October, in the city of Manchester, Professor J. ATTFIELD, Drs. A. CHEVALIER, F. MOHR, F. A. FLÜCKIGER, and G. DRAGENDORFF, and Mr. HENRY BRADY were elected Honorary Members of the Association.

Transactions of the Pharmaceutical Society.

BENEVOLENT FUND.

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Bates, Thomas, 6, Chrisp Street, Poplar	0	10	6
Bates, William I., Mill Street, Macclesfield	0	10	6
Baynes, James, 24, Waterworks Street, Hull	0	10	6
Beach and Barnicott, Bridport	1	1	0
Beach, James, East Street, Bridport	0	10	6
Beddard, John, 46, Churton Street, S.W.	1	1	0
Bell, Charles B., 6, Spring Bank, Hull	0	10	6
Bell, Edward C., High Street, Berkeley	0	10	6
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Brunton, Mrs. C., 747, Commercial Road, Limehouse	0	10	6
Bulgin, William, 22, New Road, Gravesend	0	10	0
Burch, W., 21, Onslow Road, Southampton	0	2	6
Burdon, John, 14, Claypath, Durham	0	10	6
Burgess, William, Market Street, Stourbridge	0	5	0
Burton, John, Ousegate, Selby	0	2	6
Butler, James A., 51, Sanvey Gate, Leicester	0	5	0
Butler, Thomas Edward. 51, Sanvey Gate, Leicester	0	5	0
C. H.	1	1	0
Cadman, Daniel C., 12, Rendezvous Street, Folkestone	0	10	6
Cadoux, S. H., 30, Gallowtree Gate, Leicester	0	5	0
Caley, Albert J., 2, London Street, Norwich	0	10	6
Campkin, A. S., Rose Crescent, Cambridge	0	5	0
Campion, Robert, High Street, Harlow	0	10	6
Cartwright, William, Ironmarket, Newcastle-under-Lyme	0	10	6
Chadwick, John, 50, Avenue Parade, Accrington	0	2	6
Chamberlin, William, Downton, Wilts	0	5	0
Chaplin, John Lambert, Wakefield	0	10	6
Chaston, Mrs. A. M., 82, High Street, Lowestoft	0	10	6
Clark, Thomas P., High Street, Stourbridge	0	5	0
Clark, William, 25, Charlotte Street, Landport	0	5	0
Clayton, W., Wicker, Sheffield	0	10	6
Clifton, F., Derby	0	10	6
Cocher, John A., St James's Street, King's Lynn	0	5	0
Cocker, Justus J., 111, Oxford Street, Manchester	0	5	0
Cocking, George, 45, Bull Ring, Ludlow	0	5	0
Codd, Francis, Duke Street, Devonport	0	5	0
Coldwell, David B., 86, Queen's Road, Peckham	0	10	6
Cole, Walter T., Weymouth	0	5	0
Coleman, William, Worcester Street, Wolverhampton	0	10	6
Coles, Alfred C , Commercial Road, Bournemouth	0	2	6
Collier, J. A., 55, James Street, Docks, Cardiff	0	2	6
Collins, Henry George, 29, High Street, Windsor	0	5	0
Colton, Thomas, Ousegate, Selby	0	2	6
Cooling, William John, Castlegate, Newark	0	5	0
Cooper, B N., 40, Chestergate, Stockport	0	2	6
Cooper, Henry, 44, Market Place, Leicester	0	5	0
Cooper, Thomas, 44, Market Place, Leicester	0	10	6
Cooper, Wm., H. 5, Andover Terrace, Hornsey Road	0	10	6
Cope, John A., Derby	0	5	0
Corder, Octavius, 2, London Street, Norwich	0	10	6
Cornish, Wm., 174, Western Road, Brighton	0	5	0
Cosway, Edwin C., 21, Salusbury Terrace, Kilburn	0	5	0
Cotterill, Wm. Hy., Snargate Street, Dover	0	2	6
Cousins, T. G., 17, Magdalen Street, Oxford	0	10	6
Cowgill, Mrs. Eliza P., 28, Manchester Road, Burnley	0	10	0
Cox, Mrs. Julia Jane, Stony Stratford	0	10	6
Cracknell, Chas., 217, Edgware Road, W.	2	2	0
Craft, Jas., 10, London Street, Reading	0	2	6
Crawshaw, Edward, 64, St. James Street, Burnley	0	10	0
Crawshaw, Henry, Sheffield	1	1	0
Crick, Geo. E., High Street, Maldon	0	10	6
Cross, Wm. G., Shrewsbury	0	10	6
Cross, Wm. G., jun., Shrewsbury	0	10	6
Cubley, Geo. A., High Street, Sheffield	0	10	6
Cumber, Henry, 3, Pollett Street, Guernsey	0	2	6
Currie, John, 70, Eglinton Street, Glasgow	0	5	0
Currie, John, 479, Sauchiehall Street, Glasgow	0	5	0
Cutting, Thomas John, Finkle Street, Selby	0	5	0
Davenport, H. G., 79, Heaton Lane, Stockport	0	5	0
Davidson, Chas., Uunion Street, Aberdeen	0	10	6
Davies, John L., Hay	0	5	0
Davis, R. H., 26, Regent Parade, Harrogate	0	5	0
Davison, Thomas, 126, Buchanan Street, Glasgow	0	10	6
Dawes, Herbert, 45, Bull Ring, Ludlow	0	5	0
Dawson, F. R., Quadrant, King Street, Wigan	0	5	0
Dawson, Oliver R., Belle Vue Road, Southampton	0	10	6
Deck, Arthur, 9, King's Parade, Cambridge	0	10	6
De Peare, John Thomas, 216, St. Pauls Road, N.	0	5	0
Dickie, James, 19, Struan Terr, Victoria Road, Glasgow	0	5	0
Dingley, Richard L., Bridge Street, Evesham	0	5	0
Dixon, Joseph, 30, Whitefriargate, Hull	0	5	0
Dobb, J. T., Westbar, Sheffield	0	10	6
Dobson, J. B., 47, Great Union Street, Drypool, Hull	0	5	0
Dowman, George, 160, High Street, Southampton	0	5	0
Down, R. H , Torpoint	0	19	6
Dowsett, Arthur, 16, North Street, Brighton	0	5	0
Drage, Wm. F., St. Albans	0	2	6
Duffin, Thomas, Wakefield	0	10	6
Duncalfe, Richard, 10, Lorne Grove, Urmston near Manchester	0	5	0
Duncan, Alexander, Commercial Road, Bournemouth	1	1	0
Dunhill, Son and Shaw, Frenchgate, Doncaster	1	1	0
Dunsford, Samuel, 56, Market Place, Wigan	0	5	0
Dyer, William, 1, Corn Market, Halifax	0	5	0
Dymott, Frank, 55, Grosvenor Street, W.	0	5	0
Dyson, George, 20, Myton Gate. Hull	0	5	0
Earle, Francis, 22, Market Place, Hull	1	1	0
Eckersley, Moses, Wallgate, Wigan	0	5	0
Edmunds, J., 5, High Street, Newport, Mon.	1	1	0
Ellinor, George, Spital Hill, Sheffield	0	10	6
Elliott, Robert, 279, High Street, Gateshead	0	10	6
Elliott, Wm. Thomas, Commercial Road, Bournemouth	0	5	0
Else, Wm., 52, King's Road, Brighton	0	10	6
Ereaut, John, jun., 14, Bath Street, Jersey	1	1	0
Evison, Wm., 54, Aswell Lane, Louth	0	10	6
Exley, George, 48, Hunslet Lane, Leeds	0	5	0
Eyre, Jonathan S., High Street, Launceston	0	10	6
Fairlie, James Mitchell, 17, St. Georges Road, Glasgow	0	5	0
Fairlie, Thomas, Sunderland	0	5	0
Farrage, Robert, Rothbury	0	10	6
Feaver, Samuel, Truro	0	10	6
Fenn, John Thomas, 83, Regent Street, Westminster	0	10	6
Fenwick, John, 17, Bute Terrace, Strathbungo, Glasgow	0	5	0
Field, Ebenezer, 16, Hill's Road, Cambridge	0	5	0
Field, Samuel, 57, Scholes, Wigan	0	5	0
Fisher, C. H., Bank Street, Carlisle	0	5	0
Fisher, C. and Son, Ramsgate	2	2	0
Fisher and Haselden, 18, Conduit Street, W.	1	1	0
Fisher, J. N., 5, Witham, Hull	0	5	0
Fitt, Francis E., Broadway, Barking	0	10	6
Fletcher, H. B., 321, Glossop Road, Sheffield	0	5	0

	£	s.	d.
Fletcher, R., Pickering	0	5	0
Fletcher, Samuel, 20, St. James Street, Burnley	0	2	6
Fletcher, Wm., 7, Blucher Street, Burnley	0	2	6
Foott, Richard R., 8, Stockbridge Terrace, Pimlico, S.W.	0	10	6
Forster, Robert H., Castle Street, Dover	0	10	6
Foster, George, Yorkshire Street, Burnley	0	2	6
Foster, Tom Scott, Fratton Road, Landport	0	5	0
Foulkes, Wm. Henry, 20, High Street, Rhyl	0	10	0
Fox, Geo., 89, Bloomsbury Street, Birmingham	0	5	0
Francis, George	0	5	0
Francis, Matthew R., 9, East India Dock Road, E.	0	5	0
Franklin, Alfred, 60, West Street, Fareham	0	10	6
Franklin, James, Gloucester	0	5	0
Fraser, Chas., Greenock	0	5	0
Frazer, Daniel, 113, Buchanan Street, Glasgow	1	1	0
French, Benjamin, North Cross Street, Gosport	0	10	6
Fresson, Lewis F., Stevenage	0	10	6
Frost, George, Derby	0	10	6
Furnival, J. D., 3, Upper Market Square, Hanley	0	5	0
Gadd, Charles, 1, Harleyford Road. Vauxhall	0	10	6
Gadd, Robert, 1, Harleyford Road, Vauxhall	0	10	6
Gain, F., 139, Brecknock Road, Upper Holloway. N.	0	10	6
Gale, Henry, 3, Milbrook Place, Hampstead Road	0	10	6
Gardner, Austen W., St. Margaret Street, Canterbury	0	5	0
Gardner, T., Morecambe	0	10	6
Garratt, J. C., Market Place, Rugby	0	5	0
Garratt, Samuel, Market Place, Rugby	0	5	0
Garrett, Jas. O., 171, Commercial Street, Newport, Mon.	0	2	6
Gedge, W. S., 90, St. John Street, E.C.	0	10	6
Gibb, W. C., 31, High Street, Winchester	0	2	6
Gibson, C. P., Trustees of, 16, Whitefriargate, Hull	0	5	0
Gilbert, W., Commercial Road, Bournemouth	0	2	6
Glasgow Apothecaries Co., 34, Virginia Street, Glasgow	1	1	0
Glew, Wm., Finkle Street, Selby	0	2	6
Goff, Richard, 90, St. John Street, E.C.	5	0	0
Goldsmith, John J., High Street, Abingdon	0	5	0
Goodall, Backhouse and Co., Boar Lane, Leeds	2	2	0
Goss, Samuel, High Street, Barnstaple	0	10	6
Govan, Alexander, 109, South Street, St. Andrews	0	10	0
Gow, Alexander, Dudley Street, Wolverhampton	0	10	6
Gratte, Henry J., 55, Commercial Road, Newport, Mon	0	5	0
Greenwell, Wm. C., 124, High Street, Gateshead	0	5	0
Greenwood, Charles, Parliament Street, Harrogate	0	10	6
Greenwood, John, Parliament Street, Harrogate	0	10	6
Gregory, G. Henry, East Street, Taunton	0	5	0
Gregory, William, Weymonth	0	5	0
Grieves, Herbert, Old Street, Ludlow	0	5	0
Griffiths, Waldron, Cirencester	0	10	6
Grindley, Wm., Northgate Street, Chester	0	10	6
Groves, H., Florence	1	1	0
Groves, Thomas B., Weymouth	0	10	6
Guest., Geo. C., St. John Square, Burslem	0	2	6
Gunn, John, Hambledon, Hants	0	5	0
Gutheridge, Geo. F., 52, Church Street, Falmouth	0	5	0
Gwatkin, Jas. Thos., 49, Grand Parade, Brighton	0	10	6
Hackman, L. L., Lake Road, Landport	0	10	6
Haffenden, Thomas, 46, Dyke Road, Brighton	0	10	6
Hall, Frederick, High Street, Stockton	0	10	6
Hall, Henry R. F., Beverley Road, Hull	0	5	0
Hall, Thomas, Grantham	0	10	6
Halloway, John, 52, Castle Street, Carlisle	0	5	0
Halsted, Halsted, 74, Trafalgar Street, Burnley	0	2	6
Hambly, Charles J., Sydney Terrace, Taunton	0	10	6
Hambrook, John B., Stroud Street, Dover	0	5	0
Hammond, Wm. H., 1, Caroline Street, Hull	0	5	0
Hampson, R., 205, St. John Street Road, E.C.	1	1	0
Harding, James J., Sudbury	0	10	6
Hardy, Wm., Norton Road, Stockton-on-Tees	0	5	0
Harrison, Parkinson and Co., 8, Sun Bridge, Bradford	2	2	0
Harrower, Peter, 136, Cowcaddens, Glasgow	0	5	0
Hart, C. D., Derby	0	5	0
Hart, Geo. Wm., 9, Sale Lane, Hull	0	10	6
Hartley, W., 1, Upper High Street, Winchester	0	5	0
Harvey, Thomas, Ashwood, Headingley	1	1	0
Harvey, Wm. R., 98, Humberstone Road, Leicester	0	10	6
Hasselby, Thomas J., 1, Baxtergate, Doncaster	0	5	0
Hayles Brothers, Esplanade, Ealing	1	1	0
Hayles, Wm., Arundel Street, Landport	0	5	0
Hayman, Alfred, Neath	1	1	0
Hayward, Wm. G., Bridge Street, Reading	0	5	0
Head, John, High Street, Lewes	0	10	6
Head, John T., 31, High Street, Lewes	0	10	6
Heathcote, Thos. S., Red Lion Square, Newcastle-under-Lyme	0	10	6
Heaton, Mrs. Martha, 15, Goodham Hill, Burnley	0	2	6
Henderson, John, 104, Cathedral Street, Glasgow	0	5	0
Hick, Geo., 3, Broadstones, Bradford	0	10	6
Hick, Joseph, 3, Broadstones, Bradford	0	10	6
Hickley, George, 101, Church Street, Brighton	0	10	6
Hickley, T. P., 297, Edgware Road, W.	0	10	6
Hifley, Richard J., 7, Coburg Street, Plymouth	0	5	0
Higgins, Tom Sellers, 19, West Parade, Huddersfield	0	10	6
Hirst, Brooke and Hirst, Aire Street, Leeds	2	2	0
Hitchcock and Son, 108, High Street, Oxford	1	1	0
Hitchin, Robert, 42, St. James Street, Burnley	0	5	0
Hoare, C. F., Derby	0	2	6
Hodder, Henry, Wine Street, Bristol	0	5	0
Hodgson, C. G., 60, Gallowtree Gate, Leicester	0	5	0
Hollingsworth, James, 57, New George Street, Hull	0	5	0
Holmes, W. A., 12, Shaw's Brow, Kendal	0	2	6
Hooper, Bartlett, 43, King William Street, E.C.	1	1	0
Hooper, Leonard, 43, King William Street, E.C.	0	10	6
Hopper, Chas., Market Place, Doncaster	0	5	0
Hornsby, Geo. G., 38, Lewes Road, Brighton	0	10	6
Hothersall, John, 25, Standishgate, Wigan	0	10	6
Hough, Wm., Market Place Doncaster	0	10	6
Houghton, Thos., and Son., 53, High Street, Oxford	0	10	6
Howorth, James, Market Place, Doncaster	0	10	6
Hudson, Fretwell, Westbar, Sheffield	0	10	6
Hughes, James, 219, Pitt Street, Sydney	2	2	0
Hughes, Samuel, High Street, Stourbridge	0	10	6
Humphreys, R., 9, Upper Belsize Terrace, Hampstead	0	9	0
Humphries, Charles, Garston, Liverpool	0	10	6
Hunt, T., Blackfriars Road, Southsea	0	5	0
Hunter, John, 83, High Street, Gosport	0	7	6
Hurst, John, Market Place, Louth	0	10	6
Hurst, John B., Market Place, Louth	0	10	6
Huskisson, H. O., 77, Swinton Street, W.C.	1	1	0
Hutchinson, J. C., 5, Queen Street, Hull	0	5	0
Ibbs, I. T., Market Hill, Maldon	0	5	0
Iliffe, George, 29, Market Place, Nuneaton	0	5	0
Insull, E. S., 106, Lower Litchfield Street, Hanley	0	5	0
Iredale, George, 173, York Street, Leeds	0	5	0
Iredale, Thomas, 129, North Street, Leeds	0	5	0
Izod, James, Church Road, Upper Norwood	1	1	0
Jaap, John, 268, Buchanan Street, Glasgow	0	10	6
Jarvis, A., Commercial Road, Bournemouth	0	2	6
Jefferson, Peter, Meadow Lane, Leeds	0	10	6
Jervis, Wm., Broomhill, Sheffield	1	1	0
J. M. S., Wigan	0	2	6
Job, Thos., King's Road, Southsea	0	5	0
Johnson and Sons, 4, Derby Street, Leek	1	1	0
Johnson, Thomas, 80, Wallgate, Wigan	0	5	0
Johnson, Thomas J., 35, Middle Hillgate, Stockport	0	2	6
Jones, Chas., 7, Market Square, Hanley	0	10	6
Jones. E. Powell, Rhyl	0	10	6
Jones, Humphrey, Llangollen	0	5	0
Jones, John, Market Place, Llanrwst	0	5	0
Jones, John P., Aberayron	0	2	6
Jones, Wm.. Bridge Street, Corwen	0	5	0
Jones, W. W., Kingsdown, Bristol	1	1	0
Judd, H. T., Warwick	0	5	0
Judson, C. T., Ripon	0	5	0
Kellett, Richard Edward, Market Flace, Wigan	0	10	6
Kellington, M. L., Brook Street, Hull	0	10	6
Kemp, Joseph, Cullen, Banffshire	0	2	6
Kendall, Chas. F., 126, Clapham Road, S.W.	0	10	6
King, L., King's Road, Southsea	0	2	6
Kington, J. P., 59, West Street, Hull	0	2	6
Kinninmont, Alexander, 69, South Portland Street, Glasgow	0	10	6
Kirby, Frederick, 114, Abington Street, Northampton	0	10	6
Kirkpatrick, Samuel, East Street, Taunton	0	5	0
Kirton, Joseph B., 53, Savile Street, Hull	0	10	6
Knight, Geo. E. M., 45, High Street, Winchester	0	5	0
Knowles, R. M., Great Portwood Street, Stockport	0	5	0
Lacy, Benjamin W., 4, The Terrace, Stamford Hill, W.	1	1	0
Lander, H., High Street, Rugby	0	5	0
Langford, John B., Shutes, Wellington	0	10	6
Lawrence, Frederick, 383, Kentish Town Road, N.W.	0	10	6
Lea, John, Harbour Street, Folkestone	0	10	6
Lear, Wm., 49, Bull Ring, Ludlow	0	2	6
Learoyd, E. R., Market Place, Sheffield	0	5	0
Leicester, Thos., Burslem	0	10	6
Leigh, John, High Street, Windsor	0	10	6
Leith and Ross, 5, St. Paul's Churchyard, E.C.	2	2	0
Lewis, C. E., High Street, Eton	0	5	0
Lewis, Thos. C., Sheep Street, Rugby	0	10	6
Lines, Geo., Market Place, Hertford	0	10	6
Litherland, Henry, 134, Wallgate, Wigan	0	5	0
Lloyd, Edward, Parliament Row, Hanley	0	5	0
Lloyd, T. H., 10. Friar Lane, Leicester	0	5	0
Logan, Francis, Lichfield	0	5	0
Logsdail. H., 19, Minster Yard, Lincoln	0	2	6
Longman, John H., Duke Street, Dartmouth	0	2	6
Lowndes, Hervey, 7, Hall Street, Stockport	0	5	0
Lowther, M. K., 70, Osborne Street, Hull	0	2	6
Madeley, E. S., 4, Bridge Terrace, Castelnau, Barne	0	10	6
Madge, Jas. C., Holmwood Cottage, Lymington	0	10	6
Maleham, Henry, West Bar. Sheffield	0	10	6
Marshallsay, R. I., South Street, Wareham	0	5	0
Marston, Alfdred, 49, Bull Ring, Ludlow	0	5	0
Martin, Henry G., St. Alban's	0	10	6
Martin, Thos., High Street, Lewes	0	10	6
Mason, Michael, Commercial Road, Bournemouth	0	5	0
Mather, John. 108, Scholes, Wigan	0	10	6
Medcalf ,Benjamin, Ware	0	10	6
Medcalf, B. P., Ware	0	10	6
Mellor, John G , Market Square, St. Neots	0	5	0
Merrikin, John B., 2, Beaufort Buildings West, Bath	0	10	6
Miller, Kenneth, 16, Lower Dunbar Street, Wick	0	5	0
Mills, John, Eastgate Street, Chester	0	5	0
Milner, J. G., Bridge Street, Hull	0	5	0
Morgan, Mrs. E., 111, Commercial Road, Newport, Mon.	0	2	6

	£	s.	d.
Morgan, Richard, The Cross, Newtown	0	10	6
Morris, Alfred, P., High Street, Stourbridge	0	10	6
Morton, Henry, The Elms, Ramsgate	0	5	0
Mountain, J. J., 115, Great Thornton Street, Hull	0	5	0
Mousley, William, Redditch	0	5	0
Mumby, Chas., High Street. Gosport	0	10	6
Munn, Robert, St. James's Street, Burnley	0	10	0
Murdoch, Bros., 251, Sauchiehall Street, Glasgow		10	0
Murdoch, David, Falkirk	0	10	6
Murdoch, John McGill, 225, Sauchiehall Street, Glasgow..	0	5	0
Muskett, James, Harleston	0	10	6
Myers and Saunders, 68, High Street, Hull	0	10	6
Myers, L., St. Albans..	0	5	0
Neville, James, Wallgate, Wigan	0	5	0
Newby, Chas. Adey, 46, High Street, Leamington	1	1	0
Newby, Richard I., Castelnau, Barnes	1	1	0
Newman, Robert, Bewdley	0	10	6
Nicholls, Mrs. Anne, Market Square, Hanley	0	5	0
Nicholson, Frederick, 216, St. Paul's Road, N.	1	1	0
Nicholson, John J., Sunderland	0	10	6
Nicklinson, T., Derby..	0	5	0
Norman, Henry, 1, Parade, Canterbury	0	5	0
Odell, G. W., 17, Chapter Street, Westminster	0	5	0
Oldham, Gervase, Chester Gate, Macclesfield	0	5	0
Olive, W. T., Burry Port	0	10	6
Owen, John, 51, Holloway Road, N.	1	1	0
Padley, William, 22, Market Place, Hull	0	2	6
Padwick, John, 5, Preston Street, Brighton	0	10	6
Page, Charles, High Street, Barnstaple	0	5	0
Paine, Charles, 3, Commercial Street, Newport, Mon. ..	0	10	6
Palmer, Francis, 7, Brunswick Parade, Upper Norwood	0	10	0
Palmer, Robert, 35, Ovington Square, S.W.	1	1	0
Pare, Henry B., 9. Church Bank, Bolton	0	10	6
Parkes, Edward, Botchergate, Carlisle	0	5	0
Parkes, E., 82, Piccadilly, Hanley	0	5	0
Parkinson, Isaiah, Hammerton Street, Burnley	0	2	6
Parkinson, Richard, Hammerton Street, Burnley	0	2	6
Parkinson, William, Hammerton Street, Burnley	0	2	6
Partridge, James, High Street, Barnstaple	0	5	0
Pattinson, R. J. English Street, Carlisle	0	5	0
Payne, John, 21, Elmwood Street, Leeds	0	5	0
Peacock, W. H., 10, Alma Place, West Hartlepool	0	10	6
Peake, Henry, New Bridge Street, Dover	0	5	0
Pearman, Henry, 11, Commercial Street, Newport, Mon.	0	10	6
Pearson, Charles James, 4, Russell Street, Swansea	1	1	0
Percy, Thomas B., Truro	0	10	6
Perfect, George, Commercial Road, Landport	0	5	0
Perks, Francis, 37, High Street, Stourbridge	1	0	0
Perry, W. H., 52, Ryland Street North, Birmingham ..	0	5	0
Pettigrew, John Wesley, 145, St. George's Road, Glasgow	0	5	0
Phillips, John, 92, Commercial Street, Newport, Mon. ..	0	10	6
Phillips, Jonathan, Clarence Chambers, Wallgate, Wigan	0	10	6
Pickard, Matthew, 71, Broughton Road, Salford	1	1	0
Pickering, John, Crowle	0	5	0
Pidduck, John W., 11, Bridge Terrace, Harrow Road ..	0	10	6
Pilley, Henry Thomas, 9, Bargate, Boston	0	5	0
Pilley, Samuel, 9, Bargate, Boston	0	5	0
Pipe, Walter, 1, King's College Road, Hampstead	0	10	6
Polding, Peter, 8, Market Place, Wigan	0	10	6
Pond, George P., 68, Fleet Street, E.C.	0	5	0
Porter, Albert, Steel Street, Abingdon	0	5	0
Potts, Walter, 139, King Street, Oldham	0	10	6
Powell, John, St. Mary's Butts, Reading	0	5	0
Powell, John, Shaftesbury..	1	1	0
Pratt, Edward, High Cross, Barnstaple	0	5	0
Pratt, Thomas H., 154, Bartholomew Street, Newbury ..	0	5	0
Preston, Alfred P., Bath Street, Abingdon	0	10	6
Preston, Job, High Street, Sheffield	0	10	6
Price, George, 127, Commercial Street, Newport, Mon. ..	0	5	0
Price, Robert J., 217, Edgware Road	0	2	6
Priestly, H., Norfolk Street, Sheffield	0	10	6
Prince Henry, 5, Fore Street, Taunton	0	10	6
Prior, George T., 32, Broad Street, Oxford	0	10	6
Pumphrey, John, Port Street, Bengeworth, Evesham ..	0	5	0
Radley, William V., Market Place, Sheffield	0	10	6
Randall, Thomas, West Street, Wareham	0	5	0
Randall, William B., 146, High Street, Southampton ..	1	1	0
Rastrick and Son, King's Road, Southsea	0	10	6
Rastrick, William H., 122, Queen Street, Portsea	0	5	0
Redman Sidney, East Street, Taunton	0	5	0
Reed, George, Yarm	0	10	6
Reynolds, Freshfield, 14, Commercial Street, Leeds.. ..	0	10	6
Reynolds, Richard, 13, Briggate, Leeds	1	1	0
Richardson, Thomas J., 23, London Road, Carlisle	0	2	6
Rickwood, Henry, 1, Kingsmead Square, Bath	1	1	0
Ridgeway, T. E., 31, Tithebarn Street, Liverpool	0	5	0
Rimmington and Sons, 9, Bridge Street, Bradford	1	1	0
Robbins, John, and Co., 372, Oxford Street, W.	2	2	0
Roberts, Albinus, St. Albans	1	1	0
Roberts, D. P., Llangunider, Crickhowell	0	2	6
Robinson, J. Scott, St. Leonards-on-Sea	0	5	0
Robinson, William H., High Street, Stony Stratford ..	0	10	6
Rodger, John, Inverary	0	5	0
Rollin, John G., 3, South Street, Durham	0	10	6
Roulston, Benjamin W., 39, Aire Street, Goole	0	10	6
Rowell, John C., Duke Street, Reading	0	5	0
Rowell, Robert H. Palmerston Road, Southsea	0	10	6

	£	s.	d.
Rowson, Henry, 2, Chichester Road, W.	1	1	0
Royse, Robert. 22, Great Portwood Street, Stockport ..	0	10	6
Russell, C. J. L., 29, High Street, Windsor	0	10	6
Saffery, John. 56, High Street, Mile Town, Sheerness ..	0	10	6
Sagar, Henry, Little Woodhouse Street, Leeds	0	5	0
Salisbury, W. B., 5, Market Street, Leicester	0	10	6
Salmon, Wm., High Street, Stockton	0	5	0
Salter, Joseph B., Shrewsbury	0	10	6
Samuel, Edward, Mussoorie, India	0	10	6
Samuel, James B., 217, Edgware Road, W.	0	10	6
Sapp, Jas. J., Palmerston Road, Southsea	0	10	6
Sargeant, John C., 5, Fore Street, Taunton	0	10	6
Sarsfield, Wm., 7, Market Place, Durham	1	1	0
Saunders, Chas. P., Bridge Street, Haverfordwest	0	5	0
Saunders, David P., Bridge Street, Haverfordwest	0	10	6
Saxby, Henry, High Street, Lewes..	0	10	6
Scarlett, Wm., 4, Brunswick Street, Hanley	0	10	6
Scawin and Burn, 19, Market Place, Durham	0	10	6
Schacht, Wm., 4, Finsbury Place South, E.C.	0	10	6
Scrase, Richard, 161, New Cross Road, S.E.	0	5	0
Sell, W. H., Commercial Road, Bournemouth	0	5	0
Sells, Robt. Jas., 13, Grosvenor Road, Tunbridge Wells ..	0	10	6
Seys, James A., 1, Stow Hill, Newport, Mon.	0	2	6
Shakerley, Benjamin, 27, Market Place, Penzance	0	5	0
Sharp, David B., Sunderland	0	10	6
Sharp, E. K., 44, Market Place, Leicester	0	5	0
Shaw, John, 24, Gt. George Place, Liverpool	0	10	6
Shaw, Ward, 5, Charles Street, Hull	0	5	0
Shearcroft, W. F., 9, Market Place, Spalding	0	2	7
Shemmonds, John, Lansdowne Crescent, Bournemouth ..	0	5	0
Shepherdson, W., 23, Lowgate, Hull	0	10	6
Simpson, Robt. G., Stowmarket	0	5	0
Sincox, E. S., High Street, Shirley, Southampton	0	5	0
Sindall, John W., High Street, Knaresboro'..	0	5	0
Sircom, Richard, Old Market Street, Bristol	0	10	6
Sirett, Henry, Market Square, Brackley	0	10	6
Skipper, Edward, 4, Dalston Lane, E.	0	5	0
Skirrow, W. E., Bingley	0	10	6
Slack, Wm., St. Sepulchre Gate, Doncaster..	0	5	0
Smeeton, Wm., 26, Commercial Street, Leeds	0	10	6
Smith, Anthony, 69, Queen Street, Hull	0	10	6
Smith, A. H., Broad Street, Hanley	0	10	6
Smith, Chas. S., Cirencester	1	1	0
Smith, John, High Street, Bridlington	0	2	0
Smith. J. F., Earlston, Berwickshire	0	5	0
Smith, John Francis, 1, Carr Lane, Hull	0	5	0
Smith, J. J., 9, St. James Street, Burnley	0	2	6
Smith. Wm., 2, Alfred Terrace, South Hackney..	0	10	6
Smith, Wm. F., High Street, Abingdon..	0	5	0
Smith, Wm. H., 36, St. George's Road, Brighton	0	10	6
Solomon, W. H., 107. Stafford Street, Hanley	0	5	0
Soole, J. H., High Street, Grays	0	10	6
Spearing, James, 53, Above Bar, Southampton	0	10	6
Spiller, Thomas, 2, Steven's Crescent, Totterdown, Bristol	0	10	6
Spinney, Frank, Commercial Road, Bournemouth	0	10	6
Spragg, Mrs. Elizabeth Anne, Half Moon, Dunkinfield ..	0	10	6
Stainer, John, Sandgate Road, Folkestone	1	1	0
Staning, Wm., 55, Cogan Street, Hull	0	5	0
Stanway, Edward T., Horseley Fields, Wolverhampton ..	0	10	6
Starke, George, Oxford Street, Reading	0	5	0
Steel, Thos., 89, Duke Street, Barrow-in-Furness	0	5	0
Stephenson, Robert, 45, Lowgate, Hull..	0	2	6
Stevenson, Wm. L., 165, Edgware Road, W.	0	10	6
Steward, Wm., 42, High Street, Bridgnorth..	0	10	6
Stoakes, Benjamin M., 16, Whitefriargate, Hull	0	5	0
Stoddart, W. W., 1, Park Street, Bristol	0	10	6
Stone, F. W., Exeter (balance of half-a-guinea)	0	0	6
Strawson, G., Northgate Street, Chester	0	5	0
Strongitharm, W. G., 1, Alma Terrace, Church Road, Upper Norwood	0	5	0
Summers, Frank, 12, Abbey Gate Street, Bury St. Edmunds	0	5	0
Summers, Jas. R., 86, Curtain Road, E.C.	0	10	6
Sutterby, J. N., Long Sutton	1	1	0
Sutton, Francis, Bank Plain, Norwich	0	10	6
Swingburn, R. H., South Molton	0	10	0
Swire, Jabez, King's Cross, Halifax	0	5	0
Sylvester, Paul, Rusholme..	0	5	0
Symons, Wm., 26, Joy Street, Barnstaple	0	5	0
Taplin, W. G., 75, Hampstead Road, N.W.	1	1	0
Targett, C. G., Weymouth	0	5	0
Taylor and Fletcher, 160, Briggate. Leeds	1	1	0
Taylor, John, Wakefield	0	10	6
Taylor, Joseph H. James Street, Harrogate	0	10	6
Taylor, Thos. C.. Aylesbury	0	10	6
Tench, Richard, 30, Walbrook, E.C.	1	1	0
Thomas, James, Bridge, Canterbury	0	5	0
Thomas, Richard, Manchester Road, Burnley	0	10	0
Thorne, John, Wellingborough..	0	10	6
Thresh, John C., 11, Eagle Parade, Buxton	0	5	0
Thurland, Henry, 41, St. Giles Road, Oxford	0	10	6
Tirrell, John, Market Square, Hanley	0	5	0
Todd, Joe, English Street, Carlisle..	0	10	0
Tomlin, Albert R., Shambles Street, Barnsley	0	10	6
Tomlinson, C. K., High Street, Lincoln	0	10	6
Trim, Edmund, Wellington Terrace, Bournemouth	1	1	0
Trollope, W. T., Landport	0	5	0

	£	s.	d.
Tubbs, Thos. K., Windsor Road, King's Lynn	0	2	6
Tucker, Charles, South Street, Bridport	0	10	6
Tugwell, W. H., 3, Lewisham Road, S.E.	0	10	6
Tunbridge, F., Castle Street, Reading	0	5	0
Tunley, John, High Street, West Bromwich	0	5	0
Turner, John, Aylesbury	0	10	6
Twaddle, Robert, Maitland Street, Glasgow	0	7	6
W. T. C.	0	10	6
Walker, Charles, 133, St. George Street East, E.	0	5	0
Walker, J., 149, Widemarsh Street, Hereford	0	10	6
Wallworth, D., High Street, Maldon	0	5	0
Walpole, Wm., Great Yarmouth	0	10	6
Walton, John, Sunderland	0	10	6
Ward, Francis, 1, Lower Grosvenor Place, S.W.	0	10	6
Wardle, J., 99, Broad Street, Hanley	0	5	0
Wardley, Samuel F., 5, James's Place, High Road, Lee	0	5	0
Watson, Robert W., 22, Angel Street, Sheffield	0	10	6
Watson, Wm., 6, St. Paul's Road, Burdett Road, Bow	0	5	0
Watts, Alfred, 19, Hazlewood Crescent, Upper Westbourne Park	0	5	0
Webb, Edward A., 60, Bartholomew Close	1	1	0
Webster, Paul, Padiham, Lancs.	0	10	0
Weddell, Arthur, 45, High Street, Winchester	0	5	0
Weeks, Albert J. J., Stapleton Road, Bristol	2	2	0
Weller, Geo., High Street, Windsor	0	10	0
West, Thomas, Stretford, Manchester	0	5	0
Westlake, Bernard, 58, Peascod Street, Windsor	0	10	6
White, Thomas, Church Street, Launceston	0	10	6
Whittle, E. C. C., Park House, Townshend Road, St. John's Wood	0	5	0
Whitwell, Geo., High Street, Stourbridge	0	5	0
Whysall, Wm., High Street, Grantham	0	10	6
Whyte, Wm., 556, St. Vincent Street, Glasgow	0	5	0
Wigg, Wm. C., 17, High Street, King's Lynn	0	5	0
Wilford, Josiah, Snargate Street, Dover	0	2	6
Willan, Robert, 47, Walton Road, Barrow-in-Furness	0	5	0
Williams, Hugh, 2, Cosmo Place, W.C.	0	5	0
Williams, Joel D., Turret House, Bodmin	1	1	0
Williams, J. V., Weymouth	0	5	0
Williams, Philip, 21, West Street, Horsham	1	1	0
Williams, Thomas, Northgate Street, Chester	0	5	0
Wilson, Edward, London Road, Sheffield	1	1	0
Wilson, John S., King's Road, Southsea	0	5	0
Wilson, Wm., 21, High Street, Hanley	0	5	0
Wing, Samuel W., Colsterworth	0	10	6
Wood, Charles, 15, Market Place, Wigan	0	5	0
Wood, Richard, Mill Street, Macclesfield	0	10	6
Woodhouse, Geo., 82, Benlow Place, Shrewsbury	0	5	0
Woodliffe, Alfred, High Street, Bridlington	0	2	6
Woollatt, A. N., 5, West Place, West Street, Fareham	0	2	6
Woollatt, Richard, 17, Fore Street, Taunton	0	5	0
Worth, Edwin, Town Hall Buildings, Bournemouth	1	1	0
Wortley, John, 1, Old Elvet, Durham	0	10	6
Wright, John W., 9, Cheapside, Burnley	0	2	6
Wyke, Jacob, Abergavenny	0	5	0
Wylde, Geo., 53, King's Road, Chelsea, S.W.	0	10	6
Wylie, Thos., 9, Fore Street, Port Glasgow	0	2	6
Yeomans, Geo., Desborough	0	5	0
Yewdall, Edwin, 40, Wade Lane, Leeds	0	10	6
Young, John, 20, High Street, Newport, Mon.	0	10	6
Young, Joseph, 16, Gallowtree Gate, Leicester	0	5	0
Young, Richard, Liskeard	0	5	0

DONATIONS.

A Friend, per H. Lowndes, Stockport	0	5	0
Clark, W. B., Belvoir Street, Leicester	0	10	6
Hinnell, T. C., Bury St. Edmund's	1	1	0
Hunt, Richard, 45, High Street, Winchester	5	5	0
Lamplough, Henry, 113, Holborn, W.C.	10	10	0
Portway, John, Bury St. Edmunds	0	5	0
Weddell, Arthur, 45, High Street, Winchester	0	2	6
Wills, George S. V., 4, Barkham Terrace, Lambeth Road	5	5	0
W. and M., Apothecaries' Hall, E.C.	0	3	6
Youngman, Edward, Bury St. Edmunds	0	2	6

SECRETARY'S FUND FOR CASUAL RELIEF.

Kay, Brothers, Stockport	1	1	0

NORTH BRITISH BRANCH.

As reported in the last number of this Journal, at the meeting of the North British Branch on the 30th ult., Mr. W. L. Howie brought forward the paper on "Phosphate Syrups" which was printed on page 802. The paper having been read, a discussion upon the subject was opened by the President of the Branch, Mr. William Gilmour.

After commending the paper for its ability and exhaustiveness, and noting also one or two of the more salient features contained in it, the Chairman went on to say that after perusing the interesting paper of Mr. Rees Price read before the Society in London a week or two ago, he began a series of experiments to satisfy himself of the conclusions therein arrived at, and some of the results which he obtained were corroborative of Mr. Howie's, whilst others lay somewhat in a different direction, and others still differed apparently in their conclusions from his. For example, Mr. Howie had brought out in a very interesting manner the general deficiency of iron present in all the syrups (official and otherways) of the phosphate, and one of the first points he (Mr. Gilmour) investigated was the actual yield of phosphate of iron by the B. P. process for the syrup. His attention was directed to this not only by Mr. Price's paper but also by noticing again and again in making the B. P. syrup phosphate of iron the copious precipitate yielded by the filtrate when allowed to stand for some time after filtration, a precipitate which he had proved to be phosphate. Now, keeping in mind that the process and the quantities employed in making the Pharmacopœia syrup, viz. 224 grains sulphate of iron, 200 grains phosphate of soda, and 74 grains acetate of soda, yield only theoretically 96 grains of ferrous phosphate, whilst the Pharmacopœia states that this quantity makes 12 fluid ounces, and that there is one grain in each fluid drachm, it was quite apparent that there is no allowance here made for any deficiency in the original precipitate, far less for oxidation in the process of washing. This was the more remarkable if it was borne in mind, that in the Pharmacopœia process for phosphate of iron allowance is made for loss to the extent of 55 per cent.—a loss which in this case can be accounted for from oxidation in the process of washing and drying, seeing that it is not a loss relative to the whole theoretical yield, but only to the actual precipitate washed and dried. In other words, whilst the Pharmacopœia allows for loss or change of ferrous phosphate in the washing and drying in the case of the dried powder to the extent of 55 per cent., it does not allow any loss whatever in the case of the phosphate for syrup, even although it undergoes the same amount of exposure and consequent oxidation in the process of washing. This he considered to be the first radical defect in the Pharmacopœia process, but a more serious one remained to be noticed. Taking, for example, the Pharmacopœia instructions for the preparation of the phosphate for the syrup, and adhering to them most literally, he had found that out of many experiments, with a wonderful agreement as to results, he had not been able in any case to get much more than a half of the theoretical yield of ferrous phosphate. This he found was owing to the fact that the B. P. process neither yields the full theoretical precipitate, nor does it yield the quantity actually obtainable from it at all readily. If the two solutions of soda and iron on mixing were immediately filtered the filtrate, although clear at first, invariably after a short time began to deposit a second precipitate of ferrous phosphate in some quantity, and even when the two solutions were kept for several hours under frequent agitation previous to filtration, he still found this second deposit of ferrous phosphate took place though to a smaller extent, but in both cases he *found that the second precipitate could be increased to a very considerable extent by the addition of more phosphate of soda.* Noticing, then, these defects on the very face of the B. P. process, he directed his attention principally to the following points, namely, the yield, under the most favourable circumstances of ferrous phosphate by the B. P. process for the syrup, the recovery of ferrous phosphate from the filtrate and the superiority, if any, of Price's process as mentioned in the Journal. In determining these points he had conducted over thirty different experiments and had got in all of these, as he had already indicated, a wonderful uniformity of result, so that he was convinced the conclusions were in the main correct and to be depended upon. Roughly the results might be stated as follows:—By the B.P. process and filtering immediately after thoroughly mixing the two solutions, he obtained after washing the precipitate from 50 to 55 per cent. of ferrous phosphate, whilst he recovered from the filtrate on adding more phosphate of soda, a further addition of ferrous phosphate after washing of from 30 to 36 per cent. By the same process, but allowing the two solutions after mixing to stand for at least two hours with frequent agitation, he obtained from 55 to 60 per cent. with an exact corresponding diminution of the precipitate recoverable from the filtrate. He thought these results were interesting, and that in them was disclosed the grand primary cause of the deficiency of iron in the various syrups so forcibly brought out by Mr. Howie. Doubtless the formulæ for the production of the phosphate in Parrish's syrup as well as in Easton's were different in some respects from the B.P. formula, but that they were no improvement upon it has again and again been demonstrated, and Mr. Howie's investigations on this very point are all confirmatory of this. Without entering more immediately into Mr. Howie's investigations on the preparation of phosphate of iron he preferred to briefly indicate his own conclusions, following in the same track with Mr. Price. This consisted in adding phosphate of soda in considerable excess to the ferrous sulphate without the addition of either acetate or carbonate of soda. Believing with Professor Attfield that the monosodium phosphate in this case is formed, the reaction might be thus expressed—

$$4Na_2HPO_4 + 3FeSO_4 = Fe_3P_2O_8 + 3Na_2SO_4 + 2NaH_2PO_4.$$

If this expressed the proper reaction then from the molecular weights of the foregoing could be calculated the relative proportions in which they should be employed, and it would be found as near as possible to be 43 parts by weight of phosphate of soda to 25 of sulphate of iron, instead of about 60 to 20 as indicated by Price. These quantities were expressed in grains as they were the proportions he had employed in all his experiments, and although he had in several experiments employed more soda, he had not found the addition of any advantage. He again and again by these proportions obtained a yield of ferrous phosphate after washing of from 78 to 85 per cent., whilst the filtrate on testing only gave the faintest indication of the presence of ferrous salt. This, he thought, was very satisfactory and considering the oxidation that will always take place to a greater or less extent in washing the precipitate, as nearly a maximum result as it is possible to obtain. These results were obtained in every case by the use of cold distilled water, but he further found that by using the water boiling for effecting the solution of the phosphate of soda, and then immediately adding it to the solution of the ferrous sulphate in cold water he obtained a much finer as well as a more copious precipitate, the precipitate in this case being of a fine granular appearance and retaining its greyish white colour much longer than in the other cases. To bring these various results more immediately before the meeting he had prepared a number of precipitates which he submitted for inspection, and as they were all prepared at the same time, and under the same conditions, with the exception of those prepared with the hot water and tested as well as estimated with the same reagents, the results might be taken as at least relatively correct. The samples shown illustrated in a very striking manner the various points brought forward in the foregoing remarks, and the absence of ferrous salts was shown by the proper tests being applied to the filtered solutions prepared according to the new process, whilst their presence was abundantly shown in the Pharmacopœia solution. The Chairman concluded by remarking that there were one or two other points which he would have liked to refer to, but he felt that he had already occupied too much of the time of the meeting, more especially as he doubted not that other members would be anxious to give their opinion upon a paper so thoroughly practical, and so very valuable as the one just read.

Mr. Nesbit (Portobello), in proposing a vote of thanks to Mr. Howie for his valuable paper, said he had always been aware that the process published by Parrish would not yield a syrup containing quite a grain of phosphate of iron to the fluid drachm, but was not prepared to hear that there was such a deficiency as had been shown to exist in Parrish's own syrup as well as in other syrups prepared by his process. The process was a defective one, but they had been shown how to remedy its defects. He had not tried the process proposed by Mr. Price, but thought it a good one, as he had observed that solution of phosphate of soda, added in excess to an acid solution of phosphate of iron, or to the B. P. syrup, precipitated the phosphate of iron, and the precipitate was not redissolved by adding phosphoric acid until a quantity equivalent to that contained in the phosphate of soda was added. This, he thought, had some bearing on the process, as showing that the excess of phosphate of soda acted by continuing with the free sulphuric acid and liberating an equivalent of phosphoric acid, which, however, did not dissolve the precipitate so long as there was sufficient phosphate of soda present to form with it a monobasic salt. He had great pleasure in proposing a vote of thanks to Mr. Howie, and felt sure that all those who were present could not fail to benefit by the useful information he had given them.

Mr. J. R. Young, in seconding the vote of thanks, said he thought that some of his younger friends whom he saw around him would say a few words as to their knowledge of the matter, and in response to Mr. Young's invitation, Mr. W. I. Clark said that in making phosphate of iron, he had been annoyed by the formation of the different precipitates alluded to, non-gelatinous, or granular, and sometimes but little phosphate seemingly being thrown down; he had not, however, gone into the question concerning the amount of loss, and he felt much interested by the facts regarding the precipitation and loss of the iron phosphate. He (Mr. Clark) would like to ask Mr. Howie a question. Mr. Howie had recommended that the sugar be dissolved in the cold phosphate solution. He (Mr. Clark) had tried that with one lot, and found that a precipitate was immediately formed; and in further trials solution was effected at 160° F., producing a satisfactory syrup. He would also ask if Mr. Howie could explain how one lot of syrup which he (Mr. Clark) had prepared, and used for it 19 parts of phosphoric acid, was good and kept free from precipitate, when with another lot in which he used 29 parts of acid he had a very bad product, a considerable deposit of the character of the iron precipitate shown having formed in a few weeks.

Mr. Howie, in reply to Mr. Clark's first query, said he could hardly account for the separation, from the information regarding it as stated by Mr. Clark; he would say that by cold solution he did not mean 50° F. or so (the ordinary temperature of water), but considered a slight elevation of temperature necessary for dissolving the sugar. What he wished to point out was that a continued high temperature was most injurious. Mr. Howie further remarked that his efforts had been entirely of an experimental character, whilst Mr. Clark, from his constant manipulation of large quantities, would be in a superior position to speak as to this particular point. With regard to Mr. Clark's second question, Mr. Howie did not think the increase in the quantity of the acid had anything to do with the formation of the precipitate and that the iron phosphate must have been exposed to oxidation which would be the real cause of the ferric phosphate. In studying the literature which had been the outcome of this difficulty, it was found that many causes had been suggested, such as the age of the acid, etc., but if special care was taken to prevent oxidation of the iron phosphate, and this looked upon as *the essential point*, he thought the end of their troubles, in this respect, would be reached.

In reply to Mr. Gilmour, Mr. Howie said he had estimated the waste of phosphate, as stated in the paper, by separating and weighing, which would give minimum results as to waste. His figures indicating waste were therefore certainly not over estimated, and he thought Mr. Gilmour's method of estimating volumetrically would give maximum results, as any of the precipitated phosphate changed to the ferric state would be estimated as waste. In regard to Mr. Rees Price's suggestions with the important modification brought forward by Mr. Gilmour, of reducing the quantity of phosphate of soda to the theoretical proportion, it was really a most perfect process. Yet on the score of economy he (Mr. Howie) thought the bicarbonate process superior, and on this account it would likely be followed by manufacturers, as by it the best results both for dry phosphate and syrup could be obtained. It would be observed on reference to the equation that in Mr. Price's process only half of the combined phosphoric acid was utilized; the other half was lost, being carried away in the supernatant liquid as monosodic phosphate.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The seventh scientific meeting of the session of this society was held in Anderson's University, on Tuesday evening, 4th inst., Mr. Kinninmont, Vice-President (in the absence of the President, Mr. Greig), in the chair.

The business of the evening was a paper which was read by Mr. W. L. Howie, F.C.S., of Edinburgh, on "Phosphate Syrups," which has been printed in this Journal (p. 804). At the close of the paper, which was listened to throughout with the greatest interest and attention by the large audience present, the Chairman invited remarks thereon, and amongst others Mr. Archibald Paterson, of Govan, stated that while he had passed large quantities of the syrups of the phosphates through his hands, he had never made them a special study, and could not, therefore, attempt to criticize the very exhaustive and elaborate paper which had just been read. From what he knew of Mr. Howie, however, he was disposed to think that Mr. Howie's calculations were pretty nearly correct; one point he could corroborate, namely, that it was a great mistake to heat phosphate syrups, as a gelatinous mass was sure to be formed. This was due, as Mr. Howie had pointed out, to the lime precipitating from the hot solution, lime salts, as was well known, being less soluble in hot than in cold water; for this and other reasons he (Mr. Paterson) commended the cold process.

Dr. Thomas Dryden, of Moffat, explained some of the early difficulties he had had in preparing Parrish's syrup. He found that it was then difficult to obtain the necessary chemicals at anything like a moderate price, and as his inclination was always to prepare things from the foundation he had adopted various methods of making both the phosphoric acid and the phosphate of lime, some of which he explained. Latterly, however, from want of time as well as the fact that the several ingredients were now sold at such a low figure he had abandoned that troublesome part of the process. He had always prepared it without heating anything but the sugar in a small proportion of the water, and after slightly cooling added the phosphate solutions, and had not been troubled much with deposits of any kind. He congratulated Mr. Howie on the great pains he had taken in getting up this paper, and had no doubt its publication would do much good in clearing up some of the little difficulties many may have encountered in working with the phosphates.

Mr. John C. Hunter said he had worked the bicarbonate process some time and found it very satisfactory, his method was to add the disodic phosphate to the iron and filter, then add the bicarbonate to the filtrate, by this means he thought he had been able to turn out a syrup containing one grain of ferrous phosphate per drachm.

Mr. Howie, in reply to Mr. Hunter, said that though the stated strength was one grain ferrous phosphate per drachm, that was the only basis on which such a strength could be built. The product of the formula worked as Parrish gave it could not contain much more than half a grain per drachm, and the "genuine" syrup, in his own experience, contained less than that quantity. He (Mr. Howie) therefore, considered that pharmacists were bound to follow the product and discard the loose statements found on printed labels and in the books quoted.

Mr. James M. Fairlie referred to the sugar used in preparing syrups, and said he believed that it had a good deal to do with the precipitates formed in many syrups, some formulæ he had seen he thought contained too much sugar, and he knew that many chemists used the ordinary soft sugar as sold by the grocers, which was not pure cane sugar. In Glasgow he had found the greatest difficulty in getting sugar free from "beet," and he thought that pharmacists should resolutely set themselves against using anything but a guaranteed pure cane sugar; apart from the reasons given by Mr. Howie for guarding against the use of sugar contaminated with beet-root sugar he knew that pure cane possessed at least a half more sweetening power, and, although more expensive at first, proved the cheapest in the end. He (Mr. Fairlie) had found little difficulty with deposits in his phosphate syrups, and had always prepared them by the cold process.

The Chairman (Mr. Kinninmont), in course of his remarks, alluded to the probability of the phosphates existing in the syrups in presence of free acid as bibasic or even monobasic salts, which would bring up the strength to nearer what was considered to be the proper proportion.

Mr. Howie, in reply, however, said it did not practically alter the strength; he had worked upon the amount of iron in all cases and calculated it as $Fe_3P_2O_8$. In regard to a suggestion thrown out that the product of the formula should measure only thirty-six fluid ounces, Mr. Howie said his statement could be checked at once without difficulty. For though Parrish did not state the bulk of the finished product he gave certain fixed quantities of sugar and phosphate solution, and calculating the sugar at sp. gr. 1·6 it would be found that the product theoretically should measure almost exactly forty-five fluid ounces which he had found to be corroborated by the practical outcome.

At the close of the discussion Mr. Howie was awarded a very cordial vote of thanks. Afterwards, the audience examined the various diagrams and specimens of syrups which Mr. Howie had specially prepared, together with the crystalline precipitates which were shown by the aid of several high power microscopes.

The annual meeting of the Association will be held in May.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The quarterly meeting of the Midland Counties Chemists' Association, was held on Friday last, at 90, New Street, Birmingham, the President, Mr. T. Barclay, in the chair. There was a fair attendance of members and associates.

The minutes of previous meeting having been read and confirmed, the secretary presented the report of the Soirée Committee, showing a substantial balance after payment of all expenses. The balance sheet for the year also showed a surplus in hand, the pecuniary condition of the association has thus shown to be satisfactory. Mr. Dewson then read the quarterly *résumé* of pharmaceutical progress, speaking of vaseline as a valuable addition to pharmacy from its power of resisting chemical agents, which rendered it useful in the preparation of pessaries and ointments. The use of acetic ether in the preparation of blistering fluid was commented upon, and the addition of tayuya to the list of medicines. The subject of the preparation of mercurials, etc., gave rise to some discussion in the course of which the President declared his conviction of the superiority of "hand-made" blue pill over that made by machinery.

Mr. Arblaster introduced the subject of the sale of patent medicines which gave rise to much discussion; Mr. Arblaster urging that since many patent medicines contain "poisons" in the meaning of the Pharmacy Act, and several deaths have lately occurred from the incautious administration of such medicines, it is advisable in the interest of the public that such medicines should be labelled Poison, and be sold only by the registered chemist and druggist.

After some remarks from Mr. Lucas and others, the President moved that a committee consisting of Mr. Arblaster, Mr. Lucas, and other officers of the Association, consider the patent medicine question with a view to drawing up a memorial to the House of Commons praying them to consider the unsafe condition of the law as regards patent medicines. Some conversation took place relative to the prizes offered by the president and council for competition by members of the Association classes and the meeting terminated.

LEEDS CHEMISTS' ASSOCIATION.

The eleventh general meeting of this Association for the present session was held on Wednesday evening, March the 22nd, in the library, the President, Mr. Yewdall, in the chair. After the usual preliminary business had been gone through, the Chairman directed the attention of the meeting to the appeal made by a gentleman in the trade journals on behalf of Mr. Cyrus Buott, now in distressed circumstances, and expressed the hope that the chemists of Leeds would not be backward in subscribing to so worthy an object. He next called upon Mr. Freshfield Reynolds to read his paper on "Phosphorus," of which the following is an abstract:—

Mr. Reynolds commenced by referring to an article by Mr. Joseph Ince (contained in *Pharmaceutical Journal*, vol. xviii, p. 127) on "Ambrose Godfrey Hanckwitz," who afterwards became the founder of the famous firm of "Godfrey and Cooke," and went on to say the reader of that biographical sketch would find that whilst the discovery of phosphorus was due to the distinguished chemist Brandt, of Hamburgh, about the year 1669, it would appear that Hanckwitz became the principal manufacturer of the wondrous novelty, which was speedily sought after by all the philosophers of his time, the modest price which he demanded from his customers being 60*s.* per ounce! The original process of manufacturing phosphorus from human urine, and the various modifications of its present manufacture from calcined bones having been described in detail, the most important commercial form, namely, "amorphous phosphorus," was next dealt with. Ordinary phosphorus when exposed to a temperature of 460° or 480° F. for about fifty hours in an atmosphere incapable of acting on it, becoming red and opaque, undergoes a remarkable change of properties. Thus it is non-luminous in the dark at ordinary temperatures; it is insoluble in oil, mineral naphtha, ether and carbon bisulphide, and is inert and innocuous when taken internally in considerable doses. All these properties being exactly the negative of those which belong to ordinary phosphorus. When, however, this amorphous or "negative" phosphorus is heated to about 500° F., it is re-converted into the ordinary form of the element, recovering all its old properties. Lemoine concludes that the conversion of phosphorus into amorphous phosphorus depends upon vapour tension, the limit being about 3·6 grains of phosphorus to the litre of space. It has been observed that the transformation is attended by the evolution of heat, the temperature of the vapour exceeding by about 75° that of the surrounding bath. A modification of amorphous phosphorus may be obtained, by heating it to about 530° F. in a sealed vacuous glass tube, the upper end only of which is heated to 447°, where the vapour condenses in groups of microscopic needles. The same result may also be obtained, but more perfectly, by the following method: Take a wide glass tube and fill is one fourth with phosphorus, then fill it with melted lead whilst a stream of carbon dioxide is passed through it; the tube is then exhausted, sealed, and enclosed in an iron tube packed with magnesia, and heated strongly for several hours. On cooling, the surface of the lead is covered with black lustrous crystals, unalterable in the air; well-defined but small crystals may be removed from the mass of lead by digesting in nitric acid. Returning to ordinary phosphorus, Müller says that it is not luminous in pure oxygen at ordinary temperature, but if the gas be rarefied or other gases mixed with the oxygen, the phosphorus becomes luminous, and the further the dilution is carried the lower will be the temperature at which luminosity occurs. Some vapours, as of ether and turpentine, have the power of destroying the luminosity of phosphorus in air, but do not arrest its volatilization. To demonstrate the slight solubility of phosphorus in water, take some water in which phosphorus has been kept for a considerable time, and after careful filtration pass through it a stream of hydrogen mixed with air; the bubbles of gas will be observed to shine brightly in the dark.

A solution of phosphorus in carbon bisulphide has been found useful as a delicate test for some metals, on account of its property of precipitating them in the metallic state; thus if a little of this solution be shaken with water a white turbid liquid is obtained, which gives with copper a brown-red precipitate, with silver a black one, with gold a violet one, and with mercury a brownish-yellow one. The electrotypist has taken advantage of this reducing power of phosphorus, for by treating very delicate surfaces with a solution of phosphorus and then with a solution of copper, a fine metallic film is deposited upon them.

The usual formulæ for the medicinal administration of phosphorus having been noticed, and the frequent oxidation of the phosphorus in many of these pointed out, a convenient and accurate method of preparing phosphorus pills (especially when in combination with other medicinal agents) was recommended, by using a solution of phosphorus in carbon bisulphide, of definite strength, the bisulphide quickly evaporating and leaving no trace of its disagreeable odour.

The writer concluded by disclaiming any novelty in the treatment of the subject, but had endeavoured to gather interesting information upon it from various sources.

The twelfth general meeting of this Association for the present session was held in the science lecture room of the Mechanics' Institution, on the evening of Tuesday, April 4. Mr. Thomas Child occupied the chair, and Mr. G. Ward delivered his sixth lecture on "Practical Pharmacy," entitled "Precipitation, Percolation, and Processes of Expression."

Mr. Ward commenced by describing precipitation as a process for the separation of solid matter from a state of solution. It might be effected by various means, as by heat, by light, or by chemical reagents, and in this lay the difference betwixt a precipitate and a deposit, the latter being simply a settlement of solid matter from suspension. Precipitation was often used in processes of the Pharmacopœia, as in the preparation of sulphurated antimony, and the precipitates of mercury, carb. magnesia, etc. Precipitates differ greatly in their physical conditions, ranging from the highly crystalline form down to a mere amorphous powder, and each precipitate has its own characteristic form. They are generally formed by the mixture of solutions producing a new substance which is totally or partially insoluble in the quantity of liquid present, and this insolubility may arise either from want of a sufficient quantity of the solvent or from the perfect insolubility of the new substance itself. The mechanical condition of precipitates may be modified by boiling for a length of time in the mother liquor, by modifying the temperature at which they are formed or by the degree of condensation of the solutions from which they are produced; a notable instance of which occurs in the preparation of the light and heavy carbonates of magnesia of the Pharmacopœia. When a fine powder is required, dilute solutions may be used, but it is sometimes an advantage to obtain a precipitate in a coarse or granular form. The washing of precipitates may be performed firstly by decantation, and then on a filter, and herein lies one of the advantages of a coarse precipitate. To facilitate the washing of precipitates, the "filter pump" for exhausting the air from the receiver is of great use. The process of percolation is one of considerable importance, upon which much has been written and about which great differences of opinion exist. It really is a very similar one to that of filtration, and indeed it has been stated that the best form of percolator is an ordinary funnel with an angle of about 59°. He, the lecturer, thought that for small operations nothing could be better than the conical percolator supplied by the York Glass Company, and if any means could be found of introducing a tap at the bottom of the upper portion of the apparatus it would be nearly perfect; but for operating upon large quantities, that of Mr. Haselden, as described in the *Pharmaceutical Journal* for 1863-64 was probably the best. The state of division to which substances should be reduced prior to being submitted to percolation, was subject to no rule but that of experience. It might be said that the more fibrous the substance the finer the state of division to which it should be reduced; but uniformity of division was essential, fine or coarse. Packing the percolator was an operation upon which a variety of opinions existed; some favouring dry packing, some packing the ingredients in a moist condition, whilst others, including the compilers of the Pharmacopœia, preferred subjecting them to the process of maceration previous to packing in the percolator. The latter he thought far the best method, though perhaps in some of the official preparations it would be better if a somewhat larger amount of the menstruum were left to be percolated through the substance after maceration. Expression was an exceedingly simple process. For pressing large quantities, of course, there was nothing better than the hydraulic press. For small quantities perhaps the press best adapted was that of Messrs Hayward and Tyler, combining the screw with modified hydraulic power. The difficulty of pressing some substances might often be greatly lessened by allowing them to drain in the bay for some time before pressing, using necessary precautions to prevent evaporation.

This being the last of his course of six lectures, Mr. Ward expressed the hope that some of his remarks might be of use to those who had attended, and pointed out to the young men present how much pleasure and profit might be derived by working out queries that constantly present themselves in the ordinary processes of pharmacy.

A vote of thanks to Mr. Ward for the able and interesting manner in which he had conducted the course was passed unanimously on the motion of Mr. Payne, seconded by Mr. E. D. Brown.

BRIGHTON ASSOCIATION OF PHARMACY.

A meeting was held on Tuesday evening, the 28th of March, under the presidency of the Chairman, W. D. Savage, Esq., J.P., who read a paper entitled—

The Relative Positions of the Apothecaries and the Chemists and Druggists.

Before entering upon the subject of this evening's discussion I feel that some explanation is due from me, for sometimes I have had anxious thoughts about our local Association, but continued illness made it absolutely necessary that I should altogether abstain from mental and physical work, so that for more than six months I have taken no part in business. I have much regretted that none of my colleagues of the committee of the Association have been able to find leisure enough to fill up a portion of the long interregnum that has occurred since we last met. Whilst we have been so quiet, some centres of activity have been at work cheering and encouraging their promoters by their energy and perseverance; and the Council of the Pharmaceutical Society, ever desirous of assisting those who are trying to help themselves, have made liberal grants in two instances to local institutions. The rapid strides of late that have been made in pharmacy and chemistry necessitate the rising generation to avail themselves of every means likely to aid them in keeping pace with the times, and become qualified for the ordeal which all who enter the Society must undergo. Still, strange as it may seem, there is a marked indifference about local efforts, and it is painful to witness throughout the country (with few exceptions) the want of energy and effort on the part of apprentices and students to avail themselves of the period most suitable for tuition; a well grounded knowledge of the principles and practice of their future calling, acquired from daily experience, will be much more enduring than a spasmodic effort of a few weeks or months in London, if our young men would only note some of their compeers who have sometimes under very discouraging circumstances steadily persevered until they have come to the front in our examinations, and are noble examples of what can be accomplished by steady, systematic study. Spurgeon, in the lectures to his students says, "all cram and no digestion makes flesh destitute of muscle; and this is even more deplorable mentally than physically." My friend, Mr. Atherton, in his recent admirable address to the Nottingham Chemists' Association, said "the object of study is to gain knowledge, and the object of the examinations is to test that knowledge." It is necessary, of course, that every reasonable facility should be afforded to young men for the purposes of reading and illustrative experiments, and masters do well to cultivate a kindly feeling with their *employés*, it is sure to be reciprocated by a permanent and most beneficial result. The kindly interest manifested by the professors at Bloomsbury Square is amply rewarded in the prominent scientific position taken by some of the pupils, who emulate some of the brightest examples of our forefathers in the trade. I cannot close these few preliminary remarks without expressing my deep sense of the loss which pharmacy sustained during the last year in the death of Mr. Daniel Hanbury; he was a noble fellow, and beloved by all who had the pleasure of his acquaintance. I have dwelt too long, I fear, in my introduction, I will therefore at once enter upon the subject of this evening's meeting—the relative positions of the apothecary and the chemist and druggist. I may have nothing new to offer, but at this time it appears desirable that we should, as far as we can, review the events of the past history of both apothecaries and chemists, so as to realize our relative true positions. On a former occasion I endeavoured to show that the chemist and druggist of the present is the apothecary of the past. Previous to the 1st of August, 1815, there was no restriction as to visiting or to prescribing when it did not interfere with the physician's practice, and this right was secured to all in any way connected with physic; the cow-leech-cupper, herbalist, etc., were equally with the chemist and druggist protected. Gray, in his Supplement to the Pharmacopœia, says that the titles which the physicians and apothecaries enjoyed were sufficient guarantee to the public of the possessors having gone through a certain routine of education, and being capable of performing what was required of them; whereas, in committing themselves to the care of those who practise under other titles, patients do it at their own peril, and are guarded only by the general responsibility of all practitioners to the common law of the land, which gives damages to those injured through gross neglect, that which was a restraining influence then, and is infinitely more binding now; and whilst it has always been the desire of the pharmaceutical chemist to restrict his practice as much as possible to his legitimate business, it is nevertheless absurd to suppose that the person who has been educated to a thorough knowledge of the nature and action of drugs should be placed in an inferior position to a person who has had no such opportunities of knowing the nature of the remedies beyond the experience which may have been derived from paregoric, syrup of squills, or other such medicine in popular use for coughs, etc. One of our eminent physicians once said in reference to this propensity, or it may be kindly sympathy, which the public manifested, that every one you met, knowing your malady, was ready to prescribe a remedy, whilst you might go about with holes in your boots or your trousers be out at the knees and no one would ever think of recommending to you a shoemaker or tailor. This well known trait of our national character has greatly fostered the sale of patent medicines, and now that has assumed such gigantic proportions yielding a revenue of upwards of £109,000 it is difficult to say how it can be best regulated. However it is not so with the counter practice of the chemist and druggist, for the tendency is in an opposite direction, which the higher education of pharmacists, as tested in the Major examinations, fosters. It must be borne in mind that the apothecaries, the grocers, and vintners were once combined, and the surgeons and barbers were allied. For eleven years the apothecaries and grocers were united, until James I. caused them to become two incorporations. The apothecaries have had from time to time certain privileges vested in them, such as for instance the inspection of drugs sold by apothecaries in their shops in London, which when bad they condemned and burnt in the street fronting the shop; subsequently the inspection was extended to all England, but rarely exercised, and then a more refined process was adopted of punishing the delinquent by burning the confiscated drugs more privately, and inflicting a fine. The power of the company was extensive, for if they found any false, unlawful, deceitful, stale, unwholesome, corrupt, pernicious, or hurtful drug, they had power to punish the guilty party. Some time ago when the Committee who had charge of the Adulteration of Food and Drug Bill, had some difficulty in defining breaches of the law, they should have referred to the above as likely to meet every possible delinquent. For many years the apothecaries had to restrict their charges for medicine; they could not charge for attendance and medicine until 1705, when a case of importance was decided in their favour, and as the case is often referred to I will give particulars. Mr. Rose, a properly qualified apothecary, attended a Mr. Seale, a butcher, and having charged for medicine and attendance, his legal right to do so was disputed, and an appeal to the Court of King's Bench only tended to confirm this belief, until the case was carried to the House of Lords, when the decision was reversed and ever since then the apothecaries have claimed the right. Indeed it is somewhat singular that the apothecaries retaliated, not by proceeding against the ignorant and unqualified, but against the physician who administered medicine without possessing their licence. This seemed to be an unfortunate course of procedure and tended to weaken the influence of the apothecaries, as showing their aim was not so much to put down illegal practice as to secure a monopoly. Subsequent legislation has greatly altered the position of all the parties interested; more especially has this been the case with the chemists and druggists, who became incorporated in 1843, and had further restrictive powers granted in 1852 and 1868, so that a powerful guarantee is given of their intention to make the present and future chemists capable of fulfilling all that can be reasonably required of them, without trespassing on the province of their professional neighbours. The general practice now in all the best shops is to confine themselves to their legitimate trade; and if the apothecaries and general practitioners would be equally particular in not keeping open shop or dispensing their own medicines, and avoiding when they can the making up of physicians' prescriptions, a better feeling of reciprocity and equity would exist. If we are to believe the general reports about some parts of Scotland, notably Glasgow, the apothecaries not only keep open shop with inefficient assistants, but what is infinitely worse lend their names to others who are illegally carying on retail trades; of course, one cannot come to any other conclusion than that they receive some pecuniary consideration. The great difficulty which the Pharmaceutical Society has to contend with in getting at these dishonest traders, is to get reliable evidence so as to ensure a conviction, but I hope some means will soon be devised to reach the evil.[*] On the 12th of January, 1813, the Associated Society of Apothecaries presented a petition to Parliament, setting forth their grievances; amongst others was the same that our Scotch friends now complain of in connection with the chemists and druggists, that they cannot get apprentices, as people practised without any regular education, they saved the expense of a regular curriculum, but jeopardized the lives of the public; they therefore begged to be allowed to introduce a Bill for regulating the practice of apothecaries, surgeon apothecaries, midwives, and dispensing chemists, with certain restrictions and penalties. However the physicians, chemists and others successfully opposed the Bill in its then form, and an amended one was introduced, and although still opposed it was carried by a bare majority and became the Apothecaries Act of 1815, under which recent proceedings against a chemist and druggist have been taken. You are all familiar with the case of The Master, Wardens, and Society of the Art and Mystery of the Apothecaries of the City of London *v.* Nottingham. It was tried January 27th last in the Court of Exchequer, and a verdict of £20 was given against the defendant. The proceedings were somewhat exceptional.[†] The defendant, who carried on business at 223, Shadwell, is a registered chemist and druggist, but had been in partnership with a qualified practitioner. Such a position would very naturally bring to the shop a class of persons not usually prescribed for in ordinary counter practice, and so long as the partnership continued it was legitimate enough, although it might, and probably did, annoy neighbouring apothecaries. After a dissolution of partnership there would be no legal shield, and a connection having been formed, a class of customers would under ordinary circumstances go where they had been accustomed to, and thus establish a trade which Baron Bramwell has declared to be an infringement of the Apothecaries' Act. The important question which seems to have alarmed the whole trade is, How far this decision affects the privileges of the chemist and druggist, who, in the nature of things, and whether he likes it or not, must, more or less, be called upon to give advice across the counter? This brings me to consider the reserved rights obtained by the Apothecaries' Act in the following paragraph:—"Not to prejudice or in any way affect the trade or business of a chemist and druggist, in buying, preparing, compounding, dispensing and vending drugs, medicines, and medicinable compounds, wholesale and retail; but all persons using and exercising the same trade or business shall and may use, exercise, and carry on the same trade and business in such manner as fully and amply, to all intents and purposes, as the same trade or business was used, exercised, or carried on by chemists and druggists before the passing of this Act." This language seems comprehensive enough, and the only thing necessary appears to be what were the rights and privileges possessed by the chemists and druggists before the passing of the Act? And, perhaps, the question can best be answered by a reference to the answers given before a Committee of the House of Commons nineteen years after the Act was obtained. Mr. John Nussey, the then Master of the Apothecaries' Company, in answer to the question, Does not the Act of 1815 reserve to chemists all the privileges they possessed, among which they reckon prescribing and dispensing in their own shops; does not this privilege occasion medicine to be prescribed by a number of persons who have not received any regular medical education? replied "Most undoubtedly;" and whilst Mr. Nussey would not in his subsequent examination admit their right to prescribe, he said that no prosecution had ever been instituted against them. In the 10th vol. of the *Lancet* is this version of the chemists' reserved rights. Did he not dispense the prescriptions of legally authorized physicians? Did he not retail drugs? and, moreover, did he not occasionally, nay frequently, visit and prescribe for patients? It is notorious that he did, and so he may now without being subject to any of the penalties of the Apothecaries Act. In a subsequent number of the *Lancet* the following passage occurs: "The clause which exempts chemists and druggists from all penalties of that Act, renders the Act in point of law and utility a mere dead letter;" and further on, contends "that the decision of Seale *v.* Rose, as regards attending and prescribing, the House of Lords decreed that it was legal for an apothecary or chemist to visit, prescribe, and dispense medicine for patients." This was the opinion of Mr. Wakley, Sen., and it is pretty evident that our predecessors availed themselves of what they considered their privileges to an extent far beyond what we should consider ourselves justified in doing, and whilst we most strenuously oppose anything like systematic visiting of patients or otherwise infringing upon the legitimate province of the medical man, we must protest against the enforcements of such restrictions as would seriously militate against our own interest and interfere with the proper discharge of our duties to the public in answering ordinary questions as to the relative merits of this or that medicine. How often in our daily vocations have we to caution indiscreet mothers or nurses against giving opiates and other injurious medicines to children; but in such cases if we had not the power of suggesting something else our advice would be disregarded and evil results would often follow. In the 9th vol. of the *Pharmaceutical Journal* (1849-50), there is an article on the proper business of the apothecary, who is described as "a medical practitioner who prescribes and dispenses," and, speaking of the unsatisfactory state of the law, it is said, some chemists practised *ad libitum* behind the counter, others went so far as to visit patients; and the public not being able to recognize any difference between the shop of an apothecary and that of a chemist, promotes this confusion by applying indiscriminately to the two classes both for medicine and advice. Mr. Hawes having introduced a Bill to check the threatened encroachment of the chemists on the apothecaries and the latter on the physicians, each took alarm, which subsided by the chemists no longer aspiring to medical honours, the apothecaries discarding their old name to assume that of the more dignified one of general practitioners. The respective functions of the two having been fully discussed a foundation was laid for a superstructure calculated materially to improve the positions of both. On looking back, and taking a retrospective view of what the chemists and druggists, the apothecaries, and the physicians were, we have much reason to congratulate ourselves and the public on the improvements that have taken place and the present positions which they respectively occupy, and especial credit must be given to the Pharmaceutical Society for the efforts which it has from time to time made to advance the education and improve the status of the chemist and druggist. It is, therefore, but reasonable to suppose that the case of Nottingham is an exceptional one, and not at all likely to influence the Apothecaries' Company in proceeding to extreme measures against the exercise of simple counter practice by chemists and druggists. Apart from the lega question, Baron Bramwell said that such a course would be unreasonable. After what I have here advanced we might possibly take higher ground but a much more effective mode of reconciling our differences will be by each, as far as possible, avoiding trespassing on the province of the other. However, if the apothecaries should be ill-advised and take further action the Pharmaceutical Society will not, I am sure, be found wanting to vindicate, by every legitimate means, undue interference with any of the prerogatives of its members; but I trust that the alarm which may have been aroused in London and elsewhere by the circular recording the case of Nottingham and the decision of Baron Bramwell may be allowed to subside, and remain only as a record of a peculiar case which occurred in the year 1876.

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[*] Since the above was written a conviction has been obtained and £10 paid.

[†] The *Chemist and Druggist*, in the February number, says that the defendant had his name over his shop door, but surgeon-accoucheur appeared on the facia, that he had previously been fined £20 which had been paid into court.

After the President had read his paper he asked Dr. Corfe, whom he had invited to the meeting, if he would kindly give his views on the subject. He did so, first thanking the President for the opportunity afforded him of hearing a paper couched in such temperate and judicious language. But whilst he concurred in much that had been stated, there were matters in which he must differ from the author. Dr. Corfe was sorry that allusion had been made to any malpraxis in Scotland, as the Apothecaries' Act of 1815 was strictly confined in its operation to England. In reference to the application of the Pharmaceutical Society for their charter, Dr. Corfe well remembered that it was then distinctly understood that the pharmaceutists would avoid in every way interfering with the province and rights of the medical practitioner. In corroboration of which Dr. Corfe read an extract from the *Pharmaceutical Journal* of 1841 urging on its readers the desirability of prohibiting "counter practice;" and then, comparing this language with recent comments made by the same Journal in February, 1876, we find the original and undeviating conservative tone is reiterated thus:—"We have maintained that it is to the interest of the chemist and druggist to restrict himself to those duties which properly come within the scope of his business as a practical pharmaceutist." But what are the facts? A communistic spirit had sprung up of late years amongst chemists, "who aped the medical practitioner by every device short of calling themselves doctors," as the *Lance* worded it, and who were bold enough to declare that "the Pharmaceutical Society had been a curse rather than a blessing to the trade." In the periodical advocating "counter practice" we find numerous assistants advertising their claims "to prescribe, extract teeth,' and chemists offer a business where "capital opportunity exists for dentistry, good prescribing," etc. We find nothing of this encroaching language in the *Pharmaceutical Journal*, for in forty-six advertisements of one number only a solitary case occurs of the kind. It was well known, therefore, that the chemist did visit and interfere with the legitimate duties of the medical practitioner, and it was such as these the Medical Defence Association was determined to put down, but as for the pharmaceutist, who acted in the spirit of the charter, Dr. Corfe did not think proceedings would be taken against him.

The discussion was continued by Messrs. Cornish, Brew, Salmon, Haffenden, etc., and the general opinion seemed to be that it would be practically impossible to avoid entirely giving advice over the counter in minor cases, although one and all of the speakers repudiated all intention on the part of the majority of chemists and druggists intentionally to interfere with the duly qualified medical practitioner in the treatment of disease. A strong opinion was also expressed against the practice of medical men dispensing their own prescriptions, and that if the practice were avoided and the prescriptions sent to the chemists and druggists there would be less occasion or inducement for the latter to interfere with the rights and privileges claimed by the apothecaries and exercised by the medical profession at large.

A vote of thanks proposed by Mr. Cornish and seconded by Mr. Brewer was heartily accorded to the President for his valuable paper, and terminated the proceedings.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The usual monthly meeting of this Association was held on Thursday, the 30th ult., at Britannia Chambers, Pelham Street, the President, Mr. J. H. Atherton, F.C.S., in the chair.

There was a large attendance of members and associates.

The Hon. Secretary (Mr. R. Jackson) read the minutes of the last meeting and announced some donations, after which the President introduced Mr. H. Major, B.A., who delivered a most interesting and instructive lecture on "Wonders of Plant Life."

The lecturer opened his subject by pointing out that the vegetable kingdom was full of wonders in every department, but said that he would merely glance, at first, at the part plants play in the economy of nature in depriving the air of carbonic acid, fixing the carbon in their tissues and sending forth into the atmosphere again the pure life-giving oxygen. This he illustrated by reference to numerous interesting experiments. He then proceeded to deal with the wonderful power of adaptation to surroundings of climate and soil which plants manifest. The next department reviewed by the lecturer was the means adopted by nature for the fertilization of plants and to prevent self-fertilization; flags and bribes being provided by the plant, in brightly coloured flowers, and sweet scents and nectar, to attract insects which act as carriers of pollen from one plant to another. The lecturer next proceeded to deal with fungi, pointing out that these live not, as plants generally do, upon the inorganic, but on living and dead animals and plants. He concluded by referring to the potato disease, the vine disease, the silkworm disease, mildew, smut and bunt in wheat, and thoroughly and lucidly explained each. The lecture was listened to with great attention, and was evidently much appreciated by those present, as the frequent applause testified.

A hearty vote of thanks to Mr. Major, proposed by Mr. J. Rayner and seconded by Mr. Fitzhugh brought the meeting to a conclusion.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, 6th April, 1876, Professor Abel, F.R.S., President in the chair. The first paper read, after the formal business of the Society, was a "Preliminary Notice on the Action of Sulphuric Acid on Napththalene," by Dr. J. Stenhouse and Mr. C. E. Groves. From amongst the products of the reaction the authors have succeeded in isolating two new isomeric compounds, which they call napththalene sulphones. Three notes from the Laboratory of the Yorkshire College of Science were then communicated by Professor T. E. Thorpe, namely, "On the Action of the Copper Zinc Couple on Potassium Chlorate and Perchlorate," by Mr. H. Eccles. "On Thallium Chlorate," by Mr. J. Muir; and "On the Isometric Relations of Thallium," by Mr. Thorpe himself. Finally, Dr. H. E. Armstrong read a paper "On the Nomenclature of the Carbon Compounds," the discussion of which was adjourned until the next ordinary meeting, which will be on Thursday, 20th April. On Friday, 28th April, there will be a special meeting, when Professor Andrews will deliver a lecture "On Certain Methods of Physico-Chemical Research."

Parliamentary and Law Proceedings.

PROSECUTIONS UNDER THE SALE OF FOOD AND DRUGS ACT.

THE STANDARD OF BUTTER IN MILK.

On Saturday, March 16, Mr. J. T. Hood, farmer, was summoned to the Coventry Police Court, on the charge of fraudulently selling milk deficient in cream.

Dr. Hill, public analyst, said that he had analysed the milk in question and found it to contain only 2·5 per cent. of fat, which showed a deficiency of 16 per cent.

For the defence, Mr. Alfred Bird said that he had analysed some of the same milk, and found it to contain 2·6 per cent. of fat, which was an amount quite compatible with it being a genuine milk. He had seen milk with less, and some with more. The matter depended upon the age of the cow and of the calf, the time of the year, etc.

Upon the application of the prosecution, the remainder of the milk was ordered to be forwarded to Somerset House, for the opinion of the chemical department there.

The case came on again for hearing on Saturday, April 1, when the clerk to the magistrates read the report of the result of the analysis as follows:—"Total solids 11·04, solids not fat 8·21, fat 2·83, ash 0·62. The milk was a genuine milk. Milk differed in quality according to the time of the day at which the cow was milked; and whether it was taken from the top, middle, or bottom of the can, would affect the quantity of cream in the milk."

The Town Clerk said it was at his instance that this milk had been sent to the government laboratory for examination. The figures given in the report just read showed that as to fat the government analysts had found rather more than Dr. Hill had done. Dr. Hill had said that there was 2·47 of cream, and they said 2·83, or about one-third per cent. of difference. Of course this 2·83 was below Dr. Hill's lowest and natural standard for good milk, viz., 3·0, but seeing it came so near to what he might call the foot of the scale, he felt he ought to withdraw the information against the defendant.

Mr. Wilks said that if the case had gone on and the facts had come before the bench he would have been able to have traced the history of the milk in question from the cow to the buyer, and to have proved by the most indisputable evidence that it had never been tampered with. The bench had been told already that this milk was only a little below the standard which had been given by Dr. Hill, and which he was pleased to call a natural standard of milk. Dr. Hill, in cross-examination, had admitted that there was no fixed standard of milk, but he had fixed his standard of cream from milk as the result of milking five cows, probably under the most favourable circumstances. What he contended was that Dr. Hill had drawn his conclusions from too narrow a basis, and was not justified in making the assertion he had done. His client had gone to the highest authorities possible, viz., Professor Voelcker and Professor Redwood, and if the case had gone on he would have called Professor Redwood and Professor Voelcker into the witness-box, but what would have been their testimony was determined by the report which they had given. Professor Voelcker had analysed portions of the milk—of this very milk—and he had said, "It is a genuine milk in my judgment, and, as you will notice, somewhat richer in fat than the sample handed me by Professor Redwood"; and added, "It is too bad to condemn such a sample of milk as the one sent me by Mr. Alfred Bird." Professor Voelcker's analysis of this milk was as follows:—

Water	88·992
Fat	3·144
Milk Sugar, Caseine, etc.	7·114
Mineral Matter, Ash	·700
	100·000

Professor Voelcker had said that there was no fixed standard. He would also read an analysis of four samples of milk, milked in the presence of Alfred Bird, F.C.S., from four cows belonging to Mr. J. T. Hood, at his dairy farm, Eastern Green, near Coventry, on March 25th:—

	No. 1.	No. 2.	No. 3.	No. 4.
Water	88·84	88·4	89·07	86·70
Butter	1·85	3·6	1·59	3·44
Caseine and Sugar of Milk . . .	9·33	8·0	9·34	9·86
	100·00	100·00	100·00	100·00

No. 1, Butter. 1·83; No. 2, ditto, 3·60; No. 3, ditto, 1·59; No. 4, ditto, 3·44. Divided by 4, 10·46. Average of the four butters, 2·61—2; suggested by Dr. Hill in his certificate. On these grounds he asked the Bench to formally acquit his client, to give him a certificate that he left the Court without a stain upon his character, and to allow him his costs.

The Town Clerk replied, and defended Dr. Hill from the strictures of Mr. Wilks. Dr. Hill's analysis, he affirmed, had been almost entirely endorsed by the government analysts—the difference being very small between the two. The following table would show the real state of the case:—

	Average results by myself at different times of sample No. 3 milk.	Results obtained at Somerset House.	Results given by Mr. Bird.
Total solids . . .	11·10	11·04	9·6
Solids not fat . .	8·67	8·21	6·9
Fat	2·47	2·83	2·6
Ash	0·72	0·62	

Dr. Hill had admitted that there was no fixed standard, but he took a low natural one, and it was shown that this milk did not reach this.

The Magistrates retired, and on their return the Clerk to the Bench read the following judgment:—"As the case is dismissed we adjudge the defendant to be entitled to his reasonable costs, and we direct the same to be paid by the complainant to the defendant; and if the parties differ we direct that the costs be taxed by our clerk—but we do not allow the defendant any costs in respect of expenses incurred in taking the scientific opinions of Professor Voelcker and Professor Redwood. We are further of opinion that, under the circumstances, the prosecution was properly undertaken; but we feel that the defendant leaves the Court without any stain upon his character." *Condensed from the Coventry Times.*

MILK OF SULPHUR CASE.

On Monday last, at the Greenwich Police Court, Mrs. Mary Kirby, a widow, carrying on the business of a chemist, at Trafalgar Road. Greenwich, was charged with selling adulterated precipitated sulphur. The officer stated that on the 8th ult. he went to the shop of defendant and asked for two ounces of precipitated sulphur, for which he paid 3*d*. The analyst's certificate was produced, showing that the article sold contained 45 per cent. of sulphate of lime. A fine of 5*s*. and 2*s*. costs imposed.

Obituary.

Notice has been received of the death of the following:—

On the 29th of Jan., 1876, Mr. John William Glyde, Pharmaceutical Chemist, of Dursley, Gloucestershire. Aged 54 years. Mr. Glyde had been a Member of the Pharmaceutical Society since 1858.

On the 11th of Feb., 1876, Mr. George L. A. Schoenemann, Chemist and Druggist, of Cullum Street, E.C. Aged 43 years.

On the 24th of March, 1876, Mr. John Samuel Abel, Chemist and Druggist, of Saltney. Aged 36 years.

On the 25th March, 1876, Mr. John Cornish Saunders, Chemist and Druggist, of Bideford. Aged 72 years.

On the 1st of April, 1876, Mr. Michael Hughes, Chemist and Druggist, of Mill Street, Liverpool. Aged 29 years.

On the 3rd of April, 1876, Mr. Charles Gardener, Pharmaceutical Chemist, of Tunbridge Wells. Aged 64 years. Mr. Gardener was one of the Founders of the Pharmaceutical Society.

On the 3rd of April, 1876, Mr. William Paulden, Pharmaceutical Chemist, of Altrincham, Cheshire. Aged 55 years. Mr. Paulden has been a Member of the Pharmaceutical Society since 1853.

On the 10th of April, Mr. William James Taylor, Pharmaceutical Chemist, of Middlesborough. Mr. Taylor had been a Member of the Pharmaceutical Society since 1846, and for some years served the Society as Local Secretary.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

H. M. H.—Proctor's 'Lectures on Practical Pharmacy,' published by Churchills, or Parrish's 'Practical Pharmacy,' the London publishers of which are Baillière, Tindall and Co.

"*Hyoscyamus.*"—Dr. Harley has made some experiments in the subcutaneous admininistration of increasing doses of hyoscyamia, the results of which he has described in the new edition of Royle's 'Materia Medica,' pp. 448 and 449. The passage is too long for quotation.

E. Hill.—Several recipes for Hair Restorers have already appeared in this Journal at various times.

G.—(1, 2, 3, 4) *Salix cinerea;* (5) *S. viminalis;* (7) *Taraxacum officinale*, var. *erythrospermum;* (8) *Luzula campestris.*

J. Thompson.—You will best obtain the information from the price list of any respectable optical instrument maker. We are unable to recommend particular tradesmen.

"*North-West.*"—In the present state of the law relating to patent medicines nothing can be done to prevent the practice referred to.

Mr. Ford.—We cannot undertake to return communications that are not deemed suitable for insertion in this Journal.

"*Fair Play.*"—There is nothing illegal in such an advertisement, although it is much to be regretted. But should you be in possession of evidence that poisons under the Pharmacy Act are being dispensed or retailed by an unregistered person you are recommended to communicate with the Registrar.

J. W.—The precipitate is the alkaloid quinia. Try adding the ammoniated tincture last, and then quickly shaking, but not too violently.

Messrs. Cubley and Preston.—Your enclosure has not yet come to hand, but should it do so we shall be unable to refer to it except in the advertising columns.

"*Student.*"—Apply to the Secretary of the College of Surgeons, Lincoln's Inn Fields.

"*Socius.*"—We think not. Only the diseases incidental to the human frame are mentioned.

"*Inquirer.*"—The formula for Parrish's Syrup was quoted in vol. i., p. 857, of the present series; it is too lengthy to be reproduced here.

"*Glasgow.*"—Probably the book you want is Smith's 'Commentary on the Pharmacopœia,' published by Smith, Elder and Co.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. Siebold, Mr. Batemen, Mr. McCann, Mr. Holmes, Dr. Wright, E. W., M. P. S.

ON THE CONVERSION OF BRUCINE INTO STRYCHNINE BY THE ACTION OF DILUTE NITRIC ACID.

BY A. J. COWNLEY.

It has been stated by Professor Sonnenschein, in a paper read before the German Chemical Society (*Ber. Deut. Chem. Ges.* iv., 213), an abstract of which appeared in this Journal (No. 272, p. 201), that brucine is easily converted into strychnine by the action of dilute nitric acid. The author states that this is to be effected as follows:—Brucine is heated with from four to five times its weight of dilute nitric acid, when there is a strong disengagement of gas which precipitates ammoniacal baric chloride. The red solution, having been concentrated in the water-bath, is then saturated with caustic potash and shaken with ether. The author says that the ethereal solution gives on evaporation a red colouring matter, a yellowish resin, and an alkaloid, which he has found to be strychnine, and the change is thus explained:—

$$
\begin{array}{lcr}
\text{Brucine} & \ldots\ldots\ldots & C_{23}H_{26}N_2O_4 \\
\quad + & \ldots\ldots\ldots & O_4 \\
\hline
 & & C_{23}H_{26}N_2O_8 \\
-\,2\left\{\begin{array}{l} OH_2 \\ CO_2 \end{array}\right. & \begin{array}{c}\ldots\ldots\ldots \\ \ldots\ldots\ldots\end{array} & C_2\,H_4\quad O_6 \\
\hline
 & & C_{21}H_{22}N_2O_2
\end{array}
$$

As the evolution of carbonic anhydride by the action of dilute nitric acid on the alkaloid was not a very strong link in the chain of evidence as to the transformation of brucine into strychnine,—for other observers, notably Baumert (*Ann. Chem. u. Pharm.*, lxx., 337), Rosengarten (*Ibid.*, lx., iii.), and Strecker (*Compt. Rend.*, xxxix., 49), have obtained CO_2 from brucine by the action of oxidizing agents,—and as the author's own experiments showed that by the action of the acid, only a partial change takes place; further, as no experiment was described, giving the yield of strychnine from a specific quantity of brucine, it was thought of interest to examine this reaction, taking care to follow the original instructions as far as possible, with the precaution, however, of using acid of known strength.

1. One gram of pure brucine was taken with 4 c.c. of nitric acid, sp. gr. 1180 (=about 25 per cent. N_2O_5). The mixture was heated on the water-bath; evolution of gas ensued, which precipitated ammoniacal baric chloride. On concentration the red colour disappeared, whilst at the same time yellow crystals were deposited, leaving the supernatant liquid faintly yellow. The crystals were obtained in solution by diluting with water and boiling. Caustic potash was then gradually added, until a large excess was present; this caused no precipitation of alkaloid. After shaking the alkaline liquid with 60 c.c. of ether, and allowing it to stand for some time, the colourless ethereal layer was separated from the reddish brown alkaline solution and evaporated to dryness, but no residue was left.

2. Proceeded in the same manner as before, until the yellow crystals were in solution. The solution was neutralized with caustic potash, concentrated and cooled, with the object of producing crystalline nitrate; no crystals formed.

3. 2 c.c. of acid of 1054 sp. gr. (=about 7·75 per cent. N_2O_5) was taken with ·5 grm. of brucine, following the method described in 1, so far as concerns the action of the acid. The supernatant liquid being decanted from the crystals was by itself shaken with caustic potash and ether, but the alkali caused no precipitation. Caustic potash solution was poured on the crystals to a decided alkaline reaction, when they dissolved to a yellow coloured solution, and this solution having been added to the first, the ethereal layer of the mixture gave no residue on evaporation. Having thus, with acid of moderate strength, obtained results discordant with those given in the original paper it was considered necessary in the next experiments to take acid of extreme degrees of specific gravity.

4. (*a*). Acid of 1360 sp. gr. (=about 50 per cent. N_2O_5), taking ·5 grm. of brucine and 2 c.c. of acid. The same result followed as in the other experiments, *i.e.*, no precipitation of alkaloid and no ethereal residue.

(*b*). Acid of 1035 sp. gr. (=about 5½ per cent. N_2O_5), taking ·5 gram of brucine and 2·5 c.c. of acid. The solution after gentle water-bath heat became yellow; concentration produced the blood-red colour, but no crystals formed. The solution was shaken with ether and caustic potash as before. The alkali caused a precipitation of alkaloid, soluble in large excess of ether; the alkaline liquid was of a dark reddish brown.

The ethereal residue consisted of a crystalline alkaloid and a white resin. The alkaloid gave the characteristic reaction for brucine with strong nitric acid and ammonic sulphide, but failed to give any indication of strychnine with the delicate reaction for that alkaloid with potassic chromate and sulphuric acid.

In order to ascertain the behaviour of strychnine with moderately dilute nitric acid ·5 gram strychnine was heated on the water-bath with nitric acid of 1135 sp. gr. (=about 18¾ per cent. N_2O_5). Crystals were deposited, and obtained in solution by boiling with water. Without allowing the solution thoroughly to cool, but to become sufficiently cold to give an oily opacity to the liquid, it was shaken with ether, when the opacity disappeared; on adding caustic potash there was no precipitation of alkaloid. The ethereal solution gave an alkaloid exhibiting the characteristic indication with potassic chromate and sulphuric acid. Now, brucine treated in the same manner gave no alkaloid from ether, and if in the experiment with strychnine the alkali be first added, the ether fails to abstract the alkaloid, but there is left from the ether a yellowish resin. Professor Sonnenschein obtained an alkaloid and a yellowish resin, and as he also found indications of strychnine in the brucine experimented with, these experiments taken as a whole seem to show that the brucine used must have been more contaminated with strychnine than he had evidence of. But whilst they negative the possibility of the conversion of brucine into strychnine by the direct action of dilute nitric acid, they are interesting so far as to require further evidence on the formation of the yellow crystals.

If brucine be treated with enough dilute nitric acid to acidify the solution there is no change in colour, and caustic fixed alkalies precipitate the alkaloid; (2) if enough acid be used just to form the blood red colour without the aid of heat there is a partial precipitation with alkali; (3) if gentle heat be used in presence of acid in excess, more than sufficient to colour the solution, caustic potash or soda fails to produce a precipitation, and if further heat be used after the acid has been added, yellow crystals soluble in alkali are deposited. These experiments seem to bear out the view that if the action of dilute acid be completed, the alkaloid is converted into a nitro-base. On this point Strecker has shown in the paper before mentioned, agreeing to some extent with Gerhardt and with Rosengarten, that the result of the action of strong nitric acid on brucine is to convert it into a nitro-compound, cacotheline (Laurent), of the composition of $C_{20}H_{22}N_4O_9$, expressing the reaction as

$$C_{23}H_{26}N_2O_4 + 5NO_3H = C_{20}H_{22}N_4O_9 + N(CH_3)O_2 + C_2H_2O_4 + 2NO + 2OH_2$$

CO_2 being finally evolved by the splitting up of the molecule of oxalic acid.

This nitro-base was prepared in this way, and from its behaviour with fixed caustic alkalies, from its being but difficultly soluble in dilute hydrochloric acid and its solution therein giving a yellow precipitate with platinic chloride, as well as its strong nitric acid solution failing to be precipitated with caustic alkali, to all of which characteristics the yellow crystals obtained with dilute acid correspond, it would seem that the action of dilute nitric acid in excess on brucine is to convert it into cacotheline, but to establish this further experiments are necessary. It is important, however, to observe that the detection of brucine especially, and even of strychnine, in an analytical inquiry will become doubtful if the presence of nitric acid, even dilute, be permitted; but that the one alkaloid will be converted into the other these experiments fail to corroborate.

I am indebted to Dr. Paul for his kindness in permitting me to conduct this investigation in his Laboratory.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 763.)

The astronomical use of polarized light lies considerably within quite another domain than that of the pharmacist, but an excuse is hardly necessary in these days, when every one knows something of astronomy and takes a greater or lesser interest in its problems, for introducing it here. One branch of astronomical research in which it has played an important part during the past few years is that of solar observations during eclipses. When the sun is eclipsed there is amongst the phenomena of the eclipse the very beautiful and perplexing halo or glory round the dark body of the moon.* To ascertain the nature of this halo or corona has long been the object of anxious thought and repeated observation, but the solution of the problem has been complicated by the difficulty that has been experienced in arriving at satisfactory conclusions respecting its origin; that is, as to whether it be purely a solar or purely a terrestrial phenomenon, or complicated by being solar *and* terrestrial. Towards the solution of this problem the spectroscope and photographic camera have lent important aid; the polariscope has contributed not a little, but in a very perplexing fashion.

The problem to be solved in the first instance is this: Is the light of the corona polarized? If so, is the polarization general or particular? Is the plane of polarization constant in direction for the whole corona, or is it found to change in direction as we pass our instrument over it and round it—that is, is the plane of polarization radial or not? There are thus two distinct questions to be answered. We have not only to ascertain whether the light we receive from the corona, as a whole, is polarized, but also to ascertain the exact plane of polarization of the light received from each part of it. Neither of these questions can be accurately answered by means of the apparatus hitherto described, for, although the Nicol prism or tourmaline is quite competent to detect considerable quantities of polarized light, and to distinguish with approximate accuracy its plane of polarization, it is quite incompetent to detect small traces of polarization, or distinguish minutely between varying planes of polarization. The use of a selenite film, as we have seen, is a considerable help to the detection of slight polarization, but is not sensitive enough for delicate researches. In the Savart and bi-quartz, however, we find appliances of exceeding delicacy and well adapted for our purpose. A full description of these instruments will be given later, when their use in sugar analysis is dealt with; the principles upon which they depend will form part of our discussion of circular polarization. For the present purpose it is sufficient to say that the Savart is composed of two quartz plates cut in particular directions and superposed. When viewed by polarized light, the plate being properly placed as regards the plane of polarization, numbers of coloured vertical lines are seen crossing the field from the centre to either side, the centre of the field being occupied either by a light or a dark narrow space, being the one or the other as the prisms are crossed or parallel. These lines are most clearly seen when the plate is in a definite direction as regards the plane of polarization, and we shall see if we rotate the polarizer or analyser that a slight variation of the plane of polarization materially affects the character of the lines, and that in a certain position they are quite invisible. This arrangement is extremely sensitive (excepting perhaps a "*macled*" quartz, the most sensitive of all polariscopes). The bi-quartz consists of two semi-discs of quartz, of which the one is right-handed and the other left-handed as regards its rotative power. The effect of this is that when these quartz semi-discs are placed side by side to form a "moon-like" disc, they are uniformly coloured when placed with the line of junction in the plane of polarization, and that the slightest inclination of the plane of polarization from this line of junction causes the semi-discs to be differently coloured, the one perhaps being yellow and the other blue, or the one red and the other green. The arrangement is the most sensitive when the colour of the disc is a purplish violet tint, the *teinte sensible* of French writers, when the junction of the semi-discs is in the plane of polarization, as under these circumstances the slightest alteration of the plane causes great difference in their colours. The cause of this will be shown later. It will, I hope, be easily gathered from this description of the instruments that if we take the Savart plate and attach it to a Nicol prism with its principal plane so arranged that the field of view is seen filled with coloured bands when the plane of primitive polarization accords with that of the analysing Nicol and when it exactly does not so accord, but that no bands are seen when the plane of primitive polarization is at an angle midway between these positions, we provide ourselves with means for detecting at once the presence of polarized light and the plane in which it is polarized. The presence of the bands will show that we are dealing with polarized light, and we have merely to rotate the instrument until the bands are at their brightest or quite invisible to ascertain the plane of polarization. The direction of the bands when at their brightest, with bright centre, is that of the plane of polarization. Examination of the blue light of the sky with such an instrument (which may be purchased from Tisley and Spiller, London, or other of our leading opticians, for about a guinea) is a most instructive exercise for the student. The examination of the sun's corona is only very occasionally possible to the astronomer, as total eclipses are very infrequent, and the chances of a beginner having an opportunity of making polariscope experiments upon it are, of course, extremely small. But, as Mr. Norman Lockyer has shown in a lecture delivered before the Royal Institution in 1872,* a very serviceable artificial corona can be made by cutting a circular hole with sloping sides in a plate of mahogany or other substance that will reflect light well. The degree of slope to be given to the sides of the hole will vary with the substance used, but can readily be ascertained by experimental determination of its polarizing angle. A piece of oiled tissue paper is stretched across the smaller aperture, which is to be the furthest from the observer, and then is as powerfully illuminated as possible. A suitable central diaphragm is placed within the aperture, close to the paper, to intercept all direct light and to allow the eye to receive none but light reflected from the polished sides of the aperture (if these be varnished the polarizing angle of the varnish must be taken into account). The light thus reflected is examined by either a Savart or a bi-quartz and Nicol, to which some simple telescope arrangement should be attached. We shall notice at once that when we use the bi-quartz we have quite different results from those we obtain when we deal with general polarization, such, for instance, as that of the sky (at any small portion of it). Then we had either a disc of some one colour, or semi-discs of different complementary colours, the one or the other remaining constant as we explored the whole region under examination, but now we find that the colours of the discs change with every portion of the ring, and following out our experiment with the Savart we find that the instrument must be rotated, as we pass round the ring in such manner that the coloured lines coincide with the radius of the ring, in order that we may maintain them at their maximum brightness. In other words, the polarization is not general, but particular —is "*radial*" in fact. But the phenomena of radial polarization are most effectively seen by means of Mr. W. Spottiswoode's† polariscope, where the whole phases of the successive polarization of right or left handed quartz are shown at one time by means of a rapidly revolving double image prism eye-piece.

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* See "Solar Physics," by J. Norman Lockyer. Macmillan. Or any recent good text-book of astronomy. Mr. Proctor gives a good summary of the subject in the Encyclopædia Britt., *sub voce*, Astronomy.

The instructions issued to the eclipse expedition for 1871 give tolerably complete instructions for the employment of polariscopes in the work, and should be consulted by those interested in the subject. Polariscope results gained by the observers of the corona of the 1871 eclipse are briefly these:—Mr. Lewis,* "in sweeping round the corona at a distance of 6′ or 7′ from the sun's limb, using a pair of compensating quartz wedges as an analyser, which remained parallel to itself while the telescope swept round, observed the bands gradually change in intensity, then disappear, bands of a complementary colour afterwards appearing, thereby indicating radial polarization." Dr. Thomson, at Bekul, on the other hand, found traces of atmospheric polarization only with a Savart. In this Lockyer coincided, but found faint traces of radial polarization near the sun's equator, for a short distance from the moon's limb, when he used a bi-quartz. M. Janssen† states that with him at Shoolor "the corona presented the characteristics of radial polarization, and it ought to be remarked, the maximum of effect is not observed at the lunar limb but at some minutes from its edge." Janssen used a bi-quartz by Prazmowski. These results agree with those from previous eclipses in one particular, in that they are so discordant as almost to cause us to regard them as irreconcilable and valueless. But M. Janssen discusses this point in relation to his theory of a special coronal atmosphere and the double nature of the coronal light, and thinks it is quite what we might expect, and entirely supports his theory. According to this the coronal light is only partly composed of reflected light, and it is to a great extent self-luminous. The working out of the subject from this point of view by conjunction of polariscope and spectroscope, and the results obtained, are well described in Janssen's lecture cited above.

(*To be continued.*)

A "CODE OF ETHICS."

The following "Code of Ethics," which has been issued by the Executive of the New Hampshire Pharmaceutical Association, presumably for the guidance of the members, will repay perusal:—

The pharmaceutical profession being one which demands knowledge, skill, and integrity on the part of those engaged in it, and being associated with the medical profession in the responsible duties of preserving the public health, and dispensing the useful, though often dangerous, agents adapted to the cure of disease, its members should be united on some general principles, to be observed in their several relations to each other, to the medical profession, and to the public; therefore its members have agreed upon the following principles for the government of their conduct:—

1st. We consider an apothecary being engaged in furthering the interests of any particular physician, to the prejudice of other reputable members of the medical profession, or allowing any physician a percentage or commission on his prescriptions, as unjust towards that profession, and injurious to the public.

2nd. As the diagnosis and treatment of disease belong to the province of a distinct profession, and as a pharmaceutical education does not qualify the graduate for these responsible offices, we should, when it is practicable, refer applicants for medical aid to a regular physician.

3rd. As the practice of pharmacy can become uniform only by an open and candid intercourse being kept up between apothecaries, which will lead them to discountenance the use of secret formulas, and promote the general use and knowledge of good practice; and as this association considers that any discovery which is useful in alleviating human suffering, or in restoring the diseased to health, should be made public for the good of humanity and the general advancement of the healing art, no member of this association should originate or prepare a medicine the composition of which is concealed from other members or from regular physicians. Whilst the association does not at present feel authorized to require its members to abandon the sale of secret or proprietary medicines, it earnestly recommends the propriety of discouraging their employment, when called upon for an opinion as to their merits.

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* 'Solar Physics,' page 363.

† Made by Tisley and Spiller, Brompton Road, S.W.

* Op. cit. 377.

† *Nature*, June 12, 1873.

4th. The apothecary should be remunerated by the public for his knowledge and skill, and, in his charges, should be regulated by the time consumed in preparation, as well as by the value of the article sold. Although location and other circumstances necessarily affect the rate of charges at different establishments, no apothecary should intentionally undersell his neighbours with a view to their injury.

5th. As medical men occasionally commit errors in the phraseology of their prescriptions, which may or may not involve ill consequences to the patient if dispensed, and be injurious to the character of the practitioner, it is held to be the duty of the apothecary, in such cases, to have the corrections made, if possible, without the knowledge of the patient, so that the physician may be screened from censure. When the errors are of such a character as not to be apparent without the knowledge of circumstances beyond the reach of the apothecary, we hold him to be blameless in case of ill consequences, the prescription being his guaranty, the original of which should always be retained by the apothecary.

6th. Apothecaries, likewise, are liable to commit errors in compounding prescriptions,—first, from the imperfect handwriting of the physician; secondly, owing to various synonyms of drugs in use, and their imperfect abbreviation; thirdly, from the confusion which, even in the best regulated establishments, may sometimes occur, arising from press of business; and, fourthly, from deficient knowledge or ability of one or more of the assistants in the shop, or of the proprietor.

We hold that in the three first instances named it is the duty of the physician to stand between the apothecary and the patient, so far as possible; and, in the last, that he should be governed by the circumstances of the case, drawing a distinction between an error made by a younger assistant incidentally engaged, and a case of culpable ignorance or carelessness in the superior.

7th. As the apothecary should be able to distinguish between good and bad drugs, in most cases, and as the substitution of a weak or inert drug for an active one may, negatively, be productive of serious consequences, we hold that the sale of impure drugs or medicines, from motives of competition or desire of gain, when pure articles of the same kind may be obtained, is highly culpable, and that it is the duty of every honest apothecary or druggist to expose all such fraudulent acts as may come to his knowledge. But in reference to those drugs which cannot be obtained in a state of purity, we should, as occasion offers, keep physicians informed of their „quality,‘ that they may be governed accordingly.

8th. As there are many powerful substances that rank as poisons, which are constantly kept by apothecaries and prescribed by physicians, and which are only safe in their hands,—as arsenious acid, vegetable alkaloids, ergot, cantharides, etc.,—we hold that the apothecary is not justified in vending these powerful agents indiscriminately to persons unqualified to administer them, and that a prescription should always be required, except in those cases when the poisons are intended for the destruction of animals and vermin, and in these instances only with the guaranty of a responsible person. And we hold that when there is good reason to believe that the purchaser is habitually using opiates or stimulants to excess, every druggist or apothecary should discourage such practice.

PANCREATIN.*

BY EMIL SCHEFFER, LOUISVILLE, KY.

Is pancreatin converted into pepton, when it is digested with acidulated pepsin? The answer to this query requires as first desideratum a pancreatin which possesses all the properties of the normal pancreas secretion, and as the pancreatins of the market could not be relied on in this respect, such had to be prepared.

According to physiological authorities the pancreas secretion, when taken from living animals, is a clear, almost colourless, somewhat viscid fluid, of neutral and sometimes alkaline reaction; it froths considerably upon agitation, is coagulated by heat, and is precipitated by strong acids and alcohol. The white precipitate produced by the latter is soluble in water.

The watery solution of the alcohol precipitate, as well as the normal pancreas secretion, have the property to convert starch into sugar and to decompose neutral fats into glycerin and the corresponding acids. It is also supposed to have the power of emulsifying fats, and Bernhard, Kolliker, and A. Miller found the normal secretion to possess this property in a high degree (by forming with oil a very perfect emulsion).

Other physiologists, however, do not regard this property very important, as they find that other secretions of the animal body possess it in the same if not in a higher degree.

We must, therefore, consider the saccharification of starch and the decomposition of neutral fats as the paramount functions which the pancreas secretion has to perform in the animal economy, and for these two qualities we have particularly to look in pancreatin.

The old method mentioned in physiological works, to precipitate the clear watery extraction of the pancreas with alcohol, to treat the precipitate with water, and precipitate from the clear filtered solution the pancreatin with alcohol again, yields, no doubt, the best dry preparation, as it possesses the power to saccharify starch and to decompose neutral fats in the highest degree.

The rapid putrefaction of the watery pancreas extraction, the slow process of filtering it, and the large quantity of alcohol needed, suggested to me a slight modification of the above process, by which I obtained a product which showed all the characteristic reactions of the pancreatic secretion, and by which I prepared the pancreatin used for my experiments.

A watery pancreas extraction gives with the firs drops of hydrochloric acid added to it a permanent precipitate, but when the pancreas is extracted with slightly acidulated water the albuminous substance which cause the precipitate upon the addition of a little acid to th watery extraction is not extracted. If to the solution in acidulated water hydrochloric acid is now added in smal quantities, a precipitate is formed which re-dissolve again, but remains permanent upon addition of acid in excess

Fourteen ounces well cleaned and finely chopped bee pancreas are macerated in one quart of water, to whic one drachm of hydrochloric acid is previously added After twenty-four hours the liquid is strained off, an the pancreas macerated with one pint of water withou acid for about four or six hours; the liquid obtaine from this second maceration is mixed with the acidulated extraction and filtered. The filtration is rapid, an results in a perfectly clear liquid of a light yellow colour and slightly acid reaction, which is coagulated by hea precipitated by alcohol, and which when added to a thic starch-paste, thins it in a short time even at a temperature of 70° to 75°, and formation of sugar can be prove in it in copious quantity by Trommer's test.

To the clear slightly acid liquid is now added an exces of freshly precipitated carbonate of calcium, to perfec

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[*] Reprinted from the 'Proceedings of the American Pharmaceutical Association, 1875.'

neutralization. The neutral liquid is filtered and mixed with an equal volume of alcohol at 95 per cent., by which a copious white precipitate is formed, which is collected on a filter, and after all the liquid has drained off is washed with dilute alcohol. Pressed and dried between bibulous paper the pancreatin appears then as a transparent, brittle, yellow mass, which dissolves in water slowly but almost entirely, leaving, when prepared in cold weather, only a trace of insoluble matter.

The filtered solution is perfectly clear, of a slight yellowish colour, neutral, and produces when heated a copious curdy precipitate; with alcohol it turns quite white and forms a heavy precipitate. Saturated solution of chloride of sodium does not precipitate it, but forms a clear solution; hydrochloric acid gives a precipitate which at first redissolves, but when added in larger quantity remains permanent.

Chloride of sodium solution added to an acidulated solution forms immediately a white precipitate, and, *vice versâ*, hydrochloric acid when added to a clear mixture of pancreatin solution and chloride of sodium, forms a permanent precipitate. With oil the pancreatin solution forms by longer agitation a smooth emulsion which soon separates. Starch-paste becomes by addition of pancreatin solution, when exposed to 100° F., in a short time very thin, and Trommer's test shows plenty of sugar.

From neutral fats the pancreatin separates the corresponding acids, which was proven by the following experiments:

To powdered pancreatin, mixed with a little water to a soft paste, a few drops of monobutyrin were added; after some time, according to the temperature of the air, the aromatic odour of monobutyrin disappeared, and some time afterwards the strong odour of butyric acid was noticed, while at the same time blue litmus paper was deeply reddened.

To a solution of five grains of pancreatin in two drachms of water, two drachms of pure olive oil were added, which mixture formed by agitation a kind of emulsion, after twelve hours a half ounce of absolute alcohol was added and the vial vigorously shaken.

Having found previously that the olive oil showed a slight acid reaction, I had in another vial two drachms of olive oil and two drachms of water shaken together, to which also a half ounce of absolute alcohol was added. The alcoholic solutions of both vials were put on separate filters and tested; while the solution of olive oil produced on litmus paper only a faint reddish coloration; the other solution, in which the oil had been in contact with pancreatin, reddened the litmus paper very bright; and, furthermore, the latter gave by evaporation of the alcoholic solution at least four times as much residue of strong acid reaction as the pure oil solution.

The third and most convincing proof is the following: To one ounce of neutral pancreatin solution (twenty grains to one ounce of water) two drachms of lard, which I had rendered on the water-bath from fresh leaf-lard, were added. This mixture, perfectly neutral, was at first occasionally agitated; on standing the lard collected on top again; after longer agitation the lard commenced to swell and become whiter; by more constant agitation the fatty layer increased in bulk until at last the whole was transformed into a uniform white spongy mass, from which, in rest, a part of the watery liquid separated. At the same time the mixture was occasionally tested with litmus paper. At first quite neutral, it reddened blue litmus after the lard had commenced swelling, and by the time the spongy mass was formed, the litmus paper was deeply reddened.

The acidification of the lard seemed to go hand-in-hand with the emulsification, if, indeed, the spongy mixture can be called an emulsion.

After eighteen hours, by which time the greater part of the watery liquid had separated, the entire mass was transferred to a moistened filter, and the fatty substance washed with water repeatedly. After the water had drained off as much as possible, the filter with fatty contents was put into a beaker and alcohol of 0·835 specific gravity added, which became immediately strongly acid. The alcoholic solution was after a few hours filtered off from the insoluble fat, and evaporated on a water-bath, whereby a considerable quantity of fatty acid was obtained.

The chemical and particularly the physiological tests enumerated above vindicate for my preparation the name of pancreatin.

In the *American Journal of Pharmacy*, November, 1873, Mr. R. V. Mattison published a formula for a preparation he obtained from pancreas, which he, therefore, called pancreatin. If under pancreatin that substance is understood which has the properties of the normal pancreas secretion, then Mr. Mattison's preparation cannot be and is not pancreatin; it has neither the chemical nor the physiological properties which characterize pancreatic secretion. Its solution in water has an acid reaction; is not coagulated by heat nor by alcohol; carbonate of calcium added to the solution precipitates the greater part, proving its insolubility in the neutral state; the liquid obtained by filtering off the precipitate gives, with alcohol, a little precipitate hardly soluble in water. Neutral monobutyrin added to it does not show any odour of butyric acid. Starch is not converted into sugar. Its solution shaken with oil forms a kind of emulsion, which soon separates, and which, by closer inspection, is nothing but an aggregation of minute oil-globules, which, under the magnifying glass, appear of a transparent yellow colour. The same emulsion is obtained when an acid pepton solution, obtained by dissolving albumen in pepsin solution, or when a solution of the precipitate, obtained by chloride of sodium from the pepton solution, is shaken with oil; and as this so-called pancreatin forms, with sulphate of copper and caustic potash, a deep purple-coloured solution, I am of opinion that it consists principally of pepton.

I obtained the same substance by adding to a solution of my pancreatin hydrochloric acid, drop by drop, as long as the precipitate redissolved, and then the same volume of saturated solution of chloride of sodium. The heavy precipitate formed was washed with dilute chloride of sodium solution, and proved to be exactly the same substance as when prepared directly from pancreas by Mr. Mattison's formula. It did not decompose monobutyrin; did not convert starch into sugar; and gave, with Trommer's test, a dark purple coloration. The acid liquid, filtered off from the chloride of sodium precipitate, was neutralized with carbonate of calcium, and to the filtered neutral liquid alcohol of 95 per cent. was added. A small flocculent precipitate was formed, which did not decompose fat.

By the action of hydrochloric acid on the watery pancreas extraction, particularly when the quantity of acid is considerable, and when the temperature is elevated, the pancreatin is destroyed.

A solution of pancreatin, which showed the saccharifying property in the highest degree, lost its action on starch after it was exposed to 100° F. for several hours, with the addition of five drops of hydrochloric acid to the ounce. It had no action on starch neither in the acid state nor after being neutralized with carbonate of calcium; the filtered solutions giving, with Trommer's test, only a reddish coloration, but no precipitate of suboxide of copper.

But to recur to the real question: Is pancreatin converted into pepton by the action of pepsin? or, in other words, can pancreatin, when brought into the stomach, have any physiological and therapeutical effect?

Some experiments which I have mentioned before answer this question already to some extent; but the following experiments will prove the destruction of pancreatin when acted on by pepsin:—

a. One ounce of chopped pancreas was added to a solution of one-half grain pure pepsin in three ounces of acidulated water; after six hours' digestion at 100° F. the liquid was filtered off from the undissolved portion, and neutralized with carbonate of calcium. A portion of the neutral liquid was added to starch-paste, and the vial containing it exposed to 100° F. for some time. Trommer's test produced only a purple-red coloration, but no precipitate of suboxide of copper. The balance of the neutral liquid was precipitated with alcohol, and to the washed precipitate monobutyrin added, but no odour of butyric acid could be noticed.

b. To a solution of one-half grain of pepsin, in two ounces of acidulated water, was added two ounces of pancreas liquid, obtained by rubbing down and beating three ounces of chopped pancreas with small quantities of water until after the third straining four ounces of liquid were obtained, which readily saccharified starch at the temperature of the air. The pepsin solution, containing the pancreas liquid, after four hours' digestion, was filtered, neutralized, digested with starch-paste, and tested, but no sugar reaction was obtained.

c. To two ounces of filtered pancreas extraction was added a solution of one-quarter grain of pepsin in two drachms of water, acidulated with five drops of hydrochloric acid, and the mixture treated as described before. Neither from the acid nor from the neutralized solution, after digestion with starch-paste, did I obtain any sign of sugar by Trommer's test, while the pancreas extraction by itself, treated with starch, had given the most copious precipitate of oxidulated copper.

d. The experiment of *c* was repeated with that difference that only one ounce of pancreas extraction was taken, and 120 grains of coagulated albumen added. The result was the same, except that the coloration of the liquid, by addition of Trommer's test, was deeper purple than in *c*, but no sugar could be traced.

e. A solution of one-quarter grain pepsin, six grains dry pancreatin in one ounce of water, with five drops of hydrochloric acid, was kept, at 100° F., six hours. To a portion of it starch-paste was added and digested for some time. Trommer's test, produced afterwards a light carmine-red coloration, but no precipitate of suboxide of copper. The balance of liquid, neutralized with carbonate of calcium, was, after filtration, precipitated with alcohol, and the precipitate tested with monobutyrin, but no odour of butyric acid could be detected.

The foregoing experiments, I think, are sufficient to prove the incompatibility of pancreatin and pepsin, and, furthermore, prove the usefulness of pancreatin as a therapeutical agent, as it will be decomposed when brought into the stomach.

REPULSION RESULTING FROM RADIATION.[*]

BY WILLIAM CROOKES, F.R.S., ETC.,

PART III.

This paper contains an account of experiments on the action of radiation on bodies the surfaces of which have their radiating and absorbing powers modified by various coatings. The difference between a white and a lamp-blacked surface in this respect was at first not very decided, and experiments have been instituted with the object of clearing up some anomalies in the actions observed. Two pith discs, one white and the other black, are suspended on a light arm in a glass bulb by means of a fine silk fibre; after perfect exhaustion the white and black discs are found to be equally repelled by heat of low intensity such as from the fingers, warm water, etc. A copper ball is then tried at gradually increasing temperatures. Up to 250° C. it repels both equally, above that the black is more repelled than the white, and at a full red heat the repulsion of the black disc is very energetic. A lighted candle acts with more energy than the red-hot copper.

The presence of even a small quantity of aqueous vapour in the exhausted apparatus almost, if not quite, neutralizes the more energetic action which luminous rays appear to exert on a blackened surface.

After describing several different modifications and some new forms of apparatus devised to facilitate experiment, the author gives a drawing of an instrument which enables him to get quantitative measurements of the amount of incident light falling on it. It consists of a flat bar of pith, half black and half white, suspended horizontally in a bulb by means of a long silk fibre. A small magnet and reflecting mirror are fastened to the pith, and a controlling magnet is fastened outside so that it can slide up and down the tube, and thus increase or diminish sensitiveness. The whole is completely exhausted and then enclosed in a box lined with black velvet, with apertures for the rays of light to pass in and out. A ray of light reflected from the mirror to a graduated scale shows the movements of the pith bar. The degrees of deflection produced by the light of a candle at distances from 6 feet to 35 feet are given.

The experimental observations and the numbers which are required by the theoretical diminution of light with the square of the distance are sufficiently close, as the following figures show:—

Candle	6 feet off	gives a deflection of	218·0°
"	12	" "	54·0°
"	18	" "	24·5°
"	24	" "	13·0°
"	10	" "	77·0°
"	20	" "	19·0°
"	30	" "	8·5°

The effect of two candles side by side is practically double, and of three candles three times that of one candle.

The action of various solid and liquid screens is next given.

A candle three feet off, giving a deflection of 180°, has its action reduced to the following amounts by—

Yellow glass	161°
Blue "	102°
Green "	101°
Red "	128°
Water	47°
Alum	27°

A candle on each side of the apparatus, and equidistant from it, keeps the index ray of light at zero; by shading off either one or the other light flies off to either extremity of the scale. This gives a ready means of balancing two sources of light one against the other. Thus, retaining the standard candle 48 inches off, on the left of the bar, the index is brought to zero by placing on the right

2 candles	67 ins. off.
1 candle behind solution of sulphate of copper	6 "
1 candle behind alum plate	14 "
A small gas burner	113 "

These experiments show how conveniently and accurately this instrument can be used as a photometer. By balancing a standard candle on one side against any source of light on the other, the value of the latter in terms of a candle is readily shown; thus, in the last experiment the standard candle 48 inches off is balanced by a gas-flame 113 inches off. The lights are, therefore, in the proportion of 48^2 to 113^2, or as 1 to 5½. The gas burner is, therefore, equal to 5½ candles.

By interposing screens of water or plates of alum, and so cutting off the dark heat, the actual luminosity is measured. In addition to this, by interposing coloured glasses or solutions, any desired colours can be measured either against the total radiation from a candle, its luminous rays, or any desired colour. One coloured ray can be balanced against another coloured ray, by having differently coloured screens on either side.

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[*] Abstract of a paper read before the Royal Society, Feb. 10, 1876. From the *Chemical News*, March 24, 1876.

The variations in the luminosity of a "standard" candle will cease to be of importance. Any candle may be taken; and if it be placed at such a distance from the apparatus that it will give a uniform deflection, say of 100 divisions, the standard can be reproduced at any subsequent time; and the burning of the candle may be tested during the photometric experiments by taking the deflection it causes from time to time, and altering its distance, if needed, to keep the deflection at 100 divisions.

If the pith bar in this instrument be blacked on alternate halves, an impetus given by a ray of light always acts in the same direction of movement. A candle causes it to spin round very rapidly until the suspending fibre is twisted up, and the rotation is stopped by the accumulated torsion.

By arranging the apparatus so that the black and white surfaces are suspended on a pivot instead of by a silk fibre, the interfering action of torsion is removed, and the instrument will rotate continuously under the influence of radiation. To this instrument the author has given the name of the "Radiometer." It consists of four arms of very fine glass, supported in the centre by a needle-point. and having at the extremities thin discs of pith lampblacked on one side, the black surfaces all facing the same way. The needle stands in a glass cup, and the arms and discs are delicately balanced so as to revolve with the slightest impetus.

In the *Proceedings of the Royal Society* last year, the author gave a brief account of some of the earlier experiments with these instruments. In the present paper he enters very fully into the various phenomena presented by them, and gives tables showing the number of revolutions made by the radiometer when exposed to a constant source of light removed different distances from the instrument. The law is that the rapidity of revolution is inversely as the square of the difference between the light and the instrument.

When exposed to different numbers of candles at the same distance off, the number of revolutions in a given time is in proportion to the number of candles, two candles giving twice the rapidity of one candle, and three, three times, etc.

The position of the light in the horizontal plane of the instrument is of no consequence, provided the distance is not altered; thus two candles, one foot off, gives the same number of revolutions per second, whether they are side by side or opposite to each other. From this it follows that if the radiometer is brought into a uniformly lighted space it will continue to revolve. This is proved to be the case by experiment.

The speed with which a sensitive radiometer will revolve in full sunshine is almost incredible. Nothing is visible but an undefined nebulous ring, which becomes at times almost invisible. The number of revolutions per second cannot be counted, but it must be several hundreds, for one candle will make it spin round forty times a second.

The action of dark heat (*i.e.*, from boiling water) is to repel each surface equally, and the movement of the radiometer is therefore arrested if a flask of boiling water is brought near it. The same effect is produced by ice.

From some observations made by the author, it appears probable that heat of a still lower refrangibility repels the white more than it does the black surface. Many instances are given of the radiometer revolving the reverse way. Thus, breathing gently on the instrument will generally cause this effect to be produced.

An experiment is described with a radiometer, the moving parts of which are of aluminium, blacked on one side. When exposed to the radiation from a candle, the arms revolve the normal way. On removing the candle they revolve the reverse way. Heated with a Bunsen burner the arms revolve the normal way as they are getting hot, but as soon as the source of heat is removed and cooling commences, rotation sets up in the reverse way, and continues with great energy till the whole is cold. It appears as if the reverse movement during the cooling is equal in energy to the normal movement as it is being heated.

It is easy to get rotation in a radiometer without having the surfaces of the discs differently coloured. An experiment is described with one having the pith discs blacked on both sides. On bringing a candle near it, and shading the light from one side, rapid rotation is produced, which is at once altered in direction by moving the shade to the other side.

The author describes many forms of radiometer, by means of which the movements can be exhibited to a large audience, or can be made to record themselves telegraphically on a self-recording instrument.

THE PREPARATION OF DEXTRINE-MALTOSE (MALT-SUGAR) AND ITS USE IN BREWING.*

BY WM. GEO. VALENTIN, F.C.S.

Royal College of Chemistry, South Kensington.

(*Continued from page* 826.)

Changes Produced in Malt during Mashing.

When ground malt is submitted to the mashing process, certain of the albuminoid bodies contained in the malt act upon the starch, and the latter is dissolved, with what changes will be shown more fully further on. The other carbohydrates, the constitution of which is as yet not fully made out, go likewise into solution. The albuminoids soluble below the mashing heat (say 68° C.) are also dissolved, and the insoluble constituents of the malt remain in the grains. The wort, therefore, contains the transformation products of the starch—principally Dextrine-Maltose—of the other carbohydrates, the soluble albuminoids, the soluble portion of the ash, and a little soluble fat.

Boiling with hops removes a portion of the albuminoids. Some of the carbohydrates other than the starch products undergo a slight change, which has not yet been thoroughly examined; but the starch-products are but slightly altered, in what way will be shown hereafter.

Fermentation of the Wort.

When the boiled hopped wort is subsequently submitted to the action of yeast, the carbohydrates other than those derived from starch yield alcohol first, and the portion thereof which is fermentable (60 to 70 per cent.) disappears almost altogether in the very earliest stages of the fermentation; the growth of the yeast removes a portion of the albuminoids left, and some (a very small quantity) also of the sugar, and there remains then in the beer, when the first stage of the fermentation is over, and when it is fit to go into the casks, the alcohol and a portion of the carbonic acid derived from the carbohydrates other than starch, and also from a portion of the products of the transformation of the starch itself, effected by the ferments (which, as I shall have conclusive evidence to adduce, consist of dextrine and maltose). Hence it is found that the whole of the dextrine, a considerable portion of the maltose, the remainder of the albuminoids, the soluble matter of the hop, and a few other constituents upon which I need not touch further, are left for after fermentation.

In order to correctly understand the part which the dextrine and maltrose play in the after history of a beer, we will examine for a moment the constitution of a typical Burton pale ale, analysed when the principal fermentation was finished.

That the constitution of ales will vary within certain limits, even when brewed in the same town, and by processes which vary only within narrow limits, will be readily admitted. Nor does it matter, as long as I can show you by a carefully conducted analysis of a representative sample of pure ale, what the changes are which fermentation effects.

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* Paper read before the Chemical Section of the Society of Arts, and reprinted from the *Journal of the Society of Arts*, March 24, 1876.

A normal sample of pale ale, showing an original gravity of 1063, gave, when finished and ready to be put into casks, a distillate of sp. gr. ·992, equal to 33·7 degrees of gravity lost.

33·7 degrees of gravity lost.
1029·39 residue.

1063·09 original gravity.

The unboiled wort of this beer, supposing it to have been brewed from No. 1 malt and reduced to the above specific gravity, viz., 1063, by allowing for concentration on boiling (in order not to unnecessarily complicate the explanations which I will endeavour to give of the changes) would contain in every 100 parts by measure the following solid constituents :—

Maltose	6·66
Dextrine	3·44
Other Carbohydrates, fermentable . .	3·30
Ditto, unfermentable	1·48
Albuminoids	1·45
Ash, Phosphates, Sulphates, etc. . .	0·17
Total	16·50

After boiling with hop (and correction for loss by evaporation, so as to keep it at the normal original gravity of 1063), it was composed as follows :—

	Solids in 100 parts.
Maltose	6·66
Dextrine	3·44
Other Carbohydrates, fermentable . .	3·80
Ditto, unfermentable	1·00
Albuminoids	1·05
Hop Extract	·33
Ash	·27
	16·55

Hence it follows that the fermentable constituents of the hopped wort have undergone but little change.

Not so, however, when the principal fermentation with yeast is finished and the ale is ready to be put into the cask, for the beer contains now :—

	Alcohol and solids in 100 parts.
Alcohol	4·48* sp. gr. ·992
Maltose	1·52
Dextrine	3·44
Carbohydrates, fermentable	trace.
Ditto, unfermentable	1·00
Albuminoids . . .	·66
Hop Extract . . .	·33
Non-volatile Products of the Fermentation	·47
Ash	·24
	7·66

Maltose and dextrine, constituting, however, by far the greater part of the remaining solids, viz., very nearly 60 per cent.

It will now become clear of what importance maltose and dextrine are to the brewer, both during the fermentation process, and during the after history of the beer, *i.e.*, for insuring keeping powers. How is it, then, you will ask, that only recently mention has been made of this body called maltose, so important of the brewer? This I will endeavour to answer as clearly as possible, so as to leave no doubt in the mind of any one present here tonight. We may perhaps then be spared in future the humiliating feeling that chemists should still be found who call a sugar "glucose," when in reality it is, as has been amply shown to all who will listen and experiment, a sugar of widely different properties; that it is, in fact, what chemists in France (Dubrunfaut*), in England (O'Sullivan†), and in Germany (Schulze‡) have shown us most conclusively, and all but independently of each other viz., maltose. This name was given to it by the first observer (Dubrunfaut), and retained by O'Sullivan, who undoubtedly has the merit of having placed this new sugar, found in malt-wort, beyond a shadow of a doubt, and of having pointed out its character, composition and affinities.

The sweet taste of malt led for a long time to the supposition that the starch of the grain was converted into sugar during the malting process. A very superficial examination, however, will show this, in the main, to be erroneous. Starch can be isolated from the malt, as well as from barley. Starch, then, it was found, was converted into sugar, only during the process of mashing, presumedly by the action of an albuminoid body, called "diastase," supposed to be produced during the malting process. This, too, is not altogether a correct notion, for barley contains sufficient of the transforming or saccharifying agent to dissolve the whole of its starch.

The action of this transforming agent on starch has been the subject of much investigation. Little or no attention was, however, paid to the properties of the transformation products.

The portion thereof which reduced cupric oxide was put down as glucose, grape-sugar, or dextrose, and the remainder as dextrine, and even on this supposition there has been a great diversity of opinion as to the proportion of these substances produced. It is mainly owing to O'Sullivan's painstaking and admirable labours that we have obtained a clear and definite knowledge of the exact properties and composition of the transformation products of the starch of malt, and that the quantity of each can now be determined with any degree of accuracy. After the successful isolation of the sugar-maltose found among the transformation products in wort, the relative proportions in these two bodies produced, when starch is dissolved by malt-extract, had yet to be determined, and the thought of giving a practical application to the new discovery was but a natural consequence.

If we examine for a moment the malt analyses given above, and suppose that during the mashing process the malt yielded an extract of 74 per cent., we perceive that the starch amounts to little more than 59·6 per cent.; the maltose and dextrine in the wort to a little more than 61 per cent. of the extract, the increase being due to the binding of water. This very closely corresponds to the theoretical percentage of these bodies, obtainable, if starch splits up, according to the equation :—

$$\underbrace{C_{18}H_{30}O_{15}}_{\text{Starch.}}+OH_2=\underbrace{C_{12}H_{22}O_{11}}_{\text{Maltose.}}+\underbrace{C_6H_{10}O_5}_{\text{Dextrine.}}$$

that is, 32·15 per cent. of dextrine and 67·85 of maltose.

When starch paste was submitted to the action of malt-extract, it dissolved, and the solution, at the end of an hour or two hours' digestion, contained of solid matter (allowing for the malt-extract employed) 67·85 per cent. of maltose and 32·15 per cent of dextrine. Hence the starch split up under the influence of malt-extract according to the equation given above. This is the normal transformation, and it is the one obtained in well managed mashing operations. Other proportions of maltose and dextrine are obtainable, and this is one of the reasons why brewers sometimes find, although they use the same quantity of yeast, that the attenuations are sometimes too low and sometimes too high. When this occurs they change the quantity of yeast, which is all well enough in its way, but few of them, as far as I know, go to the real root of the evil, viz., the different proportions of maltose and dextrine, formed in the mashing process. If the composition of the boiled wort given in the diagram be examined, it will be found that about 64 per cent. is fermentable matter. In all well conducted brewing operations, at the time of racking the beer, if the original gravity be determined, few instances will occur in which the amount of matter fermented is more than 64 per cent. of the original solid matter before fermentation. There may be cases in which this number is exceeded, as in old beers, in which the after-fermentation had taken place, or badly brewed beers, in which proper attention had not been paid to the mashing operation. Every brewer present will also know that it sometimes happens that the beer cannot be attenuated low enough, that, in fact, not more than 50 per cent. of the solid matter in the extract can be fermented. The blame is then laid to the barm or the water, and it is never imagined that it is due to the too high proportion of dextrine obtained from the starch in the mashing process. It is pretty well understood that if a pale ale, the worts of which had, say a specific gravity of 1063—1064, can be got into the cask when it is reduced by fermentation down to 1020—1021, things are going on rightly. The meaning of this is not far to seek. The wort would contain in every 100 parts, by measure, 16·5 parts by weight, or thereabouts, of solid matter of the composition already referred to. The specific gravity of the finished beer being taken at 1021, the specific gravity of the spirit contained in the finished beer would be 992, or 8 less than 1000. The specific gravity of the finished beer, taken at 1021, the specific gravity of the beer without the alcohol would amount to 1029 (1021+8). This represents 7·6 per 100 of solid matter, or 16·5—7·6=8·9 of converted matter, and when expressed in percentage numbers=53·9, say 54 per cent., thus leaving still in the beer, as shown above, about 10 per cent. (on original extract) of fermentable matter. This matter is maltose, and it serves to keep up, by its slow and gradual fermentation, the condition of the beer in cask. Beer, in common with all fermented liquids, is always slightly acid; and this acid fluid, no doubt, converts a further portion of the non-fermentable carbohydrates into fermentable ones, and hence a portion of the dextrine into maltose, and finally into alcohol. This, in well brewed and finished beers, is always a slow and gradual process,

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* *I.e.*, slightly less than 50 per cent. on the solid matter fermented.

* *Ann. Chim. Phys.* [3], xxi. 178.
† *Journal Chem. Soc.*, July, 1872.
‡ *Ber. d. Deut. Chem. Ges. Bd.* vii. 1047.

MALT SUBSTITUTES.

Seeing thus what beer is, and what its requirements are, we may turn to the consideration of the substances, hitherto used as substitutes for malt, in its preparation; and an examination of the character and composition of these bodies, and their behaviour when submitted to the action of yeast, will show us the success that may be expected to attend their use. Malt being sweet—and it not being understood to what the sweetness was due—cane sugar, invert sugar, and glucose, or so-called saccharines of various kinds have been proposed as substitutes.

The first substance employed as a substitute for malt to be considered is cane sugar. The properties of this body are too well known to require to be closely examined here. However, a few words will not be out of place.

Cane sugar occurs in well-defined crystals as sugar-candy, and in small crystals more or less impure in the different kinds of brown sugar, loaf sugar, etc. It has a specific rotatory power of 73·8°. A solution of cane sugar does not reduce cupric oxide. If 2·6 lbs. of this sugar are dissolved in pure water, and the solution made up to one barrel (36 gallons), an extract of one lb. brewer's gravity would be obtained; that is, 59·8 lbs. of it, dissolved in pure water, and made up to 36 gallons, this solution would have a brewer's gravity of 23 lbs. This means that the 36 gals. would weigh 23 lbs. more than the same bulk of water.

If cane sugar be submitted to the action of yeast it will be found, if sufficient yeast be added, and the temperature of the mixture be maintained at from 20° to 30° C., that the whole of it ferments in four or five days, and yields 51 to 51·5 per cent, of alcohol, together with a certain proportion of succinic acid, glycerine, and other products. If an insufficient amount of yeast be added, the fermentation will not be complete. It is possible to ferment 30, 40, 50, and 60 per cent., or the whole of the cane sugar, by varying the quantity of yeast, etc.; but if in the solution an albuminoid, and the necessary inorganic constituents of the yeast-ash (phosphates, etc.) be present, the whole of the sugar slowly and gradually disappears. The residue left on fermenting a portion of the cane sugar always tastes acid and "thin;" the acid taste is no doubt due to the succinic acid, and the thinness to the peculiar sharp bodiless taste of the sugar.

Keeping these points in view, let it be supposed that one-third of the malt extract in the pale ale mentioned above be replaced by cane sugar; the wort before boiling would then have the following composition:—

	Per 100 parts by measure.
Cane Sugar	5·57
Maltose	4·53
Dextrine	2·14
Other Carbohydrates, fermentable	2·20
Ditto, non-fermentable	0·99
Albuminoids	0·98
Ash	0·11
	16·52

After boiling with the hop it would contain—

	Per 100 parts by measure.
Cane Sugar	5·57
Maltose	4·53
Dextrine	2·14
Other Carbohydrates, fermentable	2·53
Ditto, non-fermentable	0·66
Albuminoids	0·70
Hop Extract	0·39
Ash	0·21
	16·73

The analysis is of a beer in which the same amount of hops was used as in the previous case. The numbers are before fermentation. It contains—

Cane Sugar	5·57
Maltose	4·53
Fermentable Carbohydrates	2·53
	12·63 in 16·73 parts.

i.e., 75 per cent. of fermentable matter.

Within certain limits it is in the hands of the brewer to ferment as much, or as little as he likes, of this, before he puts the beer into the cask finished. But after this he has no control over the beer; he cannot possibly separate every yeast-cell; hence, as long as the immediately fermentable bodies are present, the fermentation will go on, and stop only when the albuminoid and ash constituents of the beer become exhausted, and even then a portion of the yeast may live and work on the products of the decomposition of another portion. Thus it is that cane sugar can never be used as a substitute for malt in the brewing of keeping beers. Keeping, even for a short time, attenuates them so much, that all body and flavour are gone. During fermentation, of course, the normal quantity of albuminoids is taken out of the solution, and if the original gravity of the beer at any stage were determined by the method of Graham, Redwood, and Hofmann, the result would be always the same as that at first determined by the brewer before fermentation. Hence the debit and credit sides of the account of the advantages to be derived by the brewer from the use of cane sugar are, irrespective of its cost—

In its favour—

1. The reduction of the relative quantity of albuminoids in the beer.
2. Its maintaining the strength of the beer, after fermentation, by yielding the same quantity of alcohol, as the sugar of the malt-extract does.

Against it—

1. Its fermentability.
2. The thin taste of its solution after fermentation.

The first of these has rendered it useless to the brewer of keeping ales, without any consideration as to its cost. No matter how it be managed, it always gives a "thin, poor" beer.

The next substance to be dealt with is the so-called "invert sugar."* Of this I have before me the analysis of two samples. They appear as semi-solid, straw-coloured honey-like substances.

No. I. gave 85 per cent., and No. II. 86·88 per cent. of solid matter. Hence if they yielded as much alcohol as cane sugar they would be of as much use to the brewer as cane sugar, only that 85 parts of cane sugar would go as far as 100 parts of No. I., and 86 88 parts of cane sugar as far as 100 parts of No. II., but 100 parts of cane sugar yield 105·26 parts of invert sugar.

Percentage composition of two samples of so-called Invert Sugar.

	No. I.	No. II.
Cane Sugar	13	26
Invert Sugar	87	74
	100	100

Their value as substitutes for malt can be easily estimated from what has been said above upon cane sugar, and from the fact that invert sugar only yields 48 to 49 per cent. of alcohol by fermentation.

(*To be continued.*)

THE COMPOSITION OF THE FLESH OF OXEN AND HORSES: ITS FOOD VALUE AND ITS MONEY VALUE.*

BY J. LEYDER AND J. PYRO.

The authors briefly allude to the work which Lawes and Gilbert have done on this subject in showing the modifications which take place in the animal organism during the process of fattening, namely, that the quantity of dry material is notably increased, and that while in oxen in moderately poor condition the water is about two-thirds of its total weight, in a fat ox it is only a half; also, that the more nutritious character and superior taste of the flesh of a fat animal are due to this increase of dry material; but of this increase two-thirds consist in fat: the increase of proteids is only from 7 per cent. to 8 per cent., and of inorganic materials 1½ per cent.

This relation between the assimilated materials first becomes perceptible in the last month of the fattening; at the commencement the increase in fixed materials is only from 30 to 40 per cent., and according to J. Ruhn the production of a living kilogram costs twice as much at the end of the fattening as it does at the beginning.

From a variety of analyses which are given, the flesh of the fat animal in every case is richer in fixed material than that of the lean animal; and though the flesh of a lean animal possesses a more uniform quality than that of a fat one, yet the poorest parts in the fat one possess a higher nourishing value than the best in the lean animal.

Composition of Ox Flesh.

Constituents.	Lean cow.				Fat ox.				Very fat ox.			
	Neck.	Leg.	Paunch.	Loin.	Neck.	Leg.	Paunch	Loin.	Neck.	Leg.	Paunch.	Loin.
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Water	76·49	77·09	77·53	76·58	77·97	74·98	76·80	70·60	76·15	73·26	67·81	67·35
Fixed material . . .	23·51	22·91	22·47	23·42	22·03	25·02	23·20	23·40	23·85	26·74	32·19	32·65
Fat	1·28	0·92	0·783	2·62	0·95	4·00	4·33	7·96	2·82	5·76	8·812	12·86
Muscle substance . .	21·23	20·99	20·687	19·80	20·08	20·02	17·87	20·44	20·03	19·98	22·378	18·79
Ash calculated as 1 per cent.	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00

The animals experimented on were—

A lean ten-year-old cow.
A fat five-year-old Flemish ox.
A very fat seven-year-old Glaner cow.

The authors noticed a great loss in weight during the transport of the meat from Brussels to Gembloux—parcels which weighed in Brussels 225·3 grams, weighed in Gembloux only 192·2 grams, indicating a loss of 13·65 per cent. of water.

The nitrogen was determined in average samples, and the figures given are the average of two determinations in each.

	Lean cow.	Fat ox.	Very fat cow.
Nitrogen	14·0 per cent.	14·88 per cent.	15·9 per cent.

What may be learnt from the table is that the best piece (loin) in the fat ox and the very fat cow contains from 21 per cent. to 28 per cent. more fixed materials than the corresponding piece in the lean one. The difference in the composition of the different pieces of the lean cow is but small; in the piece containing most water (paunch) and that containing least (neck) it is less than 5 per cent., and curiously enough, the worst piece is richest in fixed material. The flesh of the neck improves but little in value by the fattening, but the flesh of the loin has increased in dried material to a noteworthy extent.

The authors consider the method in England of dividing the food into four classes of corresponding values a good one

If the first be represented by . . .	100,
The second would be	74,
The third „	61,
The fourth „	42,

for while the richer classes pay more highly for the better parts, the poor are enabled to obtain the others at a more reasonable rate.

Horse-flesh.—Horse-flesh in comparison with the price of ordinary meat is not dear. The relation of nitrogenous to fixed material is higher in horse than in ox-flesh.

Constituents.	Horse A.			Horse B.		
	Neck.	Loin.	Thigh.	Neck.	Loin.	Thigh.
Water	75·02	76·0	75·22	75·1	77·3	79·28
Fixed Material. . .	24·98	24·0	24·78	24·9	22·7	20·72
Muscle substance. .	22·85	21·76	23·26	22·16	20·64	18·35
Fat	0·95	1·24	0·52	1·74	1·06	0·86
Ash (not estimated .	1·00	1·00	1·00	1·00	1·00	1·00

The horses were both lean, but healthy.

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* I believe the manufacturers of this substance call it "inverse sugar."

* From the *Journal of the Chemical Society*, March 1876. (Arch. Pharm. [3], vii, 150—163).

The Pharmaceutical Journal.

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Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE DISPENSING OF PRESCRIPTIONS.

WHEN the premature publication of the Sheffield analyst's report furnished to sensational writers for the daily press an opportunity of terrifying their countrymen and airing their own ignorance, it required but little prescience to foretell that this report would be only one of a series. Nor do we believe that pharmacists would have wished it otherwise; for undoubtedly it would be to the interest of the entire body that doubts raised by it should be allayed and misapprehensions removed by further inquiries. It is, therefore, without surprise we learn that, for instance, the Public Analyst of St. Olave's District, Southwark, having expressed a wish to know whether the local Board had any preference with respect to the articles to be analysed during the ensuing quarter, one of the members thought it very desirable that it should be ascertained whether prescriptions were made up in accordance with instructions, and that the Inspector under the Adulteration Act was afterwards instructed to obtain samples of drugs for analysis.

To such instructions, properly carried out, pharmacists cannot consistently raise any objection, and so long as the Sale of Food and Drugs Act is the law of the land it would be futile to expect exemption from its provisions. But as probably the action of the St. Olave's Board will not be a solitary case we think pharmacists have a right to claim, after what has taken place, that the law shall not in future be exceeded, and to demand that the era of inconsequential reports and amateur and irresponsible investigations shall close.

In the Sale of Food and Drugs Act, Parliament very properly made provision that a tradesman should not be branded as an adulterator, even by a public official, without having an opportunity of disproving the evidence upon which the charge is made. Therefore, when this limit is overstepped, and persons usurping to themselves functions for which they have no authority make assertions which allow of no contradiction, because whilst sufficiently explicit to be injurious the assertions are purposely made vaguely in order to secure impunity, they should be made to understand that they will be held responsible for the publicity given to the calumnies which they affect not to be able to help.

The necessity for demanding the reduction of vague allegations to explicit charges has received a forcible illustration within the last few weeks. Sensational paragraphs appeared in many of the newspapers as to the composition of a well-known spirit as sold in certain parts of London. At last the charge took a tangible form in a case heard in a police court, when the magistrate refused to be guided by the "scientific" evidence for the prosecution, dismissed the summons, and ordered the prosecuting vestry to pay the costs. A significant commentary upon this is that at the March meeting of the Society of Public Analysts, the Secretaries were ordered to remove the name of a public analyst from the roll of members, and to announce the fact in the Society's journal.

Our contemporary, the New York *Druggists' Circular*, evidently is of opinion that the British pharmacist has already manifested an excess of patience with respect to the Sheffield report, of which it says, "No greater noise or more ado was ever made about nothing." However, this may be, these idle charges have now been repeated *usque ad nauseam*, and we agree with our contemporary that whenever a repetition of the offence takes place the pharmacists should "rally in their own defence and be content with nothing short of a circumstantial statement that will condemn only those to whom the charge applies and free those from all imputation against whom nothing derogatory can be said."

NOXIOUS VAPOURS.

THE recent promise of the Government to appoint a Royal Commission to inquire into the subject of noxious vapours given off from various works and manufactories, and to ascertain the effect produced thereby on animal and vegetable life, appears to have been construed by the Chief Inspector under the Alkali Acts as an attack upon the working of the Alkali Act of last session. Without waiting therefore for the usual period to arrive for making his report he has made an "Intermediate Report," which has just been presented to Parliament. In this Report Dr. ANGUS SMITH claims that already an improvement has been effected to an extent that the best informed manufacturers declared impossible before the passing of the Act, and he says that the allegation that more noxious vapours escape from the works now than then cannot possibly be true. Dr. SMITH then gives details, from which we hope to quote on a future occasion, as to the efforts made to carry out the spirit of the Act, and brings forward evidence that in a few places there has been a decided improvement in the appearance of the vegetation.

We say it with deference to one so qualified to judge as Dr. SMITH, but it appears to us that he scarcely attributes sufficient inclusiveness to the terms of the motion, and that he hardly credits the chemical and other works not under inspection with so much mischief as they are guilty of. The **Archbishop of Canterbury** spoke to the point in the discussion in the House of Lords, when he expressed his pleasure that the inquiry was not to be confined to the banks of the Tyne, and pointed out that within sight of their Lordships' windows the attempt to beautify the embankment had been abandoned through the incompatibility of the prevalent noxious vapours with vegetable life. In such an instance it might be sufficient to adopt one of Dr. **Smith's** suggestions and place offending manufactories under inspection for a time upon complaint being made.

No doubt there will be many disturbing influences necessitating great circumspection in the carrying out of any code of regulations. Dr. **Smith** instances a case where the owners of one of the largest works in the kingdom represented that they found it impossible to comply with the requirements of the Act. Here the literal rendering of the new law would have probably resulted in throwing a very large number of workmen out of employment and perhaps subjected the new Act to a strain that would have been fatal to it. But by a judicious relaxation of its stringency the proprietors were encouraged to make fresh efforts and they are now in a fair way to success. Indeed one most satisfactory point in this report is the evidence it affords of the willingness of the manufacturers to spend their money even lavishly in effecting the necessary improvements.

But the whole subject is bound up with the health of the community in so many places that we fail to see in the new inquiry any reflection upon the work which Dr. **Smith** and his coadjutors are carrying on so ably with respect to the alkali works.

THE ANNUAL DINNER.

It has been decided that the Dinner of the Members of the Pharmaceutical Society and their Friends in connection with the forthcoming Annual Meeting of the Society shall be held at the London Tavern, on Wednesday the 17th of May. Gentlemen who are desirous of acting as Stewards on that occasion are requested to communicate their wish to the Honorary Secretaries of the Dinner Committee, 17, Bloomsbury Square.

PHARMACY IN VICTORIA.

The Melbourne pharmacists have again been disappointed in their hopes to obtain legislation for the regulation of the practice of pharmacy in Victoria. This fresh failure does not, however, appear to have been due to opposition. The Pharmacy Bill, as revised by the Council of the Pharmaceutical Society of Victoria, had actually been drafted and printed by the Government, and everything seemed to promise that the measure would become law, but too often recurring divisions in Parliament are now reported to have brought this and all other useful legislation to a standstill. In the eighteenth annual report of the Council of the Victoria Society the Members are advised still to possess their souls in patience and to remember how long and patiently their brethren in England laboured before they attained the passing of the Act which now regulates the practice of pharmacy in Great Britain.

'THE ANALYST.'

The temporary arrangement by which the proceedings of the Society of Public Analysts were published in a contemporary has now been terminated, and the first number has been published of 'The Analyst,' which "appears primarily as the organ of the Society of Public Analysts, and secondly as the representative of Analytical Chemists in general." The new journal is intended not only to present to its readers the latest and best authenticated processes of analysis as they are perfected, but also to publish all cases of prosecution for adulteration and such parliamentary and other proceedings as may appea to effect the interests of analysts. The first numbe contains an article, by Dr. **Dupré**, on the examination of whiskey and other spirits for methylated spiri and fousel oil, and another by Dr. **Muter** on the analysis of butter.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held at 17, Bloomsbury Square, on Monday evening April 24th, at eight o'clock, when a paper will be read by the Secretary, entitled "An Introduction t Spectrum Analysis."

On Wednesday last Mr. **Sydney Plowman** wa appointed by the Governors of St. Thomas's Hospita to the office of Resident Apothecary and Teacher o Pharmacy in that institution. It will be remembere that Mr. **Plowman** was a **Bell** Scholar in 1872 an 1873, and that in the latter year he was awarded th three Silver Council Medals and the **Pereira** Meda He has for some time been acting as Assistant Demonstrator in the laboratory of the School of Pharmac in which he so distinguished himself. We believe tha the other "selected candidate" was Mr. F. J. **Barret** of the Wolverhampton and South Staffordshir General Hospital, one of the energetic Secretari of the Wolverhampton Chemists' Association.

The plates in part 7 of **Bentley** and **Trimen** "Medicinal Plants" illustrate *Illicium anisatu* (Oleum Anisi), *Polygala Senega* (Radix Senegæ), *Camellia Thea* (Tea), *Melaleuca minor* (Oleum Cajuputi), *Uncaria Gambier* (Catechu pallidum), *Chimaphila corymbosa* (Chimaphila, U.S.P), *Ophelia Chirata* (Chirata), and *Schœnocaulon officinale* (Sabadilla).

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

The fifth meeting of the session was held March 21st, Mr. Dillwyn Parrish in the chair.

Mr. Trimble exhibited an unknown substance that had been sent from Maryland to Philadelphia for sale as powdered ergot, but which had no resemblance to that drug.

Professor Remington read a paper on a singular reaction occurring in a mixture composed of syrups of wild cherry and squill, spirit of nitre, tincture of lobelia, and sulphate of morphia. The mixture turned green after standing some hours, and the colour appeared to be due to the presence of traces of iron in the spirit of nitre, and the acetic acid from which the syrup of squills had been made.

Mr. J. T. Shinn remarked that in preparing a prescription containing sulphate of iron, sulphate of magnesium, and chloride of sodium, he had found there was a precipitation of a red iron compound, which could only be prevented by the addition of sulphuric acid.

Mr. Biddle submitted samples of powdered squills, the usual caking of which had been prevented by the use of sugar of milk in the proportion of one part of sugar to three of the squills. One sample had been kept eighteen months with only such care as is usually given to a dispensing bottle. Another had been exposed to the air on paper for one month without losing its pulverulent condition.

A paper by Mr. Bibby was read, recommending that in order to facilitate the weighing of small quantities of the poisons in common use in dispensing they should be triturated with a uniform quantity of sugar of milk, say one part of the poisonous substance with seven parts of the sugar of milk.

Professor Maisch approved of the suggestion, and said that the method was recognized in the Pharmacopœia Germanica for preparing powdered narcotic extracts, and in stores where dispensing was done it was customary to keep many poisonous substances triturated to a uniform powder with milk sugar, and many salts in solution of a definite strength.

Mr. Shinn desired to know the experience of the members in preserving solutions for hypodermic use. Professor Remington said he had tried many of the methods that had been recommended, but still met with difficulties, and as these solutions were at times liable to cause irritation he had abandoned the idea of keeping a stock ready made.

NEWCASTLE-ON-TYNE CHEMICAL SOCIETY.

At the General Meeting of the above Society on the 24th of February, the following paper was taken as read and ordered to be published:—

MINERAL PHOSPHATES AND SUPERPHOSPHATE OF LIME.

BY WALTER C. REID.

The rapid development of the manufacture of artificial manures, and the total inadequacy of bones and bone ashes to meet alone the requirements of this trade, have caused the consumption of mineral phosphates to increase of late years to an enormous extent; and it is of importance for manufacturers, and others who buy and sell, to know the composition of the raw and manufactured materials, and the influence of the several constituents of the former upon the production of the latter.

The basis of nearly all fertilizers and the staple product of all manure works is superphosphate of lime, and in producing it much depends upon the care and attention given to the selecting of the raw materials, as well as to preparing and dissolving them; for, simple as the process appears, if these are neglected, an article quite unfit for use is almost certain to be the result.

Deposits of raw phosphatic materials having different characteristics in physical appearance and in chemical composition, as well as in the results obtained from them, have been found in nearly every part of the globe. The commercial value of these is chiefly regulated by the percentage of tribasic phosphate of lime they contain. The richer they are in this element, the more valuable they are, *cæteris paribus*, for the manufacture of superphosphates. But, the amount of phosphate of lime in a mineral cannot be taken as the only criterion of its value, for it sometimes happens that a phosphate containing a lower percentage of this ingredient will make a stronger and better superphosphate than a richer one containing more deleterious impurities. The value is very much affected by the amount of carbonate of lime, iron, alumina, and fluoride of calcium present; also, by its porosity or density, and the facility with which it can be reduced to a fine powder. If not in an excessive quantity, carbonate of lime is rather an advantage than otherwise in the manufacture of a good conditioned superphosphate, inasmuch as the carbonic acid disengaged from it when acid is applied makes a mass more bulky and open, and causes it to appear porous or honeycombed when finished.

The presence of a large quantity of iron and alumina in mineral phosphates is objectionable, for they not only absorb acid, but superphosphates made from them have a tendency to "go back," or become insoluble again; therefore, the unit percentage of phosphate of lime is worth less in minerals containing a good deal of these, than in others containing only a little. Fluoride of calcium, which generally accompanies phosphatic minerals, also reduces their value. It wastes acid, and in becoming a sulphate of lime its weight is increased to the detriment of the superphosphate. Silicious matter is a useless ingredient, but a harmless one, except in so far as it causes an unnecessary weight to be moved about, and when in excessive quantity reduces the proportion of soluble phosphate in the superphosphate to such an extent as to make it unmarketable. Ordinary mineral superphosphate contains bi-phosphate of lime equal to 25 to 28 per cent. of tribasic phosphate of lime rendered soluble; and as it is well known that good Cambridge coprolites are capable of yielding this of a good chemical composition, and in a dry powdery condition, the analysis of this mineral may be taken as a fair standard upon which to assess the value of others.

Cambridge Coprolites

Come from the Upper Greensand in Cambridgeshire, and occur as small nodular hard masses of a grey colour; they are supposed to be fossil excrement of animals, or occasionally concretions around bones, amongst which are found fish teeth and some vertebræ. Either from the exhaustion of the better sorts or from imperfect washing, the quality has lately somewhat deteriorated, and there is now some difficulty in making superphosphate from them to contain more than 25 per cent. of soluble phosphate.

The following tests were made before this deterioration:—

	1	2	3	4	5
Tribasic Phosphate of Lime ...	60·87	58·52	27·12	54·89	57·09
Carbonate of Lime... ...	18·25	12·47	11·66	15·13	13 27
Oxide of Iron and Alumina ...	5·3	3·49	4·44	3·82	3·24
Fluoride of Calcium... ...	1·8	2·2	3·0	4·0	4·33
Insoluble Silicious Matter ..	6·5	6·04	6·22	8·64	6·93

These coprolites are extracted by washing from a stratum not more than 1 foot thick. An average yield is 300 tons per acre, and sometimes enormous prices are paid (up to £300 per acre) for the privilege of digging them. In making contracts for superphosphates, it has hitherto been a very common practice for buyers to stipulate for them to be made from Cambridge coprolites only.

Coprolites are also raised in Suffolk, Bedfordshire, and

Buckinghamshire, in England; also, largely in France, and in Russia; but these all contain much iron or silica and other impurities, which reduce the quantity and depreciate the value of the phosphate of lime in them. It is chiefly from the neighbourhood of Boulogne, in the North of France, that the French coprolites are sent over to England, and these are largely used for mixing with richer descriptions of phosphates. They occur as dark grey nodules, larger than those from Cambridgeshire, and are rich in organic remains. An excessive quantity of silicious matter is their chief impurity, and the cause of the low percentage of phosphate of lime, which seldom exceeds 45 per cent.

Analyses of Boulogne Coprolites.

	1	2	3
Tri-phosphate of Lime	46·45	48·0	43 3
Carbonate of Lime	11·93	20 0	22·9
Iron and Alumina	7·22		
Fluoride of Calcium	2·08		
Insoluble Silicious Matter	22·56	21·1	28·3

There are also coprolite beds in France, in the valley of the Rhone, near Switzerland, and in the Ardennes near to Belgium, where it is thought worth while to go nearly 200 feet deep through an argillaceous clay to obtain them; but the cost of carriage is too great to allow them to be exported from these places to England.

Suffolk Coprolites

Are found adjacent to the London clay, and consist chiefly of rolled pebbles, with a small proportion of more or less perfect specimens of bones of various animals, as also some fish and crustacea. They were formerly regarded as fossilized excrements of animals, for which reason they were called coprolites; but they are now supposed to be calcareous pebbles, which have undergone a peculiar change, and become impregnated with phosphoric acid by long continued contact with decaying animal and vegetable matter.

The name pseudo-coprolite has been given from their resemblance to the Cambridge coprolites, but they are distinguished from the latter by a brownish ferruginous colour and a smoother surface. They are very hard, and generally contain too much oxide of iron and alumina to allow them to be used safely in the manufacture of superphosphates.

Analyses of Suffolk Coprolites.

	1	2	3	4
Tri-phosphate of Lime...	53·4	61·3	52·5	56
Carbonate of Lime	17·5	11·6	12·2	10
Iron and Alumina...	10·4	4·8	8·5	8
Fluoride of Calcium	1·4	3·0	4·3	3
Insoluble Matter	9 7	10·0	12·2	12

Wicken, Bedfordshire, and Russian coprolites (the first a poor variety from Cambridgeshire) resemble the Suffolk in their chemical character, and have the following approximate composition:—

	Bedfordshire.	Wicken.	Russian.	
			1	2
Tri-phosphate of Lime... ...	50	36	33	48
Carbonate of Lime...	8	10	5½	12
Iron and Alumina	8	12	6	
Fluoride of Calcium	4	2	3½	
Insoluble Matter	20	28	43	30¼

South Carolina or Charleston Phosphate

Stands next in importance to Cambridge coprolites as raw material for manure making. This is found in the calcareous strata of the Charleston basin, occupying an irregular area of 50 or 60 miles, and partly underlying the city of Charleston. It consists of irregular shaped nodules, assoiated with fossil bones of marine and land animals, which are found embedded in a stratum of clay and sand about two feet thick. There are two kinds, the land and the river deposit. The former is of a fawn colour, and easily ground, but there is some difficulty in washing away all adhering clay, etc., and it is chiefly kept for home use. The river phosphate has become a formidable rival to Cambridge coprolites, and in some respects it is found to be superior to our native mineral. It is dark, almost black in colour, and rather harder than the land variety; and, notwithstanding that it makes a very dark-coloured superphosphate, it is very much liked by manufacturers.

It is dredged from the rivers, and the mud and sand are washed away on board of the dredgers.

The following represents approximately the composition of the river phosphates:—

Tri-phosphate of Lime.	54
Carbonate of Lime	14
Iron and Alumina	3½
Fluoride of Calcium	2½
Insoluble Silicious Matter	15

As compared with Cambridge coprolites, this mineral is more easily dissolved, and a greater portion of the phosphates is rendered soluble; but it takes longer to grind, and the millstones are more quickly worn. The mineral known as

Lot or Bordeaux Phosphate

Comes from the Departments of Lot and Lot et Garonne, in France. It occurs in pockets or fissures and veins of the limestone, and also in thin layers, near the surface. These are covered with an alluvial soil and clay, containing phosphates, but much contaminated with iron and other impurities. The pockets, of all shapes and sizes, and sometimes reaching 100 feet deep, are generally traced and indicated by narrow vertical veins of deposit, which rise from them to the surface, and are mostly found on the highest ground. It varies greatly in appearance, texture, and composition. Occasionally it is found in snow-white compact masses, breaking with an earthy fracture, and of a moderate degree of hardness. The more ordinary kinds are of a dark yellow or brown, dense and hard; but it is frequently found of a dark agate colour, somewhat resembling the inside of broken flints, of a waxy lustre, stratified and intersected with thin layers of oxide of iron. It has the appearance of being an aqueous deposit; and the probable cementing together of lumps of phosphates, bones, etc., with more or less alluvial clay and earth, by the percolation of dissolved phosphatic matter, may account for the appearance, texture, and composition of some portions. The white specimens are generally the richest, some being as high as 85 per cent., with a minimum (½ per cent.) of iron, &c.; but the bulk of cargoes received here only contain 70 to 72 per cent., and with 4 or 5 per cent. of iron, etc. Fossil bones and teeth are found in quantity. The surface phosphatic earth finds a ready sale on the spot.

Analyses of Two Sample Parcels of Lot Phosphate.

	Best Quality.	Poor Quality.
Tri-phosphate of Lime	67·19	55·45
Carbonate of Lime	15·31	8·3
Iron, Alumina, Fluorides, etc.	4·2	12·86
Silicious Matter	5·2	19·13

The best varieties of these phosphates are well adapted for the manafacture of superphospate. Most of the large Lot mines are owned and worked by English firms, amongst which is a Newcastle Company.

German or Nassau Phosphate,

Deposited like the Bordeaux variety in pockets, is found chiefly in the neighbourhood of the rivers Lahn and Dill, in Nassau. Some of it is of a yellow colour, breaking with an earthy fracture; other portions have the appearance of pieces of phosphate, cemented together with ferruginous clay, and in rare cases it appears in a crystalline orm. The richest varieties are of a light yellow colour, nd tolerably free from iron, &c.; but the predominating ower qualities are contaminated with much iron ore, clay, limestone, etc.

Analysis of German Phosphates.

Tri-phosphate of Lime . .	58 to 65 per cent.
Carbonate of Lime . . .	5 to 8 ,,
Iron and Alumina	10 to 15 ,,
Insoluble Matter	10 to 12 ,,

From these phosphates there is no difficulty in making uperphosphate quite dry, but they invariably set extremely hard, and they therefore require much breaking up. Very few cargoes of German phosphates arrive in his country now.

Spanish and Portuguese Phosphorites

Generally go under the name of Estremadura phosphate, from the province in Spain where it is chiefly found. It is hard, of light yellow colour, crystalline structure, and generally more or less mixed with quartz, and becomes phosphorescent when heated. It is tolerably free from iron and alumina, but contains variable and often considerable quantities of fluoride of calcium.

The following are some analyses of Estremadura phosphate: —

	1	2	3	4
Tri-phosphate of Lime ...	72	78·7	72·6	80·6
Carbonate of Lime	9	Nil.	Nil.	4·2
Iron and Alumina	3½	8·8	5 1	2·0
Fluoride of Calcium	3½			
Insoluble Matter...	4	11·4	18·3	12·3

In dissolving, from 30 to 33 per cent. of the phosphates in the superphosphates is rendered soluble; but, owing to the small quantity of carbonate of lime in the mineral, the superphosphates when first made are generally dense and damp, and require some time to get into good condition.

Norwegian and Canadian Phosphates.

Under the name of apatite, we import from Norway and Canada small quantities of phosphatic minerals, obtained from veins in the primitive rocks. They are hard and crystalline, of vitreous lustre, and of various shades of colour, white, yellowish white, and greenish white. According to Voelcker, the Norway apatite contains no fluoride of calcium, but the Canadian a great deal. Neither contain any carbonate of lime, and only a little iron and alumina. Some parcels have tested above 90 per cent. of phosphate of lime, but on an average they do not exceed 75 per cent. The following analyses represent the best qualities :—.

	Norway.	Canada.
Tri-phosphate of Lime	90·74	91·2
Iron and Alumina	2·0	,,
Fluoride of Calcium	,,	7·6
Sand, etc.	1·64	·9
Chloride of Calcium	1·61	·78

The apatites are the only mineral phosphates that contain an appreciable quantity of chloride of calcium. In one kind, from Snarum, in Norway, the fluoride of calcium is, to a great extent, replaced by chloride of calcium, thus :—

Tri-phosphate of Lime . . .	91·13 per cent.
Chloride of Calcium	4·28 ,,
Fluoride of Calcium	1·59 ,,

From apatites alone it is difficult to make dry and powdery superphosphates; but, by mixture with weaker phosphatic minerals that contain more carbonate of lime, they work very well indeed.

Guanos.

As non-nitrogenous guanos we receive phosphatic materials from the West Indian Islands. These are called Sombrero, Navassa, Malden, and Curacoa, after the islets from which they are taken, and they are distinguished from the Peruvian, Majellones, and Ichaboe kinds by the almost entire absence of ammonia, by the small quantity of organic matter, and by the large proportion of insoluble phosphates which they contain.

Sombrero Rock or Crust Guano was at one time largely imported into England, but at the present time very little arrives in this country. It is quarried on Sombrero, one of the group of the Leeward Islands in the Carribean Sea; an islet about two-and-a-half miles long, three-quarters of a mile wide, and not more than twenty or thirty feet above the level of the sea, and which is entirely composed of this phosphatic substance. Fragments of bones are found in the rock, and it is supposed to be a breccia of bones of turtles and other marine vertebrata, coral debris, etc., collected before the elevation of the islet above the water, and cemented together since by the droppings of birds carried down through the mass by rains.

It varies in colour and texture, some being porous and friable, whilst other specimens are dense and compact. Recent importations have contained less iron and alumina and more carbonate of lime than formerly, and from this it is inferred that the rock (at present worked from under the sea) is mined in close proximity to the coral rock on which it rests.

Analyses of Sombrero Guano.

Tri-phosphate of Lime . .	from 69 to 76 per cent.
Carbonate of Lime . . .	,, 2 to 4 ,,
Iron and Alumina . . .	,, 7 to 10 ,,
Fluoride of Calcium . .	,, 1½ to 1¾ ,,
Insoluble Matter	,, 1 to 2 ,,

When Sombrero guano is dissolved by itself, it makes a high grade superphosphate of a light yellow colour.

Navassa Guano.

From the coral island of that name in the Carribean Sea, is of a reddish brown colour, and consists of globular grains of phosphate of lime, cemented into hard masses, and contaminated with a good deal of iron and alumina. It is found chiefly in the cavities of the rocks which form the framework of the island.

Tri-phosphate of Lime . .	from 55 to 70 per cent.
Carbonate of Lime . . .	,, 4 to 6 ,,
Oxides of Iron and Alumina	,, 15 to 18 ,,
Iron and Alumi. (as Phosphates)	,, 8 to 10 ,,
Fluoride of Calcium . . .	,, 1 to 2 ,,
Insoluble matter	,, 4 to 5 ,,

Superphosphate of lime, when made from Navassa alone, is exceedingly hard and tough, and proportionately low in strength.

Curacoa and Malden Islands both furnish guanos, but they have lately been almost entirely sold on the Continent, where better prices seem to be obtainable. In these the phosphate of lime is in an unmineralized state, and in a fine state of division, they contain but little carbonate of lime, and are almost free from oxide of iron, alumina, and silicious matter. They range in quality from 65 to 80 per cent. of tribasic phosphate of lime, the average being about 70 per cent. The lower qualities are, however, almost as valuable proportionately as the higher, in consequence of there being no oxide of iron, etc., to deteriorate the product, as in the case of most of the inferior phosphates, and they are capable of yielding superphosphates of high quality.

Conversion of Mineral Phosphates into Superphosphates.

It is scarcely necessary to remark, that the phosphatic materials are mixed with sulphuric acid, with the object of converting the unavailable natural phosphate of lime into a state to be assimilated by plants, and, if we assume that the acid acts upon all the ingredients simultaneously, we shall probably have the following decompositions :—

(1.) Tri-phos. of Lime + Acid = Bi-phos. of Lime and Sulphate of Lime.

(2.) Carb. of Lime + Acid = Sulphate of Lime and Carbonic Acid.

(3.) Fluoride of Calcium + Acid = Hydrofluoric Acid and Sulphate of Lime.

Hydrofluoric Acid + Silicia = Gaseous Fluoride of Silicium.

(4.) Oxides of Iron and Alumina + Acid = { Sulph. of Iron and Alumina.

Sulphates of Iron and Alumina + Bi-phos. of Lime = Phosphates of Iron, etc., Sulphate of Lime.

There can be no doubt about the action of the acid on the phosphates and carbonate of lime. Nor can there be much doubt about the decomposition of the fluoride of calcium ; for hydrofluoric acid and fluoride of silicium are shown to be in the evolved gases, first, by the fact that glass is etched when brought into contact with them ; and secondly, by the depositing from them of pure gelatinous silica and hydrofluosilicic acid, resulting from the action of moisture upon the fluoride of silicium.

But, if the oxides of iron and alumina are converted into sulphates, it will not account for the gradual precipitation, or "going back" of some of the soluble portion of superphosphates, which continues for some time after being made.

If the acid is in sufficient quantity and powerful enough to decompose the fluoride of calcium, it seems strange that it should not also dissolve the iron and alumina ; but the most probable way to account for "reduced phosphates," is to suppose, that a portion at any rate, of these remain as uncombined bases, to act as precipitants of the soluble phosphates.

After selecting a mineral by its chemical composition, the next thing is to consider its density or porosity, and the facility with which it can be reduced to a fine powder, and acted on by acid. It is impossible, in practice, to render the whole of the phosphate of lime soluble, and the proportion left undissolved, and depending upon the state of aggregation of the minerals, varies from 10 to 26 per cent. of the total phosphates in the superphosphate.

In almost every case it is requisite to dry the phosphates before grinding, and to have powerful machinery to reduce them to powder. After drying, they are crushed in mills or stone-breakers, then ground fine under French burr stones, and riddled. The quantity that can thus be prepared depends very much upon the hardness of the mineral, and the arrangement of the machinery and engine power ; but a fair average quantity is six to seven tons per mill per twelve hours. All the powder should be screened through wire gauze not less than 30 meshes to the inch.

The mixing or dissolving of phosphates in sulphuric acid is now almost entirely done by machinery. There are two kinds of mixing machines in use. One is vertical, and made either of wood or metal, with an upright spindle, to which are attached arms or wings for agitating, and wheel and pinion, etc., on top for turning same. The other kind consists of a long cylinder of metal or wood (or wood lined with lead), in which a stirrer revolves horizontally. Whether the mixers be vertical or horizontal they are always suspended over "Dens" (air-tight brick-built chambers), into which the superphosphate, when in a semi-fluid state, is allowed to run. The horizontal form of mixer is more generally in use, and 10 feet long by 2½ to 3 feet diameter is a convenient size, and will make about six tons of supers per hour. The ground materials and acid should be charged at one end, and the paddles or agitators should be so arranged as to work the mixture forward to the other end to be discharged.

It is advisable to feed the powdered phosphates into the mixing apparatus by means of elevators working by machinery, as in this way it is supplied much more regularly than when done by hand, and it is important that the supply of the two materials (phosphates and acid) should be at the same rate and finish together.

The acid employed should not be under 1·5, or above 1·6 sp. gr., and when new kinds of phosphates have to be dissolved, it is better to ascertain the quantity of acid that they will carry, by a series of actual experiments with moderate sized batches, rather than depend upon theoretical calculations based upon analysis of the mineral.

Some of the phosphates take their own weight of acid of 1·55 sp. gr., but the majority of them require rather less. It varies from 80 to 100 for each 100 of mineral. During the incorporation of the two materials irritating vapours are given off, and these are generally conveyed by a special flue to a condenser, or in some cases through a lime purifier, before being allowed to pass into the atmosphere. After remaining twenty-four to thirty-six hours in the "Dens," the superphosphate is taken out and either stored for future or riddled for immediate use. If good, it should be light and porous, and easily crumbled.

Parliamentary and Law Proceedings.

THE TRAFFIC IN EXPLOSIVES.

At the Bow Street Police Court, on Saturday, April 15, Henry W. Johnson, aged 36, described as a merchant, of 22, Bow Street, was charged on a warrant for unlawfully attempting to send away in a British ship, the *Bokhara*, certain dangerous goods without distinctly marking their nature on the outside of the packages, and without giving written notice of the nature of such goods to the owner of the said ship, contrary to the Merchant Shipping Act of 1873, section 23.

Mr. Poland prosecuted on behalf of the Peninsular and Oriental Steam Navigation Company ; and Mr. George Lewis defended.

Mr. Poland, in opening the case, said the act provided that if any person carried or attempted to carry on board any vessel naphtha, lucifer matches, or any dangerous materials, without distinctly marking their nature on the outside of the packages, and without giving written notice of their nature to the owner or master of such vessel, he should be liable for every such offence to a penalty of 100*l.* Section 24 of the same act provided also that if any person carried or attempted to carry dangerous substances under a false description, he should be liable, for every such offence, to a penalty of 500*l.* The prisoner took his passage from Venice to Bombay, and when doing so asked if he might take some photographic chemicals with his baggage. He was shown the rules of the company, which utterly forbade the carriage of explosive or dangerous materials on board their ships. He left then, but soon afterwards two packages marked "H. W. J." were sent by him to a branch office at Cockspur Street, with passengers' baggage, and were forwarded to the Nine Elms Station *en route* to Southampton. There an accident happened to one of the packages, and it was discovered that they contained photographic chemicals, such as collodion, ether, etc., all highly inflammable. Ether, for instance, threw out a vapour when exposed to even moderate heat, and the vessel these goods were to be placed in was to pass through the Red Sea. If these boxes had been put on board in the hold, the result might have been a fearful calamity. The company had taken these proceedings with a view to the public safety.

The police serjeant was called, and said that about 10.0 p.m. on Thursday night he went to Pentonville to the prisoner's lodging. The warrant was read to him, and he said "There was nothing in it but photographic chemicals, and there are the invoices from Tenches." Witness said he must take possession of them, and the prisoner said "It is useless you taking them; let me keep them." He also tried to put some papers into his pocket, but witness told him he must have them, and he then gave them up.

Another police witness said that when the prisoner was arrested at his lodgings at Pentonville, he remarked, "There must be some mistake about this; I shall make the Peninsular and Oriental pay for this."

A clerk of the Peninsular and Oriental, at 172, Leadenhall Street, City, proved that on the 10th of April the prisoner took a second class ticket from Venice to Bombay in a steamer that was to leave Venice on the 21st April. He paid £26 for that ticket. He said he wanted to send a camera and a few bottles of non-explosive photographic chemicals as part of his baggage. Witness said they could not be taken as part of the baggage, and also that they would be explosive if there was collodion or stuff of that kind amongst them. There is a notice in the office to the effect that passengers' baggage can be received at Cockspur Street, the branch office of the company. Prisoner had travelled before.

A messenger in the service of the company at Cockspur Street, said it was part of his duty to receive passengers' baggage. On the 10th April he received two cases—those outside. They were marked, "H. W. J., passenger, Bokhara." They were forwarded to the rail to be sent to join the vessel at Southampton. On the 13th witness went to the Nine Elms Station, and there again saw these two packages. One of them had been partially burnt. He saw six bottles with labels on them, ether, collodion, etc.

The receiver of goods, Nine Elms Station, said that on the morning of the 17th he saw a van belonging to the Peninsular and Oriental Company on their premises. He took out one case, and in about three or four minutes smoke came from it. Witness had it at once removed. Some explosions occurred inside the case.

Dr. Albert I. Bernays, professor of chemistry at St. Thomas's Hospital, said that he had examined the contents of one of the cases. It was lined with tinned iron. In one corner some damage by fire had taken place. There was in that corner a great smell of nitrous ether. The tinned iron was perforated, and pieces could be broken off quite easily. Witness would imagine that was caused by a mixture of acid and iodine. The hay in which the bottle had been packed was very much charred. The action of an acid upon tinned iron is very great, and the heat caused in that way would be quite sufficient to cause the accident. A bottle marked "Ether," was broken inside. A large bottle of cyanide of potassium was broken, and a very strong smell of prussic acid was given off. The things in the box were of a very dangerous nature. At a very low heat ether will give off a highly inflammable vapour, which when mixed with the ordinary air is extremely explosive. If this had occurred in the hold, as the bottle of ether was broken, the ether would have soon filled the whole compartment with the vapour. The alcohol here found is absolute alcohol, and is highly inflammable. Collodion is made by dissolving gun cotton in a mixture of alcohol and ether. There was a large quantity of collodion in the case.

Mr. Flowers said the case was clearly proved against the prisoner. Taking into consideration, however, that he had been put to inconvenience and loss of time by being arrested, thus delaying his journey, he (Mr. Flowers) should reduce the penalty (100*l.*) to one of 70*l.* and 10*l.* costs—making in all 80*l.* If he could find two sureties in 50*l.* each, and enter into his own recognizance in 100*l.* to appear that day week or to pay the money in the meanwhile, he might have that time allowed him. If the money was not paid then he would have to go to prison. Bail was forthcoming, and it was promised that the money should be paid.—*Standard.*

Suspected Death by Poisoning.

On Tuesday, Dr. Diplock, coroner for the western district of Middlesex, held an inquest on the body of Mrs. Porter, who had been found in a dying state under circumstances that appeared to indicate that she had been poisoned. The medical evidence was as follows:—

Mr. Thomas Whitefield, M.R.C.S., a registered medical practitioner, said Mrs. Porter had been his patient for three or four years. On Thursday morning a Mrs. Wallace asked him to go round to see Mrs. Porter, and said that she wished to see him as soon as possible. He went ten minutes afterwards and saw her with a slight cold and a little bilious fever. She was not in the slightest danger. He sent the ordinary medicine he was in the habit of sending her, and did not see her again till just before 11 o'clock at night, when Mr. Clift, the landlord, came and said he thought she was dead. He returned with Mr. Clift. Mrs. Porter was quite dead, lying on the left, with her face towards the door, and her arm slightly raised. He examined her body externally. There were only one or two small marks like bruises on the side of her nose and on her face. The features were perfectly placid; the mouth firmly closed. He made a *post mortem* examination on Saturday in company with Dr. Thurston. There was a slight congestion on the brain, and a slight effusion in the ventricle—very slight. The pupils of the eyes were much dilated; the lungs were also congested; the stomach was much inflated, and the contents have been retained for analysis. All the other organs of the body seemed perfectly healthy. In his opinion, death was caused by suffocation, probably by chloroform. He judged from the marks on the nose and on the mouth. But from the other symptoms—the nausea—he was not sure that arsenic or some irritant poison was not previously administered.

By the jury.—He expected their sending for him in the morning was to get his certificate. He never knew deceased to suffer from a fit. She was a very delicate woman. He ought to have said that her heart was in a very bad state It was very small, flabby, and weak, and quite empty. She was suffering from heart disease, and the least shock or fright might put an end to her existence. He never saw so weak a heart. It had no muscular power at all. He wondered how she had lived so long. It was his impression that she had been for a long time under the influence of some irritant poison in order that the chloroform might accelerate her death. After finding she was dead, witness inquired for Mrs. Wallace, and then learnt that she had gone away. He might have given a certificate that she died in a fit if it had not been for the surrounding circumstances.

The Coroner said he thought there should be a special analysis of the contents of the stomach, and suggested that the jury should address him in writing to that effect.

The jury assented and the inquiry was adjourned till Wednesday next at 3.

Death Through Fear of Poison.

On Wednesday Mr. Langham held an inquest at St. James's Vestry Hall, on the body of Mr. George Gillian, 62, a private hotelkeeper of Jermyn Street, St. James's, who died from fright under the belief that he had taken poison. It appeared that the deceased on Good Friday complained of illness, and his wife by mistake gave him a draught out of a lotion bottle marked "Poison." The bottle had not been used for some years. The mistake was immediately discovered, and the deceased exclaimed, "Oh, I am poisoned. I shall die." Medical assistance was obtained, but the deceased died the same afternoon. Dr. Waters said that the bottle originally contained prussic acid, which, however, had evaporated. The body of the deceased did not contain the slightest traces of poison. Death arose from disease of the heart. In his opinion the deceased was under the belief that he had taken poison, and the fright caused a sudden failure of the action of the heart. The jury returned a verdict accordingly.—*Times.*

Review.

CHIMIE ORGANIQUE. PRINCIPES DE LA CLASSIFICATION DES SUBSTANCES ORGANIQUES : Par A. EDME BOURGOIN. Paris : J. B. Baillière et Fils.

ORGANIC CHEMISTRY. PRINCIPLES OF THE CLASSIFICATION OF ORGANIC SUBSTANCES : By A. EDME BOURGOIN. Paris : J. B. Baillière and Son.

This small work has apparently been written by the author with the object of pointing out that the typical system of classification due to Gerhardt, and the more modern developments of it, are less convenient in practice and are open to more serious theoretical objections than the more natural system of classification attributed by him to Berthelot (of whom he is a disciple), viz., that in which organic substances are classed by their chemical functions into one or other of the eight principal classes, hydrocarbons, alcohols, aldehydes, acids, ethers, alkaloids, amides, and organo-metallic bodies.

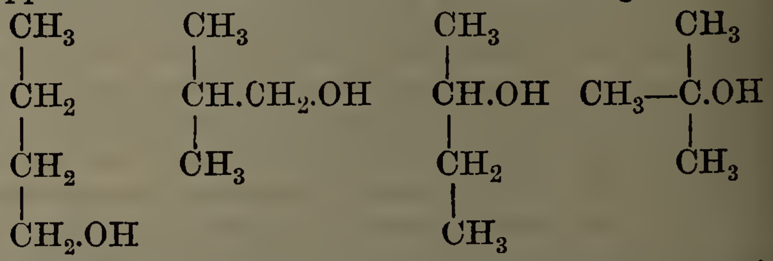
Setting aside the question as to how far the author is justified in assigning a considerable portion of this classication solely to M. Berthelot, serious objections may be taken both to the premises on which the author bases his arguments, and to the conclusions thence deduced. Starting from the earliest classifications of Lavoisier and Fourcroy, in which a few proximate principles only were recognized, the author briefly discusses the classification of Gay Lussac into organic acids, bases, and neutral substances ; and that of Thénard into seven ranks, viz., acids ; neutral bodies ; resinous, oily, alcoholic, and ethereal substances ; colouring matters ; bodies whose existence is doubtful (!) ; nitrogenous substances of basic character ; and azotized matters of neutral character. He then discusses the influence of the discoveries of Liebig and Wöhler concerning the derivatives of bitter almond oil (benzoyl series) on theoretical chemistry ; and finally describes the system of types arrived at by Gerhardt, pointing out that this system goes further than is warranted by facts when it represents all organic substances as being formed the one from the other by double decompositions ; and discusses the condensed types and mixed types introduced by Williamson, Odling and others.

In order to avoid various errors and inconveniences necessarily pertaining to the theory of types pure and simple, the chemists whose views are based on the atomic doctrine (les atomistes) have, according to the author, "subordinated this theory to a more general principle, that of atomicity." Whilst admitting that the doctrine of the mutual combination of carbon atoms, and the views as to the "constitution" of numerous bodies to which this doctrine leads, are satisfactory enough in numerous cases, M. Bourgoin yet considers that this principle of atomicity does not afford a suitable means of classification of either simple or complex substances generally. He is unable to accept the view that the active atomicity of a given atom may vary according to the nature of the other atoms with which it is brought into association, and the conditions as to temperature, etc. ; but considers that if the doctrine of atomicity be held at all, it must be regarded "as a property of atoms as specific and clearly defined, as for example, the atomic weight."

Having thus pinned himself to a view of atomic constitution clearly out of harmony with numerous facts, M. Bourgoin proceeds to point out the discrepancies between the limited atomicities doctrine, accepted as to some extent tenable by himself, and the actual facts; and as a consequence concludes that as the capacity of saturation of certain given atoms must be variable from the nature of their compounds, it is impossible to rely on atomicity for the purpose of classification.

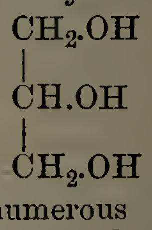
A much more legitimate objection to the atomic hypothesis generally is, however, raised by M. Bourgoin when he argues that in the existing state of chemical science we may fairly conjecture that the relationship between the varying atomicities of elementary atom (taking the word in a relative sense) are connected with the thermal phenomena produced during combination thus during the combination of hydrogen with chlorine *one* atom of each only is necessary, whilst *two* atoms o hydrogen are requisite to fix one atom of oxygen ; in the reactions there is a transformation of latent energy (*forc vive*) into sensible heat; and "by not taking accoun of these fundamental phenomena, the atomic theory becomes enclosed in a narrow circle from which it can not emerge without abandoning the theoretical base o the system ;" and hence he concludes that "from the point of view of molecular mechanics, the atomic theory in its actual form, presents difficulties which can only be removed by the deep-seated modification of the fundamental principles and hypotheses on which it rests."

M. Bourgoin appears wholly to ignore a mode of viewing chemical formulæ which is gaining ground daily, viz. that the symbols employed do not necessarily represent atoms and molecules at all (in the concrete sense in which these terms would be understood by a physicist discussion the kinetic theory of gases), but that they simply stand as *memoria technica* representing in brief most of the numerous chemical habitudes, functions and capabilities of reaction possessed by the substances indicated, being founded solely on the quantitative volumetric and gravimetric composition of the bodies, their vapour densities and other physical properties, and certain purely arbitrary conventions. Looked at from this point of view the "structural" formulæ in ordinary use in organic chemistry are free from numerous objections which M. Bourgoin very justly brings against the hypotheses and theoretical speculations which atomic chemists are in the habit of interweaving with the other ideas connected by these symbols, but which are by no means inextricably bound up with them. M. Bourgoin, however, prefers the kind of notation adopted by M. Berthelot, because it "expresses the generating equations," *i.e.*, it indicates the chemical reactions by which the bodies represented can be produced from and can give rise to other bodies ; it does not seem at first sight clear, however, what special advantages in this respect the formulæ of M. Berthelot have over those in ordinary use, whilst in certain cases of isomerism the usual formulæ represent differences between bodies which do not seem to be indicated at all by the symbols of Berthelot. M. Bourgoin indeed says that it must not be supposed that such formulæ as the following :—



$$\begin{array}{cccc} CH_3 & CH_3 & CH_3 & CH_3 \\ | & | & | & | \\ CH_2 & CH.CH_2.OH & CH.OH & CH_3—C.OH \\ | & | & | & | \\ CH_2 & CH_3 & CH_2 & CH_3 \\ | & & | & \\ CH_2.OH & & CH_3 & \end{array}$$

are the only ones which have the power of characterizing the differences in chemical deportment between the four isomeric butylic alcohols ; but he does not indicate how these differences are represented by Berthelot's formulæ. Similarly glycerine can give rise to one trichlorhydrin, and to two mono-, two di-chlorhydrins ; whilst the formula—



$$\begin{array}{c} CH_2.OH \\ | \\ CH.OH \\ | \\ CH_2.OH \end{array}$$

expresses this and numerous other facts connected with glycerine at a glance, the formula of Berthelot, $C_3H_2(H_2O)(H_2O)(H_2O)$, does not represent these circumstances so readily, if at all ; it does not differentiate the functions of the three water groups (H_2O), or represent the one as of a secondary, the others of a primary alcoholic character, as does the "dissected" formula in ordinary use. Similarly the formulæ for methyl-ethyl-benzene, propyl-benzene, and trimethyl-benzene given, viz.—

$$C_6H_4[C_2H_4(CH_4)]$$
$$C_6H_4(C_3H_8)$$
$$C_8H_8(CH_3)$$

lo not indicate the relations of the bodies to the mono- li- and tri-carboxyly benzenes producible by the oxidation f the hydrocarbons in question, nor to the ortho- meta- nd para- modifications of some of them as clearly as the ormulæ—

$$C_6H_4\left\{\begin{array}{l}C_2H_5\\CH_3\end{array}\right.$$
$$C_6H_5.C_3H_7$$
$$C_6H_3\left\{\begin{array}{l}CH_3\\CH_3\\CH_3\end{array}\right.$$

specially when these formulæ are expanded in accordance with the notation of benzene derivatives introduced y Kekulé, or with some analogous system of notation.

Apart from questions of notation, there can be no loubt that the classification of organic substances in ccordance with their predominent chemical functions is most natural and simple plan. Of course many bodies, n fact most, will thus appear in more ranks than one, wing to their possessing mixed functions and characters; hus mixed classes of the following eight kinds may be dded to the eight principal single function classes above numerated, viz.:—

lcohol Ethers .	*e.g.*	Dichlorhydrin.
lcohol Aldehydes	„	Salicylic Aldehyde.
lcohol Acids . .	„	Lactic Acid from Propyl Glycol.
lcohol Alkalies .	„	Glyceramine $C_3H_5\left\{\begin{array}{l}NH_2\\OH\\OH\end{array}\right.$
cid Ethers . .	„	Ethyl Glycollic Acid.
cid Aldehydes .	„	Glyoxylic Acid.
cid Alkalies . .	„	Glycocine (Amido-Acetic Acid).
cid Phenols . .	„	Salicylic Acid.

In the same way more complex classes might also have en enumerated, *e.g.*, methyl noropianic acid—

$$C_6H_2\left\{\begin{array}{l}OH\\O.CH_3\\COH\\CO.OH\end{array}\right.$$

Vhich is at once a phenol, an ether, an aldehyde, and monobasic acid proper.

The following table represents the classification adopted rom M. Berthelot by the author:—

- . Hydrocarbons
  - Saturated = Paraffins (Carbures Forméniques)
  - Non-saturated
    - Ethylenic
    - Acetylenic, etc., etc.
- I. Alcohols
  - Alcohols proper
    - Monatomic
      - Ethylic,
      - Acetylic
      - etc., etc.
    - Diatomic etc., etc.
      - Glycolic,
      - etc., etc.
  - Do. of Hydration; isomeric with the above classes.
  - Secondary, Tertiary, etc., Alcohols; ditto, ditto, Phenols.
  - Alcohols of mixed functions.
- III. Aldehydes
  - Aldehydes proper
    - Monatomic
      - Ethylic
      - Acrolenic etc.
      - Carbonyles
    - Diatomic
      - Analogues of Furfurol.
      - Analogues of Glyoxal.
  - Secondary Aldehydes (Ketones).
  - Quinones.
  - Aldehydes of mixed functions.
- IV. Organic Acids
  - Monobasic containing O_2
    - Acetic series (fatty acids)
    - Acrylic „
    - Sorbic „
    - Benzoic „ etc., etc.
  - Bibasic containing O_4
    - Oxalic series
    - Fumaric „
    - Phthalic „ etc., etc.
  - Tribasic containing O_6
    - Carballylic
    - Aconitic
    - Trimesic, etc., etc.
  - Acids of mixed functions
    - Containing O_3
      - Glycollic series.
      - Pyruvic series, etc.
    - More complex
      - Glyceric series
      - Protocatechuic, etc
    - From tetratomic and pentatomic alcohols, etc.
- V. Ethers
  - Compound Ethers
    - from monobasic Acids and monobasic Alcohols with elimination of H_2O
    - from bibasic do.
      - acid ethers
      - neutral do.
    - from tribasic do.
      - 2 classes of acid ethers
      - 1 class of neutral ethers
    - from polyatomic alcohols and different classes of acids with elimination of water
  - Mixed Ethers
    - from various classes of alcohols with elimination of water
  - Aldehydic Ethers
    - from various aldehydes and alcohols with elimination of water, *e.g.*, Acetal
- VI. Alkaloids
  - Amines
    - Primary from various classes of monatomic alcohols, *e.g.*, methylamine: Aniline
    - Secondary ditto, *e.g.*, methyl-ethyl-amine: diethylamine
    - Tertiary ditto, *e.g.*, tri-methylamine: methyl-diphenylamine
    - Quarternary Ammonium bases, *e.g.*, tetra-ethylammonium hydrate
  - Alkaloids from polyatomic alcohols.
- VII. Amides Bodies resulting from the union of ammonia with various classes of acids, and elimination of water.
- VIII. Organo-metallic bodies
  - Derived from a hydride or analogous body, *e.g.*, Stanethyl, triethylphosphosphine, etc., etc.
  - Derived from a hydrocarbon, *e.g.*, Cupracetylene.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Quantitative Chemical Analysis. By Dr. C. Remigius Fresenius. Seventh edition. Translated from the sixth German edition, by A. Vacher. Vol. I. London: J. and A. Churchill. 1876. From the Publishers.

Notes and Queries.

[504].—PEPSINA PORCI.—"*Alpha*" wishes to know the best plan to dissolve Pepsina Porci, say three grains to the drachm. He says that *all published* forms have failed.

[505].—DISPENSING QUERY.—I enclose the copy of a prescription I have had to dispense on several occasions; it presents some unusual features and if published in the Journal will enable some of the knowing ones to exercise their ingenuity. I have sent the mixture out clear but do not expect it remains so.—J. B.

℞ Quiniæ Sulph.	gr. xvi.
Potass. Iodid.	gr. xxiv.
„ Bicarb.	ʒiss.
Acid Nitrici dilut.	ʒiss.
Syr. Flor. Aurant.	℥j.
Aquæ ad.	℥viij.

M. ft. Mist.

[506].—SYR. CALCIS ET SODÆ HYPOPHOS.—"A. F." wishes to be supplied with a formula for Syrupus Calcis et Sodæ Hypophosphitis.

[507].—TOILET VINEGAR.—Can any reader oblige by giving a formula for a toilet vinegar similar to either Rimmell's or Bully's?—"PIL. HYDRARG."

[508].—TINCT. SCORPIO.—Can any reader of the *Ph. Journ.* oblige me with the formula for Tinct. Scorpio, which occurred in a prescription with Pil. Philip. alluded to some time ago in the Journal?—J. STRACHAN.

[509].—PERFUMES.—Can any reader furnish me with a formula for making New Mown Hay Perfume; also one for Hawthorn Bloom, as I have a large quantity of hawthorn blossoms preserved in S. V. R. for several years and which I think I may be able to utilize for the latter perfume?—A LOVER OF PERFUMES.

[501].—OAK STAIN.—"C" will find the following a good dark stain:—

Vandyke Brown	2½ ozs.
Carb. Ammonia	1 „
Bichrom. Potash	½ „
Common Soda	½ „
Water	1 quart.

Boil together six or eight minutes.—E. S.

[503]. DISPENSING PRICES.—"*Jupiter Pluvius*" gives a prescription at page 779 (March 25, 1876) for a Quinine Tincture, and wants to know what ought to be charged for dispensing the same. Now a pharmacist is like an artist, who may raise his charges when he becomes known and valued, or popular. When he starts in life he must sometimes be content with *remuneration*, which Shakespeare's Costard tells us is "the Latin word for three farthings." And sometimes for performing the same service he will receive *guerdon*, which, the same authority tells us, is eleven pence farthing better than remuneration. The young pharmacist would perhaps charge the tincture by the retail prices of the ingredients; and perhaps some who dabble in the wholesale would cut down below the retail prices, and so be suspected of stinting the ingredients. So that the charge might vary from eight shillings down to four shillings, and perhaps below the latter sum. I leave it to others to fix the price more correctly.—JOSEPH LEAY, *Chilcompton, Bath.*

Replying to the query of "*Jupiter Pluvius*," "*Eastern Suburb*" writes that he should charge 6*s.* "*Pil. Hydrarg.*" considers that 7*s.* 6*d.* would be the price charged by any good London house.

Correspondence.

**** No notice can be taken of anonymous communica tions. Whatever is intended for insertion must be authenti cated by the name and address of the writer; not neccssaril for publication, but as a guarantee of good faith.*

PHARMACY IN THE ANTIPODES.

Sir,—Having had some experience in Australian pharmac I have been interested in your note on the above subject which appeared in last week's Journal. I, however, do no altogether agree with your Brisbane correspondent in thinking that assistants are paid as well at home as in th Colonies.

I spent the year 1874 in Melbcurne, and easily obtaine a salary equal to £85 indoor, with about two hours a da less duty than your correspondent speaks of. When it considered that I was then but twenty-one years of age, th difference between an assistant's prospects at home and i Victoria is more apparent, for whereas a lengthy experienc is required at home before he can obtain a salary of say £6 indoor, yet four or five years' experience is sufficient t enable him to obtain £80 in the colonies; and it is thes younger ones who would reap most advantage by goin abroad. English assistants of good character are in grea request in Australia. I have known a very good colonia assistant discharged, simply because his employer had a opportunity of engaging one just arrived from Englan This is looking at the affair purely in a pecuniary point c view. But there is a great disadvantage to a young assistant in colonial pharmacy, viz., that there is nothing beyon his own taste or inclination to induce him to improve himself in the scientific part of his profession, there being n examinations or lectures to incite or assist study. Ther was a "Chemists' Assistants' Association" in Melbourn but the question of salary seemed to occupy far more attention than pharmaceutical education. I should advise an intending emigrant to at least pass the Minor before leavin England. He would find it a good testimonial, beside leaving him on the safe side if he should wish to return t England to begin business. With regard to the prescriptio you describe as an average specimen of those written i Queensland, I can only say that that colony must be far behind Victoria in this respect. I have found Melbourn prescriptions quite as neat productions as English ones.

W. D.

April 18, 1876.

J. C Hunter.—The communication was received and acknowledged, but it was considered not quite suitable fc publication. We are, however, obliged to you for havin forwarded it.

"*Kermes.*"—A paper on the Physiological Properties c Nitro-Benzol, by the late Dr. Letheby, was printed in vo v. of the second series of this Journal, p. 130. Severa cases of poisoning from nitro-benzol have been recorded.

"*Phosphates.*"—(1). We are not at liberty to specif particular manufacturers. (2). Some information respectin the mineral phosphates will be found on p. 853 et seq. the present number.

M. P. S.—The answers on the previous column wi illustrate how little is to be gained by publishing suc questions, the answers being subject to so many disturbing influences, notably local ones, as to render them practically useless.

J. N.—We think that probably a galvanic action woul be set up.

W. R. C.—Consult Wanklyn's 'Treatise on Tea, Coffe and Cocoa Analysis.'

COMMUNICATIONS, LETTERS, ETC., have been received fro Professor Dragendorff, Mr. J. Barrett, G. P. P., " Student of the Pharmaceutical Society," "Censor, "Tadpole."

EMARKS UPON RHUBARB AND RHEUM OFFICINALE.

BY F. A. FLÜCKIGER.

The new volume of the *Repertorium für Pharmacie* ommences with a long and interesting discussion by rofessor Flückiger of various points in connection vith the history of rhubarb and *Rheum officinale*, from vhich the following is an abstract. The original aper is accompanied by numerous references, etc., o the authorities quoted and by a figure of the plant.

In recent years the French missionaries have ained the advantage of being able to seek for the hubarb plant in South-east Thibet, and already in 863 the apostolic vicar of the district, Monseigneur hauveau, knew where to procure it. But it was in 867 that Dabry, the French consul at Hankow, was irst able to forward to the Society of Acclimatization n Paris a living root, which although it arrived in a ery bad condition was through the care of the ecretary, Dr. Soubeiran, grown in the garden of the nedical faculty. The plant was at once recognized y Baillon as belonging to a new species which was lescribed by him in the 'Adansonia.'* After the plant ad flowered, the description was supplemented by a igure in the 'Proceedings of the Association française our l'Avancement des Sciences' for 1871.† It was lso figured in the *Botanical Magazine*, 1874, t. 6135.

In the summer of 1874 the author received roots rom the late Mr. Daniel Hanbury, and in 1875 the lant flowered for the first time in Germany in the arden of the Pharmaceutisches Institut of the Iniversity of Strassburg, forming a stately elegant lant. The flower stalk reached its full height bout the 25th of May, when the flower, which was at rst almost horizontally drooping, appeared. The ower opened on the 27th of May, and on the 9th f June it stood upright, and was in full bloom. In his case it was not, however, as described by Baillon, pallide virescens," but white. Fruit had appeared n the 20th of June, and by the 26th the flowering ad nearly ended and the stalk had attained its reatest height, 2½ metres. Most of the fruit was ripe y the 20th of July, but the quantity in proportion o the number of flowers was small. Professor lückiger says the flowers and fruit of *Rheum officinale* present no characters which distinguish it from ther species of *Rheum*.

At the author's request, Mr. Hanbury also distributed the *Rheum officinale* to Messrs. Rufus Usher and ons, the owners of the large rhubarb plantations at odicott in Oxfordshire, the rhubarb cultivated there eing probably *R. Rhaponticum*. Professor Flückiger as now had an opportunity of comparing a root of *officinale* grown by himself with one from the arden of the Paris School of Pharmacy, supplied by rofessor Planchon, and one obtained by Messrs. Jsher, and treated and dried in the same way as heir rhubarb for the market is usually prepared. After this comparison Professor Flückiger is able to ay that the root of *R. officinale* undoubtedly bears he characters of true Chinese rhubarb, and he thinks hat with suitable treatment it would yield a product dentical in external appearance.

The first epidermis of the subterranean portion of *officinale* is remarkable for a very bright brown-red colour; the roots of other species, at any rate those of *R. Rhaponticum* and *R. Emodi*, are only yellowish or yellow brown. But what still more distinguishes *R. officinale* is the strong development of the root-stock, a large part of which occasionally projects conically from the ground and is provided with not very numerous secondary roots of the thickness of a finger. Only the root-stock approaches the marbled structure of the true rhubarb; the secondary roots show the ordinary regular structure of this kind of axis and no trace of the starlike spots or knots which give the drug its special appearance.

Dr. Schmitz, of Halle,* was the first to point out the signification of these knots, and to show that the official rhubarb is a root stock, which for one year grows as a tuberous thickened short stem, producing a flower stalk that dies off completely and that on this short stem appear numerous lateral buds that grow in a similar manner to the stem from which they are produced. The knots, however, which Dr. Schmitz looks upon as starting from the medulla, appear, Professor Flückiger thinks, to be related to the vascular bundles of the leaf. In consequence of the close arrangement of the leaves round the root stock the irregular net-like interwoven fibres stand very close together, so that a tranverse section at the base of the leaf-stalks also gives the characteristic circular distribution of the knots. The fibres increase in thickness independently, the inner portion of each separate knot consisting of parenchyma, which behaves as bark tissue, and is surrounded by a cambium ring. Outside the latter the fibre has the character of the woody portion (xylem) to the extent that well perfected vessels appear in it.

The knots are, however, by no means peculiar to the true officinal rhubarb, as they appear also in the so-called European rhubarbs. But there is this very great difference, that they are to be found much more plentifully and in a dense though irregularly arranged zone in the true officinal drug as well as in the root stock of *Rheum officinale*. But a small number of isolated knots occur not unfrequently in the French or English rhubarbs. This fact led Schmitz to say that the root stock of *R. Emodi*, Wallich, also possesses the characteristic markings of true Chinese rhubarb, a statement that the author thinks needs limitation. Especially a remark connected with this, that probably a portion of the Himalaya rhubarb obtained in the country of *R. Emodi*, might be derived from that plant, is, Professor Flückiger thinks, put beyond consideration by the fact that no Himalayan rhubarb occurs in European commerce. After careful consideration of the English and Indian markets Flückiger and Hanbury felt bound not to perpetuate the name "Himalayan rhubarb" in their 'Pharmacographia.' Together with innumerable other drugs, probably the roots of *R. Emodi* and other nearly allied species which grow in the Himalayas and Tibet are to be met within the Indian bazaars, and once, a couple of chests of such Himalayan rhubarb strayed to England. These, however, as well as authentic pieces of the root which were supplied by Wallich himself, were deficient in the characters of true rhubarb.† Practically, therefore, we have no varieties of rhubarb from the Himalayas. The brothers Schlagintweit in their journey through the western part of the Himalayas met with *Rheum Emodi*, *R. Moorcroftia-*

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* 'Adansonia,' x. (1868), 246.

† A translation of Baillon's description appeared in this ournal, vol. iii. (1872), p. 301.

* Session of the Naturforscher Gesellschaft at Halle, Dec. 12, 1874.

† Pereira, 'Elements Mat. Med. II.,' Part I. (1852), p. 492.

num, Wall., and *R. australe*, Dón., but not with the collection or cultivation of true rhubarb.*

Similarly with respect to the rhubarb of present commerce, opinions are not wanting that it should be considered different from the so-called Russian rhubarb. Thus Berg is of opinion that this drug, at present disappeared from commerce, should be attributed to another plant which has sometimes been indicated as *R. palmatum.* To the author's knowledge, however, no *Rheum palmatum* cultivated in Europe has yielded roots resembling the true drug. But in 1872 what appears to be a more nearly allied plant was collected by Przewalski in the highlands of Tangut, near the salt lake of Koko-nor, in the province of Kansu (lat. 37° N., long. 100° E.), and described by Maximowicz as *Rheum palmatum*, var. *Tanguticum.* According to the Russian botanist this plant, which is now cultivated at Erfurt, in Germany, is the plant from which the once preferred Russian rhubarb was derived. Professor Flückiger, however, thinks that a decisive opinion upon the relation of this *Rheum Tanguticum* to *R. palmatum* at present cultivated in European gardens on the one hand, and *R. officinale* on the other, is not at present possible; Tangut and Thibet lie so far asunder that some experience in the propagation of these two plants is desirable.

This uncertainty imparts interest to the notices of the origin and commercial routes of the rhubarb coming into European trade that have accumulated in the course of time. It appears probable that the Chinese, in the thousandth year of their annals, which is earlier than our chronology, employed rhubarb, and, that very early caravans went from Central China to Western Asia, to Bokhara for instance, so that it is possible that rhubarb spread westwards in very early times. Acquaintance with it in India in ancient times cannot be determined inasmuch as the Sanscrit language has no word to describe it. With the question whether the *Rha pontica*, *Rha coma*, or *Rha* of the later Latin writers was the drug of to-day Professor Flückiger does not deal; but he thinks the expression *Rheum barbarum* or *barbaricum*, first appearing in the sixth century, certainly relates to our drug and this name appears to have gradually supplanted *Rha ponticum.* Probably it is spoken of in the great geography of China, 'Taï-thsing-i-thoring-tchi,' when it is said that Rhubarb, "taï hoäng," a product of the province of Si-ning-fu [east of the Sea of Koko-nor, already mentioned, in the present province of Kanzu], was admitted into Tangut during the rule of the dynasty of Tang as tribute from the Kouohtcheou district. This dynasty ruled from A.D. 618 till A.D. 905, just at the time when the name *Rha barbarum* was given to the drug in Europe. If there is not here strict evidence of the identity of the Chinese drug, Taï-hoang, *i.e.* the great yellow [root], with *Rha barbarum*, the author thinks there is the highest probability.

Esdrisi, the Arab geographer of the middle ages, in his 'Geography,' written in 1154, and based on oral communications from travellers and the literature of the time, says of a certain district, "It is also there that the Chinese rhubarb grows, and the root is found there in abundance; it is exported to many oriental and occidental countries." The district indicated was the mountains near Buthink, where according to Esdrisi's account, the nardus (*Nard* *stachys Jatamansi*, D.C.) also grew and the mu deer lived. Professor Sprenger refers the notice the district lying between Hlassa and the Tengri-nc the great mountain lake of North-east Thibet.

"Reubarbe" is found entered among a lar number of North Asiatic and Indian products in tl customs list of St. Jean d'Acre (1173 to 1183). I a note on Marco Polo's Travels (Leipzig, 1855) Bü speaks of entire loads which the Dschingiskh troops met with at the conquest of the town of Lin tscheu (or Lant-scheu-feu), east of Sining in 1227, a which were very acceptable. Wilhelm von Ruy brock (Rubruquis), who in 1253 in the service King Ludwig reached the court of the Mongol Kha Mangu, found there "Reubarba" in frequent us though he did not reach further than the Karakoru mountains. Twenty years later the famous travell Marco Polo pressed much further eastwards, ar especially among other places to Tangut, to whic province so many notices on rhubarb refer it. I speaking of Suctur, the present province of Kanz Marco Polo says, "La grant province general, où c trois provinces sont, est Tanqut. Et partoutes les mo tagnes de ces provinces se trouve le reobarbe in gra habondance. Et illec l'achatent les marchans et l portent par le monde." And further, "Ci dict de cité de Siguy : Siguy est une très noble cité grande . . . Et si y a si grant planté de gent que l' n'en puet savoir le nombre . . ., mais ils ne so point hommes d'armes, ains sont marchans et ge moult soubtilz de tous mestiers. Et si a en ce cité moult de philosophes et moult de mires [méd cins ?]. . . . Et es montaignes de ceste cité croi réobarbe et gingembre aussi a grant planté." Pr fessor Flückiger does not think with Pauthier, Mar Polo's editor and commentater, that by Siguy is be understood Su-tscheu in the province of Kiang- but Sining in the western part of the province Schen-si. The doubt remains, how it was possib that ginger (gingembre) could occur together wi rhubarb; but that rhubarb was wanting in tl comparatively well-known province of Kiang-su certain.

As a Venetian, Marco Polo naturally turned h attention to rhubarb. It is known that the Ven tians, as well as their neighbours, the Genoes obtained supplies of Asiatic products not on through the Red Sea and across Egypt, but th their commercial routes from Central Asia fou an exit also by the Sea of Azov or the Syrian coas In this way possibly rhubarb may have been su plied when the Sultan of Egypt interposed difficu ties to transit through his dominions.

During the whole of the middle ages rhubarb do not appear to have been a very important article commerce. "Rabarbara" occurs in the commerci police regulations of the city of Bruges, in 1380, an import from Italy. In 1445, rhubarb was i ported into Dantzic from Riga, and it was one of t valuable drugs which, in 1497, were sought in t first doubling of the Cape of Good Hope. T Portuguese and Italians, who reached India at t commencement of the sixteenth century, obtain from Calicut and Cochin rhubarb that had be imported from China *viâ* Malacca.

Garcia de Orta gives further information respe ing the commercial routes which the trade of th time (1563) struck out. It reached Ormuz in t Persian Gulf, made its way through Mesopotamia leppo and thence to Alexandria, where the Vene- ns took it in hand. Garcia states that rhubarb as supplied direct from Canton to Ormuz. Like her oriental products rhubarb appears to have been nfined principally to land routes, hence the very gh price of the drug. According to Leber, in 1542, pound of cloves cost 3 livres, pepper 15 sols., but ubarb 18 livres 15 sols., whilst saffron was only livres 10 sols. In Ulm, in 1596, rhubarb was of gher value than opium.

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* 'Annales des Sciences Naturelles (Botanique),' vol. vi., p. 334.

In the seventeenth century, also, according to a ntemporary notice rhubarb reached Europe by the me different routes "across the Indian Ocean, rough the Kingdom of Cascar (Kashgar), through rtary, Astrachan, and through Russia, or to Mos- w, and finally through the Kingdom of Thibet, ogor, and Persia."

Holland, Smyrna, and Constantinople became nporiums for rhubarb, so that not not only Rus- an or Muscovitic but also Holland and Turkish ubarbs were spoken of. Gradually this trade as diverted into other courses. Russia entered to treaties with China, and the commerce between e two great empires was concentrated at the market Kiachta, in Southern Siberia. The good rhubarb nceforth took its way through Siberia and Russia, hilst only the poorer sorts were brought for export Canton, the only port in China at that time open. he further changes that the commerce in rhubarb as undergone have been described elsewhere.*

Professor Flückiger then proceeds to glance at e more recent notices which have appeared con- rning the countries in which rhubarb is collected. he famous description of the Jesuit mission only ates that the native country of the principal kind f rhubarb was the province of Se-tschueu (Sui- chuan); also the snow-mountains from Sue-cheu Leang-tcheou; and, lastly, Tibet, where, however, nly a poorer root was found. Father J. B. der Ialde, to whom we owe this information, bases it pon the testimony of eye-witnesses, who do not, owever, appear to have given any special attention rhubarb.

More trustworthy information is given in an count of a journey from Pekin to Sz'tshwan (Oct. 871 to May 1872) by F. v. Richtofen, who mentions at amongst the products of the province of z'tshwan (or Sui-tschuan, at the head of the great Kiang river) the rhubarb grows wild only on the ighest hills. The central line of its occurrence runs hrough the Bayankara range (south-west of the alt sea of Koko-nor), where the yellow river Hwangho) takes its rise. From this range the hubarb extends through the highlands north and uth. In the south it occurs on the hills in the more mmediate neighbourhood of Kwan-hien, but the etter sorts begin first ten or twelve days' journey urther north.

The principal markets for rhubarb are Sining-fu just as in Marco Polo's time) in Kansu and Kwan-hien in Sz'tshwan. That which comes from the irst named place is known as Schensi rhubarb and btains the highest price, notwithstanding that the inhabitants of Sz'tshwan are convinced that they produce a better sort. In the western part of the plain of Tshing-tu-fu a kind of rhubarb is cultivated n the fields; but it is far inferior to the wild plant which does not allow of cultivation, and resembles that which is produced in the frontier hills between Sz'tshwan, Hupe and Shensi.

Evidently, therefore, the rhubarb plant is distributed through an immense tract of country in the central provinces of China; it is consequently quite possible that several species yield the same drug.

Von Richthofen's statement that the best sorts are obtained from wild plants is remarkable, as formerly it was generally accepted that the plants were cultivated. The contradiction is probably explained in a letter received by Collin* from the missionary Biet in 1871, according to which the rhubarb plant succeeds best, at any rate in Upper Tibet, in the land richly manured by cattle surrounding the mountain huts and stables. The same thing may be said of *Rumex alpinus*, so nearly allied to the species of *Rheum*, in the mountains of Germany, where it grows most luxuriantly in such land, although it is not the subject of special culture.

In 1870, the apostolic vicar Chauveau reported from Tibet that the export of rhubarb from that land had almost ceased, and that nobody cultivated it. It appears, therefore, that the principal seat of the rhubarb production must be considered still to lie in regions mentioned in the middle ages. The natural central point for its export is the city of Hankow in the province of Hupe, on the upper Kiang, or Yan-tse-Kiang. Nevertheless the yearly export from Hankow to Shanghai does not exceed 250,000 kilos, and it is probable that the general consumption of the drug is falling off.

From the foregoing Professor Flückiger draws the following conclusions:—

(1) In *Rheum officinale*, we possess for the first time a plant the rootstock of which agrees with the true rhubarb.

(2) This kind grows in Tibet, the north east district of which probably formerly yielded good rhubarb, but appears to do so no longer.

(3) Whether *Rheum officinale* occurs in Sui-tschuan, Schensi and Kansu, from which provinces the true rhubarb is obtained, remains to be seen.

(4) Also, we require more exact information respecting *R. palmatum*, var. *Tanguticum*. The official rhubarb formerly came from the provinces mentioned under (3), at one time by land, at another through Canton, reaching the sea at Ormuz, Syria, Asia Minor or South Russia, according to existing political relations.

(5) Only when China became more accessible this drug took its natural way to Hankow, the chief market of the Chinese interior, and from thence to the sea.

MORTAR PRACTICE: A FEW NOTES ON CONTUSION.†

BY H. T. CUMMINGS, M.D.

The United States Pharmacopœia gives great prominence to the subject of drug powdering, defining in all its formulas the fineness of the power required in carrying out the processes and reaching the results aimed at. And this is especially noticeable in the various receipts for tinctures, syrups, and fluid extracts. The range of fineness comprised in these formulas extends from drugs' comminuted sufficiently to pass through a sieve of twenty meshes to the linear inch, which is the coarsest powder, and is designated as "*coarse*," to that fine enough to pass a sieve of eighty meshes to the linear inch, which is designated as "*very fine*." An admirable idea, this, for now one knows how to arrive at fine, moderately fine, coarse, moderately coarse, etc., and these terms have no longer a vague signification, but can be brought to the test of the rule and compasses.

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* 'Pharmacographia,' pp. 443–445.

* 'Des Rhubarbes' (Paris, 1871), p. 24.

† From the 'Proceedings of the American Pharmaceutical Association,' vol. xxiii.

Considerable difference of opinion exists among eminent practical pharmaceutists as to the fineness of powders requisite to secure the best results. While Dr. Squibb, of Brooklyn, insists that the finer the powder the more perfect is its exhaustion by appropriate menstrua, as in the case of buchu and cinchona, Mr. Campbell, of Philadelphia, deems the labour of obtaining these fine powders for percolation as thrown away, and regards a powder which will pass a sieve of forty meshes to the inch as sufficiently fine for all practical purposes. But whichever is right, it is clear that no Procrustean rule can be made to cover all cases, the structure and constitution of drugs requiring some difference in treatment for every individual in the materia medica; and, moreover, that where any considerable expenditure of muscle and nerve-power is required, we shall find comparatively few willing to incur it, as all men naturally shrink from taking their share of the divine prescription, "In the sweat of thy face shalt thou eat bread," regarding it rather as a curse to be shunned than as a blessing in disguise. Nevertheless, in all pharmacies, well regulated or otherwise, more or less of this work has to be done, and the writer believes that in detailing to some extent the results of his experience and observation in this connection, he may benefit some apothecary or his *élèves*.

The apparatus employed in drug powdering on the small scale includes the mortar and pestle, the mortar-block and its supports, and the sieves. Of hand-mills I say nothing, for, although very useful for coarse grinding, my experience with some mills in the production of fine powder has not been of a nature to encourage me to make further investments or trials in that direction. An hour's labour in turning the flywheel is far more exhausting to the system generally than four hours' labour with a ten-pound pestle. I speak knowingly, for I speak from experience.

The mortar, then, when employed for the contusion of refractory substances, is almost universally made of iron. There are two forms of this utensil in the market. The bell-shaped mortar has a solid base resting throughout upon the block. The goblet shape has a foot which leaves a portion of the bottom of the mortar unsupported, and apparently ill-calculated to resist a powerful blow from the pestle; yet one of this shape which I have in use has seen pretty hard service and gives no signs as yet of failing.

The discussion of the relation between the form of a mortar and pestle, and the yield of powder from the drug under comminution, would be an interesting question, but comparative experiments have yet to be instituted to determine the best one. Rather more easily settled is that of its capacity. This should be as great, and the weight of the pestle should be as much as the operator can well manage without undue fatigue or exhaustion. No doubt one would be tired at the end of a two hours' hammering if his pestle did not weigh over a pound, but there is no question that he would be better suited, even at the expense of a little more fatigue, to have something to show as the result of his labour. The writer has used a mortar holding seven quarts, and an eight-pound pestle; and on one occasion a two hours' pounding gave five and a half pounds of buchu powdered fine enough to pass a sieve of forty-one meshes to the linear inch. And I am led to believe that a mortar of the capacity of eight to twelve pints, and a pestle of seven or eight pounds weight, will be the most convenient and effective means of producing powders where the quantities required fall within a pound avoirdupois.

An interesting question has suggested itself to me as to the life of a mortar, that is, the number of blows from the pestle it will endure before taking on the crystalline structure, the formation of a crack which gradually extends around the mortar just above the base, until finally the upper part forming the wall of the mortar is separated from the bottom. This has happened to three mortars which have been in my possession. As to two of them, I had no means of knowing how long they had been in use, or the kind of usage they received; but the third, which was larger than either of the other two, holding about a gallon, was carefully treated, and subjected only to its legitimate use. From a careful count of the blows of the pestle upon the charges in several operations, I am inclined to the belief that it received two hundred and fifty thousand blows before breaking.

Another circumstance attending this fracture attracted my attention, and that was the great lightness of the base after the top had been removed, and the superior ease of emptying the mortar, which suggested the query whether it would not be a good scheme to make mortars with the top removable by simply lifting it off. An objection to this might be urged that in a mortar so constructed the top might be thrown off by the jar of the pestle; but in practice it has been found that a pretty violent blow, or a succession of rapid and hard blows, is required to displace the top when simply laid upon the base, especially if supported by the hand. Moreover, if the joint between the upper part of the mortar and its base should be made with a good rebate, or "rabbit," as mechanics pronounce it, it seems to me that there would be little or no trouble from fair blows delivered at the bottom.

An adjunct to the mortar, which is by no means of trifling importance, is a flexible cover of conical shape, variously termed hood, cap, or apron. This is far superior to the sheet-iron or wooden covers, with a perforation in the centre admitting of but limited play for the pestle, which are occasionally seen. It is best made of flexible leather, or strong, closely woven duck, though I have used, with good results, one made of stout, ordinary sheeting, which lasted well for more than a year. The form of the hood, as stated above, is conical, and should have a binding, some inch or two in width, sewed to the base, and if a strap and buckle are attached to fasten it tightly around the rim of the mortar, so much the better. At the upper part of the cone a similar binding should be placed, with an aperture sufficiently large to permit the passage of the upper end of the pestle, and is grasped by the hand which is lowest during the act of striking. Thus made, it is as much superior to a towel wrapped round the mortar and pestle, or similar expedient, as anything made for a definite purpose is superior to any makeshift. The uses of this addition are obvious enough, as the confining of dust, or of particles of the substance under the pestle from being projected from the mortar. Its height should be sufficient to allow the operator to raise the pestle as high as ever will be done in ordinary work, and to afford him full scope therein.

The hood, as above described, may be, and perhaps can be better cut out by the pharmacist himself than by an outsider who is unaquainted with the required conditions of the case. A good rule for this is as follows: Measure the circumference of your mortar around the rim. Determine the highest lift you are likely to make of your pestle in ordinary work. With this latter quantity as a radius, you draw a semicircle. Draw a line from the centre of your semicircle to its commencement point, and from that point measure off a distance upon the circumference equal to the circumference of your mortar. In the arc thus obtained take three or more points equidistant from each other and from the extremities, and draw radii from the centre, which will divide the sector of the circles into four or more equal parts, and you have a pattern which will exactly fit your mortar. It is best to measure a little more than the circumference of the mortar, in order to allow for seams in sewing the gores thus obtained together. This pattern might be cut out in one piece, and when the mortar is sufficiently small t admit of it, I know of no objection to its being so done, except one on the score of economy of material. Let us suppose, for instance, that the circumference of our mortar is thirty-four (34) inches, and that in ordinary work with the pestle the highest point to which it will be lifted in any stroke is sixteen (16) inches. We take this sixteen inches as a radius, and draw a semicircle. Upon this semicircle we measure off the thirty-four inches, and two (2) inches additional to allow for seam, and it will be found that less than half the circle is required to fulfil the conditions, and secure a perfect fit. This is divided into four equal parts, making a pattern, which measures nine inches at the base and has a height of sixteen inches.

The mortar-block next claims our attention. The main requisites in this part of the apparatus are size and steadiness. The material does not appear to be of so much consequence, for while hard wood is almost always sought, I have had one made from a piece cut from the end of a pine stick which was employed for a ship's mast. This block is eighteen (18) inches in diameter, and thirty (30) inches high. It has served an excellent purpose, and I do not think it could have been any better had it been of oak or maple. The mortar-block should be of full size to receive the base of any mortar likely to be used upon it, and a good addition is an iron hoop around the top which shall rise above the surface, say half an inch. The hoop should be well secured to the top by being shrunk on, as well as by nails or screws. This will prevent the mortar from working over the edge of the block under the action of the pestle. Most mortar-blocks that I have seen have been left in the rough, but within the last twenty years I have had three made, and all of them have been turned to shapes something like those figured in Mohr and Redwood, and Proctor's Pharmacy, and they have been rather an ornamental part of the furniture of the "back shop."

The situation of this part of the apparatus is not at all a matter of indifference. It should have a good strong light upon it by day or night. Its position is likely to be permanent if used according to the directions of the Pharmacopœia, that is in furnishing powders for percolation, and nothing is more discouraging than working in a dusky, ill-lighted corner, where it is impossible to see what one is doing; where one works at random, knowing nothing whether he makes a hit or miss, unless he scores upon his fingers, when the work may be thrown aside in disgust with that kind of counting. A good light is quite as necessary in the simple operation of pounding as in any other pharmaceutical manipulation whatever.

Having secured a good light for your mortar, the next thing is to see that its foundation rests upon the earth, and that it is not supported by the floor of the shop. There are two disadvantages in the latter form of support, of which the first and most obvious is the jarring and derangement of the goods and furniture of the shop, and even considerable breakage and other damage may be caused by it; the second is the loss of power, or rather of effect, by the yielding of the floor to every blow. If the pharmacist possesses a well-lighted cellar with a cemented floor, he cannot have a better place for his mortar-block. If he has not this convenience, let him lay a broad flat stone in the earth at the bottom of his cellar, as level as possible, then upon this set a stick of timber at least six inches square, and long enough to come fully up to the surface of the floor of his shop, and upon this set his mortar-block. A pin or bolt about a foot long set for half its length in the supporting timber, and half in the axis of the block, will serve to keep the latter in place while powdering is going on. And thus arranged all is steady, no trouble to goods or furniture, and every thwack of the pestle tells upon the drug under comminution with full effect.

(To be continued.)

THE PREPARATION OF DEXTRINE-MALTOSE (MALT-SUGAR) AND ITS USE IN BREWING.*

BY WM. GEO. VALENTIN, F.C.S.

Royal College of Chemistry, South Kensington.

(Concluded from page 850.)

The next set of bodies with which we have to deal are the so-called "saccharines" or "glucoses," etc., produced by the action of sulphuric acid on starch or starchy substances—rice, maize, etc. One firm advertises these substances as "saccharine," containing—

Grape Sugar	83·65	per cent.
Moisture	14·81	"
Ash and loss in analysis . .	1·54	"
	100·00	

Another, as "patent grape sugar;" a third, as "maize saccharine;" a fourth, as "malt saccharine;" and so on.

It is only necessary to understand the action of ferments on starch, to infer pretty closely what all these bodies are, and, knowing this, we have only to look at the analyses of the wort and hopped beer given above, to arrive at a pretty fair notion as to the value of these bodies to the brewer. They are all sent to the brewer in the form of light brown to perfectly white, not brittle, lumps or chips. They can be cut with a knife, and they break with a rough fracture.

I subjoin the analyses of five samples of saccharines, from different makers:—

Sample No. 1.—Rather brown; very hard; English manufacture.

Sample No. 2.—Pale straw colour; softish; French manufacture.

Sample No. 3.—Rather white; somewhat hard; English manufacture.

Sample No. 4.—Rather white; somewhat hard; German manufacture.

Sample No. 5.—Whiter; somewhat hard; German manufacture.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Glucose . . .	80.0	58·85	67·44	63·42	61·46
Maltose . . .	None.	14·11	10·96	13·50	13·20
Dextrine . . .	None.	1·70	None.	None.	None.
Neutral carbohydrate, with a little albuminoids . .	8·2	9·38	4·30	8·40	8·60
Ash	1·3	1·40	1·60	1·50	1·60
Water	10·5	14·56	15·70	13·18	15·20
Total	100·00	100·00	100·00	100·00	100·00
Total solid matter	89·5	85·44	84·30	86·82	84·80
Percentage of matter of use to the brewer	80·0	74·66	78·40	76·92	74·60

These analyses require little explanation, and very little comment of any kind.

The glucose is of the $C_6H_{12}O_6$ type, and yields only 48 per cent. to 49 per cent. of alcohol on fermentation; that is, 105 parts of it are only of the same value to the brewer in producing alcohol for his beer, as 100 parts of cane sugar or maltose. From this and the low percentage of fermentable matter which these saccharines contain, it is obvious of what little value they are to the brewer, especially when it be considered that he has to pay duty on the total weight, water included.

Four out of the five contain maltose, and only one contains a small percentage of dextrine.

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* Paper read before the Chemical Section of the Society of Arts, and reprinted from the *Journal of the Society of Arts*, March 24, 1876.

The neutral carbohydrates are useless to the brewer, for although they increase the specific gravity of the beer, they are devoid of taste and "body-giving" properties. They, under no condition, yield alcohol, and cannot be converted like dextrine by the slow and gradual action of the beer into bodies capable of yielding this substance. My time will not allow me to pursue the consideration of these inert bodies.

If the analyses of these saccharines be examined and compared with that of the malt-wort given above, it will be seen that they have only one constituent in common, viz., maltose, and this exists in the saccharines in such small quantity as to be of little consequence. It will be noticed also that the malt-wort contains a small proportion, 1·6 per cent. of non-fermentable carbohydrates, other than dextrine, but this, like dextrine, is capable of complete conversion into fermentable sugar by the slight acid action of the beer, and infinitely more rapidly than that body. In an old beer it is almost altogether absent, whilst the "body-giving" dextrine remains almost intact. These carbohydrates of the malt-wort are the low ones of the $C_6H_{10}O_5$ type, and not the high ones (contained in the saccharines) of the $C_6H_{14}O_7$, etc., type.

The latter may be looked upon as the result of a chemical reaction, which has gone too far, *i.e.*, the continued assimilation of water molecules has given rise to non-fermentable bodies.

A consideration of these facts, a knowledge of the action of malt-extract on starch, and the discovery that the same reaction takes place with sulphuric acid, within certain easily definable stages of the process, led us to the idea that a substance could be produced from the starch of rice, maize, etc., by the action of an acid which would have the same composition and properties as that derived from the starch of malt by the mashing process in the manufacture of beer, and thus render the cheaper grains, such as rice, etc., more available and suitable for brewing operations. This substance is dextrine-maltose. A slight consideration of its composition and properties will show at once its great superiority over all other malt substitutes offered to the brewer.

It contains in 100 parts in round numbers :—

Maltose	67
Dextrine	33
	100·0

Maltose yields the same proportional quantity of alcohol as cane sugar does, and the alcohol it yields is, in flavour, as far superior to the raw alcohol of the glucose of the saccharines, as that of the fine malt whisky is to potato spirit. In fact, the fine flavour of malt spirit is due to the fermentation of maltose, and that of the so-called potato spirit to that of glucose. This is another reason why the saccharines have not come into more general use. If we go back to the analysis of the most carefully prepared wort of pale ale, we find that it contains maltose 6·7 grams in 100 c.c. ; dextrine 3·3 grams in 100 c.c., and as these substances, within certain limits, are the most important to the beer, it will be easily seen that we can increase them, without in any degree altering the character of the beer, either in composition, colour, or in flavour, by the addition of a proportion of dextrine-maltrose. It will be seen, too, that fermentability of the beer is not materially changed. 64 per cent. of its solid matter is fermentable, whilst 67 per cent. of the solid matter of the proposed substitute "dextrine-maltose" can yield alcohol in the first stages of the brewing process. Thus it is obvious, too, how by its use the proportions of albuminoid matter in the beer can be reduced without changing the fermentability of the liquid. There is far more yeast-forming albuminoid matter in malt-wort than is required to ferment its saccharine constituents, and an addition of dextrine-maltose in varying proportions will have the additional effect of removing a further quantity of this yeast-forming matter from the beer before it goes into the casks.

Manufacture of Dextrine-Maltose.

The process which we have adopted is a close imitation of the transformation process which the starch of malt undergoes during a properly conducted mashing process ; only instead of making use of the converting action of the soluble albuminoid bodies found in malt, we employ dilute sulphuric acid, in order to effect the conversion of the starchy matter found in rice and other grains, and we arrest its converting action, as soon as the requisite proportion of dextrine and maltose, which, I have shown you to be present in properly mashed malt, has been reached.

The opinions held by chemists, even within more recent years, have varied considerably regarding the actual nature and proportional quantities of the products of transformation found in malt-wort. The French chemist, Musculus,* who may be said to have made starch and sugar his special study, thought that the starch molecule consisted of $C_{18}H_{30}O_{15}$ and was disolved by diastase, with assimilation of water, into one molecule of glucose, and two molecules of dextrine, according to the equation:—

$$\underbrace{C_{18}H_{30}O_{15}}_{\text{Starch}}+\underbrace{OH_2}_{\text{Water}}=\underbrace{C_6H_{12}O_6}_{\substack{\text{Glucose}\\ \text{(one third)}}}+\underbrace{2C_6H_{10}O_5}_{\substack{\text{Dextrine}\\ \text{(two thirds)}}}$$

Another eminent French chemist, Payen,† contested this view, and held that more than 50 per cent. of glucose formed, and that diastase possessed the power of converting dextrine likewise into glucose, but that the conversion ceased as soon as a certain quantity of sugar had been produced. This he thought of proving by the fact that in the alcoholic fermentation, the dextrine is acted upon by diastase, and the conversion recommences, as soon as the sugar, previously formed, has been converted into alcohol and carbonic acid.

A German chemist, Schwarzer,‡ agreed with Musculus' view of the splitting up of the starch molecule, but differed from him in supposing that dextrine is formed first, then sugar, and that the reaction ceases when definite equivalent proportions have been produced. He also held that the product obtained when the reaction takes place above 65° always contained less sugar than that produced at a lower temperature. Above 65° to 70° C. the proportion he stated to be as one mol. of glucose to three mol. of dextrine, below 60° C. as one mol. to one molecule.

I mention this briefly in order to show that the views held by the chemists of the day, up to a very recent date, regarding the breaking up of the starch molecule were anything but orthodox or concordant. The confusion, as we can now readily see, arose evidently from the fixed idea that the sugar formed was glucose.

With the discovery of maltose, and the clear definition of its character and properties, the difficulty altogether disappeared. This body being a simple compound, reducing only two-thirds as much cupric oxide as glucose, and being totally fermentable, led to the idea that dextrine was fermentable and soluble in alcohol, because the portion of it, if I may use such an expression, which did not reduce cupric oxide was looked upon as dextrine, whereas in reality it was part and parcel of the new sugar-maltose. This is not an isolated case. Lactose, a well-defined body, reduces only as much cupric oxide as $\frac{7}{10}$th of glucose. The other $\frac{3}{10}$ths might just as well be called a dextrine as the one-third was which corresponds to the non-reducing power of maltose.

This conception of a dextrine, soluble in alcohol, or, Gamma dextrine, is but of recent growth. It did not matter that such a dextrine had never been isolated, nor that it ran counter to all the knowledge we possess of the chemical and physical properties of dextrine, such as insolubility in alcohol, total absence of copper oxide reducing power, colloid nature when dialysed, etc. Nor need I have troubled you with this phase of chemical opinion if an attempt had not come to my knowledge, to jeopardize, as I venture to think, a well-earned discovery by manufacturing the all but identical article, which we have called, in accordance with its well established chemical constitution and properties, dextrine-maltose, calling it, however, by the unmeaning name, "dextrum." I must crave your indulgence for having even for a moment detained you with this subject, but I would not pass on without entering a decided protest against this new evolution of the theory on the fermentation products in malt-wort.

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* *Ann. Chem. Phys.* [3], iv. 203.

† *Ibid.* [4], iv. 286.

‡ *Journ. pr. Chem.* [2], i. 212.

That maltose is not a mixture of a mythical dextrine, soluble in alcohol (or of any other known or unknown properties), and of ordinary glucose, has been conclusively shown by O'Sullivan in a paper recently read before the Chemical Society, and submitted through that channel to the chemical world. From among several conclusive arguments brought forward in that paper, I will only quote that when a mixture of dextrine and dextrose is fermented, the dextrose alone undergoes transformation into alcohol and carbonic acid, and the dextrine remains untouched during ten or twelve days even. Again, in a carefully prepared mixture of maltose and dextrose, the latter ferments first, and the maltose remains untouched until the dextrose has entirely disappeared from the solution, and, lastly, when maltose itself was submitted to fermentation it disappears as a whole, and yields 51 to 52 per cent. of alcohol.

I will now proceed to describe as briefly as possible the process and apparatus we employ.

When rice is employed for the purpose of manufacturing dextrine-maltose, it should be husked and finely ground. The rice-meal is first steeped in from one to one and a half times its weight of cold acidulated water, or in water not higher than 40° C., and thoroughly agitated by mechanical means. It is then gradually introduced into acidulated boiling water, in the proportion of 100 parts by weight of rice to 250 by weight of the latter, care being taken not to allow the temperature to fall much below 90° C. The amount of acid—by preference sulphuric acid—may vary. We employ from one and a half to two or three parts per cent. A dilute acid is preferable, for although the converting action is not quite so rapid, it proceeds much more regularly.

The vessel in which the rice-meal is converted consists of an ordinary mash-tun, lined with sheet-lead and provided with steam coils and a stirrer.

As soon as the rice has become thoroughly diffused throughout the boiling water, a rapid conversion is observed. The liquid boils up briskly, and the steam has to be checked for a while to prevent its boiling over. This action is evidently owing to a chemical change. The rice paste becomes rapidly thinner, when kept at a boiling temperature for about an hour or an hour and a quarter. It is best and most expeditiously tested by neutralizing a sample with baryta-water or chalk, filtering and examining the clear solution by means of the polariscope.

The conversion may be considered complete when the rotatory power is + 171° or thereabout, indicating two parts of maltose (rotatory power + 150°) and one part of dextrine (rotatory power + 213°), *i.e.*

$$\frac{2 \times 150^\circ + 213^\circ}{3} = 171^\circ$$

By always infusing the same quantities of rice-meal and keeping up the same temperature, it is possible, after a few experiments, to dispense with the polariscopic determination altogether, and to obtain a liquor containing the proportionate quantities of dextrine and maltose, as they are found in malt-wort. The acid liquor is then carefully neutralized with good chalk to the extent of about 90 per cent., finishing off with milk of lime. This operation can be carried out with the greatest delicacy. It is preferred to leave the liquor, however, rather a trifle acid than alkaline. The strength of the liquor, after filtering off the grains and the gypsum through Taylor's filtering bags, usually amounts to 1115 to 1125, or 30 to 32·5 per cent. of solid matter, *i.e.*, about double the strength or original gravity of malt-wort required for brewing strong ales. It is of a light amber colour and filters very readily. It is next evaporated either in an open pan, or with greater advantage in a vacuum pan, to a concentration of about 1200, or about 52 per cent. of solid matter. A little more gypsum and a little flocculent albuminoid matter are at this stage best separated by filtration, and the concentrated liquor finished off in a properly constructed vacuum pan, or in an open steam-jacketed pan, provided with an agitator, till it acquires a stiff viscidity. It is then run off hot into forms and cast into cakes of convenient weight, which on cooling, set hard, and are ready to be sent to the brewery. 78 to 80 per cent. of the starch in rice, in fact every particle, can be converted into dextrine-maltose.

The cost of manufacture, as you will perceive from the description, is not more than 25*s.* to 30*s.* per ton.

It is obvious, however, that there would be a considerable advantage arising to the brewer if, by an alteration of the present Excise laws, a concentrated solution of dextrine-maltose could be employed. As the law stands at present, I am informed, no saccharine matter—in fact, no fermentable substance of any kind—is allowed to enter a brewery in a liquid condition. This law presses all the more harshly upon dextrine-maltose, as this particular saccharine material could be readily obtained in the form of a concentrated liquid containing as much as from 75 to 90 per cent. of solid dextrine-maltose, in which form it could be kept as easily as any solid sugar.

I have no doubt there will be a time coming when these laws will be altered, and when the brewer will manufacture his dextrine-maltose as easily as he now infuses his malt, and will run it into the coppers, together with the proper proportion of malt-wort.

I need not trouble you at this late hour with any comparative statements as to the cost of production. Knowing as you all do the cost price of rice, maize, etc., and being now familiar with the mode of manufacture, you will be able to make out your own estimate. Considering, however, that we can offer to the brewer a malt substitute containing 95 per cent. of solid available matter, the saving upon Excise duty must constitute an additional recommendation. I have therefore no hesitation in saying that our dextrine-maltose (for the manufacture of which I have made arrangements with Mr. John Schwartz, sugar refiner, Pelham Street, Mile End New Town) will be found to be the cheapest and most suitable malt substitute ever brought under the notice of brewers.

The objections sometimes raised by brewers to the use of saccharine substitutes for even a partial replacement of malt in brewing cannot be urged against the perfectly natural and legitimate substitute which we have called dextrine-maltose. It must be held to be quite a legitimate object for investigation, based upon correct scientific principles, and guided by experience, to solve the question what materials are capable of at least partially replacing malt in brewing, so long as the character and composition of the beer does not suffer thereby. In how far we have succeeded in doing this I may leave you to judge.

In conclusion, I will now only call your attention to the results of the brewing experiment which Mr. O'Sullivan made, and of which I have bottled specimens on the table for your inspection.

NOTE ON THE EXAMINATION OF WHISKY AND OTHER SPIRITS, FOR MYTHYLATED SPIRIT AND FOUSEL OIL.*

BY A. DUPRÉ, PH.D., F.R.S.

A.—Examination for Methylated Spirit.

Now and then we hear of a whisky supposed to be adulterated with methylated spirit. I myself have had several such suspected whiskies to examine, but failed to detect such an adulterant. My belief is that such adulteration is extremely rarely if ever practised, and that most, if not all, of the cases reported are based on an error in analysis.

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* Read at an ordinary meeting of the Society of Public Analysts, held on Feb. 16th, 1876. From the *Analyst.*

Under these circumstances, I have thought it might be of interest to other analysts to describe the method I have adopted for some time past, for testing spirits suspected of being adulterated with methylated spirit. Five fluid ounces of the suspected spirit are distilled twice, having been rendered alkaline the first time, and acid the second time, about two-thirds being distilled over each time. The distillate is now shaken up with dry potassium carbonate, and after standing over night the upper layer is taken off by a syphon or pipette, and again twice distilled, about half an ounce being driven over this time. This last half-ounce will be found to contain any methylic alcohol present in the original five ounces.

All the distillations should be conducted in an apparatus having the receiver connected air-tight with the condenser, and furnished with a mercury valve, allowing of expansion and contraction of the air, but presenting loss by evaporation during the distillation. About one-third of this distillate is now diluted to a strength of from 10 to 15 per cent. by the addition of distilled water, or 70 fluid grains are made up to about 500. In this diluted spirit the alcohol is now determined, 1st, by specific gravity; 2nd, by means of Geissler's vaporimeter; and 3rd, by oxidation into acetic acid, and volumetric estimation of the latter.

With pure alcohol, all three methods give results which should agree to within at least one-tenth of a per cent. If, however, any appreciable amount of methylated spirit is present, the results will differ more or less widely.

The specific gravity will give the total amount of both alcohols present, the specific gravity of aqueous methylic and ethylic alcohols being almost identical. Geissler's vaporimeter will, however, now give a higher result, the higher the more methylic alcohol is present, this alcohol having a lower boiling point than ethylic alcohol, or, at the same temperature, a higher vapour tension.

On the other hand, the oxidation process will yield a lower result, since the methylic alcohol, when completely oxidized by sulphuric acid and potassium dichromate, yields only water and carbonic anhydride, which, of course, is not estimated volumetrically. This process will therefore indicate only the ethylic alcohol present in the mixture, and the difference between the strength thus found and that derived from the specific gravity, gives a rough indication of the proportion of methylic alcohol present.

When pure aqueous alcohol is oxidized in this manner in a closed flask, it will be found on opening the flask after cooling, that if anything, a slight vacuum has been produced in the flask. If, however, any appreciable mount of methylic alcohol is present, it will be found that, on opening the flask, a slight escape of gas takes place, owing to the carbonic anhydride produced.

For details of the method of oxidation, I must refer you to the work on wine, by Dr. Thudichum and myself (page 207). Should the presence of methylic alcohol be indicated by this process, the remainder of the half-ounce may be employed for confirmation by other tests, such as production of methyl aniline-violet, or oxalate of methyl. The method, however, will, I think, be found valuable chiefly as yielding very strong negative evidence, and when once one gets accustomed to it, it is very easily worked, much more so than might perhaps appear from my description of it.

In conclusion, I will give two experiments, showing the working of the process.

Firstly. A pure whisky, when treated as above, gave the following results for the diluted final distillate :—

Strength by specific gravity	9·83	per cent.
„ „ vaporimeter	9·75	„
„ „ oxidation	9·75	„

A portion of the same whisky was now adulterated with 10 per cent. of ordinary methylated spirit and again tested. The final diluted distillate now gave :—

Strength by specific gravity	10·08	per cent.
„ „ vaporimeter	10·45	„
„ „ oxidation	9·50	„

The differences between the three estimations are, as will be seen, so great, that we are justified in concluding that as small an addition as 2 or 3 per cent. of methylated spirit would be distinctly recognizable, and that at all events, as much as 5 per cent. could not possibly be overlooked.

B.—Testing for Fousel Oil.

From time to time, a certain amount of commotion is produced in the public mind, by alarming statements regarding the presence of fousel oil in spirits, and its alleged maddening effect on consumers of such spirits, and analysts have even been found certifying certain spirits to have been adulterated with fousel oil. Now in the first place I am not aware that any perfectly trustworthy evidence exists of the alleged injurious effects of fousel oil, and secondly I believe it is utterly absurd to suppose that any spirit is ever in any proper sense of the word, adulterated with fousel oil. Nevertheless the subject is an interesting one, and as I have not seen any process described for the detection and approximate estimation of the small quantities of fousel oil, such as are usually found in spirits, I venture to bring the following method which I have employed for years past for this purpose before this society, without wishing to claim any special novelty for the process.

Fousel oil, as is well known, consists of a mixture of various of the higher homologues of ethylic alcohol, all or most of which, when oxidized by means of sulphuric acid and potassium dichromate, yield their corresponding acids, and these latter are much more readily separated than the alcohols.

Upon this fact the method is based. An amount of spirit containing from one to two grammes of alcohol, previously distilled if necessary, is oxidized in a closed flask by means of sulphuric acid and potassium dichromate, care being of course taken to have an excess of this mixture in the flask. I usually digest the mixture in the flask for two hours in a water-bath.

When cool the flask is opened, the excess of dichromate present reduced by zinc, and the acids produced are distilled off (see the work previously quoted). The acid distillate is now neutralized with a standard solution of normal soda, the solution is evaporated to a small bulk and transferred to a retort. An amount of normal sulphuric acid equal to one twentieth of the normal alkali used is now added, and the contents of the retort are distilled to dryness in an oil-bath; the temperature being allowed to rise to about 130 deg. C. Water is now added and a further addition of one-twentieth proportion of normal acid is made, after which the contents are again distilled to dryness. These two distillates may be collected separately, but I prefer to collect them together. It is advisable to add some water to the dry residue in the retort, and again distil to dryness repeating this addition of water and distillation three times after the second addition of acid. The acid distillate which contains all the acids higher in the series than the acetic acid, together with a proportion of this latter, is now neutralized by means of pure carbonate of barium, the solution is boiled, filtered, evaporated to dryness, the residue dried at 130 deg. C. and weighed.

The amount of barium contained in the salt is now estimated in the usual way by conversion into the sulphate. We now have the necessary data for calculating the amount of fousel oil contained in the spirit under examination, on the assumption that it consists either of amylic alcohol or of any other alcohol that may be supposed to be the chief impurity present. The real amount present cannot of course be obtained without a knowledge of the exact nature of the acids produced, but even this can be accomplished according to Ducloux (*Compts. Rénd.* lxxviii. p. 1160), by submitting the mixture of acids to fractional distillation, and estimating the proportion of acid which does over with each fraction.

In conclusion, I will give the analyses of a few spirits by the foregoing process.

A sample of Scotch whisky, strength 54·5 per cent. by weight in volume was found to contain 0·108 per cent. amylic alcohol (Ba in $\frac{1}{10}$ acid 53·49 per cent.)

The same spirit submitted to a process of purification gave no trace of fousel oil. (Ba in $\frac{1}{10}$ acid, 53·73 per cent.)

A sample of "cape smoke," strength 35·75 per cent. by weight in volume was found to contain by weight in volume 0·089 per cent. amylic alcohol. (Ba in $\frac{1}{10}$ acid, 33·39 per cent.)

A sample of "samsho," strength 21·51 per cent. by weight in volume, contained 0·04 per cent. amylic alcohol. (Ba in $\frac{1}{10}$ acid 53·46 per cent.)

A sample of fine "samsho," strength 24·49 per cent. by weight in volume, contained 0·033 per cent. amylic alcohol (Ba in $\frac{1}{10}$ acid 53·42 per cent.), calculating in each case the proportion of amylic alcohol to 100 ethylic alcohol we get—

Scotch Whisky	for 100	ethylic	0·19	per cent.	amylic alcohol.
Cape Smoke	,,	,,	0·24	,,	,,
Common Samsho	,,	,,	0·18	,,	,,
Fine ,,	,,	,,	0·13	,,	,,

EXAMINATION OF WHITE AGARIC. (POLYPORUS OFFICINALIS).*

BY G. FLEURY.

Five hundred and eighty grams of the powdered fungus, not previously dried were exhausted successively with ether, alcohol, cold water, boiling water, water acidulated with hydrochloric acid, and water rendered alkaline with potash; and the resulting solutions were examined:—

1. The ether extracts a resin, and a body to which the name of *agaric acid* is given. The examination of several salts of this acid yielded results so discordant that no definite formula could be obtained, but the nearest approaches to accuracy lead to the supposition that its formula may be $C_{24}H_{44}O_7$. Efforts made to determine the basicity of the acid were unsuccessful. It is shown that the addition of the elements of water to the resin represents the composition of the agaric acid. After heating with very dilute sulphuric acid, a substance is yielded which reduces the cupro-potassic liquor. The agaric acid amounts to about one-fifth of the weight of the fungus.

2. The alcoholic solution has a very red colour, due apparently to the air, and on evaporation yields a residue of the consistence of hard wax, from which ether dissolves a resinous body soluble in alkaline liquids; its reaction is acid, it is not crystallizable, and it contains 1·5 per cent. of nitrogen. It combines with metallic oxides. The remainder behaves like a resin; it is reddish, nitrogenized, fusible below 100°, forms viscous solutions with alkalies, and gelatinous precipitates with other bases.

3. Cold water yields a red solution which on concentration deposits calcic and possibly also magnesic oxalate in microscopic crystals, while the solution contains a brown, resinous, nitrogenous body, considered to be identical with Boudier's viscosin.

4. Boiling water extracts a small quantity of a nitrogenous substance.

5. Water acidulated with hydrochloric acid (2 per cent.) yields a yellowish solution containing lime, iron, magnesia, and oxalic, phosphoric, and malic acids.

6. Water containing 2 per cent. of potash yielded a solution which, on treatment with hydrochloric acid, deposited a flocculent substance unacted upon by acetic or phosphoric acids, and containing 3·12 per cent. of nitrogen.

The remainder after this treatment, is a whitish flocculent substance; on drying at 100° it blackens and coheres; yet its microscopic appearance does not differ from the original aspect of the fungus. It contains 1·21 per cent. of nitrogen, and affords on calcination 2 per cent. of ash containing lime, iron, magnesia (chiefly), potash, and sulphuric, and phosphoric acids. The body possesses all the properties of fungin.

The following is the tabulated result of the analysis:—

Water	9·200
1. Resin and agaric acid	60·584
2. Another resin with magnesic sulphate .	7·282
3. Resinous body with lime and magnesia .	2·514
4. Nitrogenous substance with salts . . .	1·900
5. Oxalate, malate, and phosphate of calcium, iron, etc.	1·058
6. Nitrogenous substance soluble in potash .	7·776
Fungin	9·686
	100·000

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* From the *Journal of the Chemical Society*, March, 1876. (J. Pharm. Chim. [4], xxi., 279—284).

'THE TIMES' ON CO-OPERATION.

The following interesting article on Co-operation appeared in the *Times* of the 20th inst. :—

"The Co-operative Congress, which is now holding its annual meeting in Glasgow, must be very unlike other bodies of the same kind if it is entirely satisfied with the tone of the opening address. Such an association is understood to expect that its president shall do honour in a strain of all but unbroken eulogy to its objects and its machinery. No one better fulfilled such an expectation than Lord Brougham in the series of astonishing discourses which invited the Social Science Association to reform all the institutions of mankind. But Professor Hodgson has carried a somewhat different idea of presidential duty to the chair of the Co-operative Congress. There is much to be praised in his manly and intelligent discourse, but some parts of it must have chilled the heated fancies of the assembled reformers. He did not say a word against so excellent a system as co-operation, and, indeed he praised it highly; but he gave, to say the least, a very prosaic account of its possibilities, and he did not go far with those philanthropic seers who foretell that it will change the face of society. Twenty years ago Professor Hodgson himself, perhaps, would have pitched his expectations somewhat higher. At least, a loose school of political economists, and some boisterous hangers-on, were once in the habit of speaking as if the principle of co-operation were a momentous discovery, worthy to be named in the same rank as the invention of the art of printing. They appeared to think that it could in course of time break down the barriers between capital and labour, fuse masters and servants into a common mass, abolish pauperism, and thus clear away the chief political as well as social perils which menace the future. They forgot that, if society could be cured of its ills by patent prescriptions it would long ago have been on the high road to the millennium. Devices for the regeneration of mankind have always been abundant. They have sometimes been most plentiful in the most hopeless ages. Many of them have also been without flaw, save in their forgetfulness of the infirmities of human nature. The patrons of co-operation have not always made allowance for the friction which the best system must in practice undergo from indifference, selfishness, ignorance, stupidity, and many other defects which bid fair to last for a considerable time. Co-operation is very useful, but there is no harm in cooling the fevered expectations of its missionaries, as Professor Hodgson has done, with the reflections of good sense.

"One kind of co-operation tries to get rid of middlemen, so that the consumer may directly buy for himself in the cheapest market. Another kind aspires to make workmen their own employers and paymasters. Both systems are founded on the assumption that thus the workman in the one case and the consumer in the other can intercept the large profit which goes into the pocket of an individual capitalist. In both cases the aim is good, since it is an attempt to get rid of useless agencies, and hence to economize wealth. Greater or less success has also attended both efforts. But Professor Hodgson did well to point out the futility of expecting that large profits in any particular business could always be intercepted by the aid of any mere system. Profits which seem to be large are often, he showed, found to be moderate or small when the elements of them are analysed. So much may be reckoned as an average return for capital, and so much as the effect produced by skill of management. In many cases that skill makes all the difference between fortune and ruin, and Professor Hodgson would term the profit which it brings a salary for intellect or industry rather than a return for capital. There can be no objection to such a division so long as we remember that the "salary" thus earned in one generation may become an inheritance in the next. But it is quite true that the "salary" cannot always be divided among a multitude of co-operative partners by the mere displacement of an individual capitalist, for he himself, and not his capital, may have been the chief spring of success. The late Mr. Brassey and the late Mr. Stewart, of New York, made immense fortunes by industrial enterprise; but it would need a robust faith to believe that the business of either would have been equally profitable for a single month if it had been converted into a co-operative society. A manager as able as Mr. Brassey or Mr. Stewart would have been needed to guide the colossal machine through the perils of competition and the fluctuating currents of the market. Such a manager cannot be fished up at any moment by means of a mere advertisement. The probability is that the consciousness of his own powers would prompt him to go into business on his own account. Nor would the difficulty be at an end if he were to be found and handsomely salaried. In many cases he must be made as despotic as if he were at the head of an army, and the very last thing that an uneducated society will do is to put blind trust in one of their own servants. Suspiciousness is one of the most common accompaniments of ignorance, and it is well known that many of the humbler co-operative societies have been ruined by the refusal of the uneducated members to allow the manager due freedom of discretion. Nor have the leaders of a miscellaneous mob of shareholders the same intense inducements to watch every turn of the market, and to think of new devices, as a few capitalists who have each a great stake in their business. Nor, again, have English workmen frugality or self-denial enough to set aside immediate advantages for the sake of distant gain. With all their virtues, they are as wasteful as any set of people in the world. Hence they are no sooner made co-operative partners in a great business than their tendency is to clamour for a ruinous division of profits. An interesting experiment of this kind was made in some Yorkshire collieries, but we believe that it has, wholly or partially, failed because the workmen refused to forego the luxury of immediate dividends. When thriftlessness is thus carried into the most delicate operations of capital the end is clear. Thus it is easy to explain the failure of the predictions that the working cotton-spinners would soon take the process of manufacture into their own hands. Their attempts to do so have been few, for the simple reason that they lack the rare moral and mental qualities necessary even to put them on the way to success. The cases of real success have been still fewer for the same reason. Wherever they have held their own against the competition of individual capitalists, the result may be attributed to some rare combination of frugality and intelligence. Such a reflection contains, no doubt, an element of hope. When the artizans of England become as frugal as the peasants of France, as well educated as the workmen of Germany, and as acute masters of the science of profit and loss as the ordinary traders of our own middle class, they may make a wonderful use of co-operation. So beneficent a revolution may be awaited with perfect calmness by the most "bloated" of capitalists, for it would do good to everybody, and it is a long way off. What is needed to secure success is not a change of system so much as a moral change. Co-operation, as Professor Hodgson says, is not a new plan, and, in truth, it is, in one form or other, as old as human society. All social and political machinery is old. When it is successful, nine-tenths of the credit is due to the moral qualities of the men by whom it is worked. The British Constitution itself would be a conspicuous failure in France, and it is a triumph in England chiefly because it is worked by Englishmen.

"The simpler forms of co-operation are, no doubt, independent of subtle moral or mental qualities. Such companies as the Civil Service Supply Association are simply expedients for diminishing the parade, the intricacy, and the temptations of retail trade. As Professor Hodgson said, such a kind of co-operation reduced "the waste of human labour consequent on the needless multiplication of small distributive agences;" "customers being already provided, it saved the heavy cost of sensation-advertising, it afforded safeguards against adulteration, false weights and measures, forged trade marks, and fraudulent dealing. It abolished the evils of small but accumulating credits; it had an educative and socializing influence. It held out encouragement to saving." Professor Hodgson would have tersely summed up the benefits of the system if he had said that, above all things, it habituated the middle class to buy their household necessaries with ready-money. In itself that is a great reform, and the further it goes the better it will be. A vast amount of noxious trade flourishes on a system of needless credit, and the same evil leads to foolish luxury. Much is also saved by the reduction of useless retail agencies, with which buyers can easily dispense by putting themselves to a little trouble. Still greater is the good done to the poor even by the most imperfect systems of co-operation, for the simple reason that by requiring ready money they stimulate habits of thrift and increase the buying power of every shilling. It is satisfactory to know that the co-operative societies have a share capital of £3,653,532; that they do "a ready cash business" to the extent of £14,000,000, and yield a profit of £1,000,000 to their members. These are no mean triumphs. If they fall ludicrously short of many expectations, the cause must be found, we repeat, in those infirmities of human nature which threaten for a long time to defy the skill of social systems and the good intentions of philanthropy."

The Pharmaceutical Journal.

SATURDAY, APRIL 29, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PROVINCIAL COLLEGES OF SCIENCE.

ONE of the greatest difficulties in the problem of supplying facilities for pharmaceutical education in the provinces has been the necessity for providing a complete staff of teachers in several subjects, notwithstanding the too frequently limited number of pupils who present themselves. It is true that this difficulty has been overcome in many cases by the voluntary rendering of unpaid services or of contributions towards the subsidizing of professional teachers. But it is evident that an arrangement open to so much fluctuation is only temporary and artificial, and is no true solution of the question although perhaps the best substitute that at present offers itself.

On former occasions attention has been invited in this Journal to the possibility of good service being rendered to pharmacists in this direction by the establishment of colleges of science in various localities, and it has been urged that it would be well if such schemes met with the active sympathy of pharmacists in their initiation and development. The faintest probability of a time arriving when sound teaching in chemistry, botany, and physic will be available for a moderate payment to pharmaceutical students at all the more important provincial centres should surely meet with the warmest welcome; for the need of making provision for special teaching outside the pharmacy would then be extremely limited. No further apology appears, therefore, to be required for alluding to the present condition of the College of Science recently established in Yorkshire, or to the prospects of the one that it is proposed to establish in the West of England.

On Friday, the 21st inst., the second Annual Report of the Yorkshire College of Science was presented to a meeting of the donors and subscribers in one of the College class rooms at Leeds, and on the whole it was a favourable one. More funds are still required for a site and permanent building, and it is to be hoped they will be forthcoming. Respecting the students, however, the chairman was able to say that the College had been successful in this its first year beyond expectation, the number in the various classes exceeding three hundred, or more than entered Owens College or the Newcastle College during their first or second years. The attendance in the chemistry department, under Professor THORPE, has been:—Lectures, medical, 23; general, 14; Laboratory, 17; Evening Lectures on Chemistry, 18. It is pleasant to be able to add that for this measure of success, according to the chairman of the Council, the College is pre-eminently indebted to the assiduity of the Honorary Secretary, Mr. RICHARD REYNOLDS, whose name is a special guarantee that the educational wants of the Yorkshire pharmaceutical students will not be lost sight of in the College arrangements.

With respect to the College for the West of England it is satisfactory to learn from *Nature*, that "University College, Bristol, is now being incorporated as a company limited by guarantee, under the Company's Acts." The supreme governing body is to be the Board of Governors, which is to comprise all contributors of above £5. The executive Council is to consist of sixteen members, half of whom are elected by the contributors, and half are nominated by various university and other authorities. Here again among the elected members of the first Council is a distinguished pharmacist, Mr. G. F. SCHACHT. Besides aid offered by Baliol and New Colleges, Oxford, the Clothworkers' Company has promised a "hand some subvention" to the College, and a sum of about £20,000 has been promised in Bristol alone. The Council has decided to commence operations in October next, and an advertisement has already appeared announcing the intention of making appointments to a chair of Chemistry and a chair of Modern History and Literature. For the first session or longer the lectures will be delivered in temporary premises, but a site of land for the erection of the College building has been secured. Meanwhile the registered temporary office of the College is Shannon Court, Bristol.

A QUININE QUARREL.

BEFORE the war of secession the United States were importing and exporting cinchona barks largely, and were also manufacturing as well as importing and exporting a considerable quantity of quinine. Under the financial pressure caused by the war a tax of 20 per cent. was laid upon cinchona barks, and 45 per cent. on quinine salts. This heavy tax on cinchona bark at once put a stop to the United States' export trade in quinine, whilst, on the other hand, the enormous tariff on the manufactured article entirely shut out the competition of foreign quinine makers, and the import trade ceased. An attempt was made to establish in New York a quinine manufacturing company in connection with a celebrated French house, but the experiment was unsuccessful, and the supply of the entire quantity of quinine consumed in the United States, estimated at 800,000 ounces yearly, is said to have become virtually a monopoly in the hands of two American manufacturers. In 1870, cinchona bark was placed on the free list, but a tariff of 20 per cent. on quinine was retained, which has naturally proved still to be an effective prohibitory duty.

Such is the story of the United States' quinine trade during the last dozen years, as told in a pamphlet that has just come to hand. Of course, estimates respecting the advantage or disadvantage of the present result would be variously influenced by position in respect to the monopoly, as well as by inherent like or dislike of the principles of protection, and therefore it is not surprising that conflicting opinions or interests respecting the quinine tariff are just now being brought forward rather prominently before the Senate and House of Representatives of the United States, the occasion being a bill which has been introduced proposing, among other things, to abolish entirely the duty on quinine.

This bill has been met by a petition urging various arguments for the retention of the tariff, some of them having a considerable family likeness to pleas formerly put forward in this country in the interests of protection. Thus it is stated that the home manufacture of sulphate of quinine is sufficient in quantity to meet the demand, is moderate in price, and equal in quality to the best foreign productions; that a large amount of capital is necessary in the business in order to provide stocks to meet promptly a varying and uncertain demand, and that a possible deficiency of imports, or their total cessation, in the absence of a sufficient home supply is a "national calamity" that may follow interference with the present arrangements; that American manufacturers have acquired a vested interest in the monoply; and that the present uniformity of price is preferable to the variations that would inevitably follow foreign competition. But perhaps the queerest argument for the retention of the tax on quinine is that cinchonine and cinchonidine sell at a lower price in the United States than in Europe.

The statements of the petition are challenged seriatim in a counter petition from Mr. Robbins, an importer and dealer in drugs and chemicals, of considerable experience. Amongst other things he denies that the home supply has always been equal to the demand, or that the price compares favourably with that current in the European market; and he expresses his doubt whether the article itself equals in quality the best European brand. He also ridicules the probability of a blockade ever existing that would shut out quinine by the ounce and let in bark for its manufacture by the bale.

We do not presume to comment, nor are we required to advise, upon this knotty point. Brother Jonathan generally manages to take care of himself. But, as an illustration of one phase of pharmaceutical finance we have thought the subject of sufficient interest for a passing notice.

INTERNATIONAL CONGRESS OF HYGIENE.

On the 15th of June next an International Exhibition and Congress of Hygiène is to be opened at Brussels. The exhibition is to be divided into ten classes. One of these is to be devoted to Medicine, Surgery and Pharmacy; but the last word is apparently added on the same principle as *lucus à non lucendo*, for amongst the articles enumerated there are none that would belong to pharmacy, at any rate as understood in this country. Information respecting the exhibition may be obtained from the commissioner, Mr. Edmund Johnson, 3, Castle Street, Holborn.

CIVIL SERVICE TRADING.

On Monday night Sir Thomas Chambers gave notice that on Tuesday, the 22nd of May, he would call the attention of the House to Civil Service Trading, and move for a Committee on the subject.

AFRICAN ESSENCES.

In the regency of Tunis, one of the Barbary states, are distilled very large quantities of rose, orange-flower, and mint waters, with which the natives perfume their sherbet and sweetmeats. The district is also highly celebrated for its essences or attars, which are held in great esteem for their delicacy of perfume. On account of the high prices only a very small quantity of these attars is exported. Mr. Consul-General Wood mentions the following sums as representing the money value of a metical (equal 4¾ grains) of some of them:—Attar of orange, or acid or sweet lemon, 4*s.* 9½*d.* per metical; attar of roses, acacia, henna (*Lawsonia, sp.*) or quince, 9*s.* 7*d.* per metical; attar of jasmine, £1 per metical; and attar of double jasmine, £1 11*s.* 8*d.* per metical.

ACORN COFFEE.

The imposition of high custom duties in Algeria appears in respect to some articles to have led to a decrease in the imports and a corresponding increase in the quantities produced in the colony itself. In the case of coffee, however, this is true with a difference, the consumers only raising the adulterant. According to Mr. Consul Playfair, since the increased duties have been levied a brisk trade has sprung up with France in sweet acorns, which are first slightly treated in Algeria to prevent them from germinating, and then sent to France for the sole purpose of adulterating coffee. In 1874, Algeria imported "coffee" to the value of more than 2,300,000 francs.

The intimate relation between roasted acorns and "pelotas coffee" has been demonstrated in this country, as described in the recent report of the Principal of the Laboratory at Somerset House (before, page 727).

Announcement is made in the *Répertoire de Pharmacie* that Professor Chevallier finding himself compelled to give up the direction of the *Journal de Chimie Médicale* which he has edited for fifty years, these two Journals will henceforth be combined under the title of *Répertoire de Pharmacie et Journal de Chemie Médicale réunis.* We hope that the length of their joint life may be proportional to that of their joint title.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

April 3, 1876.

Two hundred and eighty-seven candidates presented themselves for examination, of whom *ninety-three* failed. The following *one hundred and ninety-four* passed, and have been duly registered as Apprentices or Students:—

(Arranged alphabetically.)

Abbott, Frederick Ernest	Barnard Castle.
Anderson, John	Dundee.
Arkle, Charles Albert	Lancaster.
Aston, Walter	Tarporley.
Atkinson, Thomas	Penrith.
Attwell, Benjamin Arthur	Wincanton.
Baker, George	London.
Baker, Joseph Palmer	Bulwell.
Ball, Henry	Lancaster.
Bardill, Draper Welch	Derby.
Bate, Joseph William	Walsall.
Bing, Charles	Canterbury.
Black, Thomas	Greenock.
Blomfield, James H. S.	Stoke Ferry.
Blower, Joseph	Shrewsbury.
Bodley, Thomas	Dartmouth.
Booth, Charles William	Brighouse.
Bowie, Robert Forbes	Forres.
Bransby, William Newton	Bath.
Brigham, Sibbitt	Berwick-on-Tweed.
Brook, Samuel Verlander	Colchester.
Burgess, Thomas Alexander	Taibach.
Burton, John Finch	Sudbury.
Byass, Robert	Hull.
Campbell, George Francis	Dalston.
Campbell, John	Falkirk.
Cann, James	Dorking.
Chattaway, Frederick Daniel	Coventry.
Christopherson, Fred	Ipswich.
Clark, Frank	Liverpool.
Clower, Henry	Nottingham.
Cluett, Benjamin	Kingston-on-Thames.
Cobden, Alfred Walker	London.
Colley, Henry	Hull.
Coulthart, Thomas	Annan.
Crichton, James	Haddington.
Cudden, Bernard	Tunbridge Wells.
Cummings, William	Alloa.
Cuthbert, Sidney Agar	Bedford.
Davey, Arthur	Oundle.
Davies, Caleb	Saundersfoot.
Davy, Henry	London.
Douglas, Thomas	Greenock.
Eland, Richard	Brentford.
Ellis, William Cambridge	Weston-super-Mare.
Evans, Evan James	Aberystwith.
Everett, Wm. John Hugo	London.
Fawcett, Joseph	Wray.
Fingland, Edward Dobbie	Wavertree.
Fogg, John	Wigan.
Forster, William Revely	Sunderland.
Forth, Charles Edward	Wakefield.
Freeland. Alonzo Joseph	Angmering.
Freeman, Harry Richard	Hastings.
Freke, Cecil Henry	Shaftesbury.
Fulton, Robert	Inverary.
Goddard, James	Gt. Yarmouth.
Goodman, John Rashdall	Hammersmith.
Gordon, John	Bradford, Yorks.
Guthrie, Thomas	Musselburgh.
Haddock, James	Bedford Leigh.
Haddon, John	Birmingham.
Hall, Amos	Stafford.
Hamer, Joseph Armistead	Southport.
Hancock, George William F.	Dursley.
Hands, Ernest	Atherstone.
Harlock, Herbert	King's Lynn.
Harrison, Peter Webster	St. Helen's.
Harvey, Frederick	Margate.
Haworth, John	Bury.
Head, George Gubbatas	Lewes.
Healy, Joseph	Leicester.
Heap, Edward Barlow	Ashton-under-Lyne.
Hickley, Arthur Mackenzie	London.
Hindle, Robert George	Wirksworth.
Hinks, John	London.
Hogg, Henry Scott	Glasgow.
Hopkinson, Harry	Grantham.
Howe, Charles Lawrence	Nottingham.
Hughes, Henry Milner	Newcastle-on-Tyne.
Hutchinson, A.	Nottingham.
Isaac, James Griffith	Strood.
Jackson, James Edmunds	Monmouth.
James, Howel	St. Clears.
James, William Charles	New Southgate.
Jenkin, William John	Plymouth.
Job, Andrew Theaker	Clapham.
Jonas, Frederick Gome	Kilmarnock.
Jones, Daniel Morgan	Cardigan.
Jones, John Lewis	St. Asaph.
Jones, Llewellyn	London.
Kendall, George	London.
Kent, Douglas William	Landport.
Kershaw, Arthur Noble	Halifax.
Kidner, Henry Richard C.	Bristol.
Langley, Frank Collins	Ashford.
Last, Alfred	Rochford.
Lawrence, Samuel	Oban.
Leicester, Frederick	Northwich.
Leppington, George Carter	Scarborough.
Lewis, Daniel	Tredegar.
Lowe, William Foulkes	Rock Ferry.
M'Derment, James	Ayr.
Macdougall, Dugald	Greenock.
Mackenzie, James	Grantown.
Mackirdy, John	Glasgow.
McNay, David	Thornhill.
Mainprize, John Vickerman	Scarborough.
Maitland. Frank	Stonehouse, Devon.
Mansell, Harry Roper	Anerley.
Mason, Frederic Silvester	Leicester.
Massey, William	Newport, Salop.
Metcalfe, Arthur Pollard	Doncaster.
Milne, James	New Pitsligo.
Mitchell, Harold	Horncastle.
Mitchell, Richard Pryce	Cardigan.
Mitchell, Wm. Kirkpatrick	Wigton.
Moore, Edward W. C.	Cheltenham.
Newcombe, Wm. Langdon	Shepton Mallet.
Nicholls, William	Hayle.
Nisbet, George Dundas	Dalbeattie.
Oates, Frank	London.
Oldfield, Manton	London.
Osborne, Walter	Portsea.
Ould, Francis James	Hayle.
Owens, John	Sheffield.
Passmore, Arthur Bradshaw	Bristol.
Pay, Harry Hilder	Margate.
Pearson, James	Dewsbury.
Pedley, George Aston	Margate.
Percival, Thomas	Falkirk.
Pigott, Samuel	Manchester.
Place, James Henry H.	Bishop Auckland.
Pollard, Thomas Comins	Crediton.
Pond, George Peter	London.
Preece, Charles Godwin	Ely.
Prentice, William Charles	Ipswich.
Purvis, John Bowlt	South Shields.
Ratcliffe, Joseph William	Sutton Bridge.
Reade, John Edmunds	Wolverhampton.
Rich, George	Cowbridge.

Roberts, Arthur Harry	Barrow-in-Furness.
Roberts, William	Swansea.
Roberts, William Irwin	Oswestry.
Robinson, George D. R.	York.
Rogers, William John	Wem.
Routly, John	Brighton.
Ruston, John	Malton.
Saul, John Edward	Rock Ferry.
Saul, William Osborne	Sibsey.
Saunders, Wm. Henry	Bristol.
Sanguinetti, Francis John	Aylesbury.
Scholey, John	Burnham.
Sherwin, Frederic	Bakewell.
Short, Frederick William	Chagford.
Skinner, Alfred J. P.	Seaton.
Smith, Joseph	Salford.
Smith, Sydney	Whitley.
Smith, William Thomas	Bath.
Spencer, George	Hitchin.
Stainer, Harry William	Ryde.
Stephenson, George Richard	Notting Hill.
Sturrock, Charles Lankester	Edinburgh.
Sturrock, James	Arbroath.
Sutherland, Alex. McCallum	Portsoy.
Swindells, Thomas	Manchester.
Taylor, Ernest Sanderson	Grantham.
Thorpe, Thomas Frederick	Northampton.
Thrift Robert	Newcastle-on-Tyne.
Totten, John	Beccles.
Turner, Thomas	London.
Twiss, Mark	Hunstanton.
Upstone, Philip	Shipton.
Veitch, John	Peebles.
Wakeham, Charles Henry	Helston.
Walker, Joseph	Wantage.
Watkins, George Albert	Spilsby.
Watson, John	Newcastle-on-Tyne.
Watson, John M.	Glasgow.
Walton, Frederick M. W.	Reading.
Way, John Francis	Lower Tottenham.
Webster, Samuel G. G.	Alfreton.
Whyte, William H. H.	Southsea.
Wilcock, John	Lancaster.
Wilkes, Charles Alfred	Cinderford.
Wilkins, Charles John	Norwich.
Williams, Alfred Joseph	London.
Williams, John Richard	Rhyl.
Williams, Willliam Lloyd	Buckley.
Winship, William John	Felling-on-Tyne.
Wood, George William	Hull.
Wright, Robert Fitch	Littleport.
Wyatt, William Hyde	Newark.
Wyllie, George	Jedburgh.

The Questions for the Examination were as follows:—

(*Time allowed: Three hours for the three subjects.*)

I. LATIN.

1. Translate into English:—Flumen est Arar, quod per fines Aeduorum et Sequanorum in Rhodanum influit incredibili lenitate ita ut oculis in utram partem fluat judicari non possit. Id Helvetii ratibus ac lintribus junctis transibant. Ubi per exploratores Caesar certior factus est tres jam partes copiarum Helvetios id flumen transduxisse, quartam vero partem citra flumen Ararim reliquam esse, de tertia vigilia cum legionibus tribus e castris profectus ad eam partem pervenit quae nondum flumen transierat. Eos impeditos et inopinantes adgressus magnam partem eorum concidit.

2. Decline the nouns *flumen* and *oculus*; and decline together the adjective and noun *magna pars*.

3. Parse fully the words *utram, possit, junctis, copiarum, tribus, profectus, concidit.*

4. Give the present, the perfect, the infinitive, and the supine, of the verbs *judicari, jungo, pervenit, transierat.*

5. State the rules for the agreement (1) of an adjective with a noun; (2) of a verb with its subject; (3) of a relative pronoun with its antecedent.

II. ARITHMETIC.

(The working of these questions as well as the answers must be written out in full.)

6. Multiply seven hundred and nine thousand and nineteen by sixty thousand five hundred and eight; and divide thirty-six millions two hundred and eighteen thousand one hundred and three by five thousand seven hundred and forty-nine.

7. Find the difference between $\frac{4}{5}$ of $\frac{7}{9}$ and $\frac{2}{7}$ of $\frac{3}{8}$; an divide $5\frac{2}{7}$ by $7\frac{1}{9}$.

8. Multiply 2·314 by ·0215; and reduce $\frac{7}{125}$ to a decimal.

9. By how much does 3·25 of £7 13*s.* 6*d.* exceed 2·16 of £6 13*s.* 7*d.* ?

10. Find the value of 37 yards of cloth, when 25 yards cost £4 7*s.* 6*d.*

III. ENGLISH.

11. Write out the declension of the personal pronouns of the first and second persons. What relative pronouns have we in English?

12. Give the past indefinite tense and the past participle of each of the following verbs:—*seek, bring, strike, thrive, ride, break, tear, catch, freeze.*

13. Parse the following passage:—

> "What cannot praise effect in mighty minds,
> When flattery soothes, and when ambition blinds?"

14. Write a short account of Joan of Arc, Cardinal Wolsey, or Sir Walter Raleigh; or of the Battle of Hastings, the Battle of Waterloo, or the Battle of Sedan.

The following is a list of the Centres at which the examination was held, showing the number of Candidates examined at each Centre, and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	4	2	2	Leicester	3	2	1
Aberystwith	2	1	1	Lincoln	2	2	0
Barnstaple	1	1	0	Liverpool	11	8	3
Berwick	1	1	0	London	50	30	20
Birmingham	12	3	9	Lynn	4	4	0
Boston	5	2	3	Macclesfield	1	0	1
Brighton	6	3	3	Manchester	11	7	4
Bristol	9	7	2	Newcastle-on-Tyne	10	6	4
Cambridge	8	4	4	Northampton	2	2	0
Canterbury	5	5	0	Norwich	3	3	0
Cardiff	4	3	1	Nottingham	9	7	2
Cardigan	4	2	2	Oxford	5	2	3
Carlisle	2	2	0	Peterborough	1	1	0
Carmarthen	4	2	2	Plymouth	2	2	0
Cheltenham	2	2	0	Portsmouth	5	4	1
Chester	5	5	0	Preston	7	4	3
Colchester	3	3	0	Reading	1	1	0
Darlington	3	3	0	Salisbury	3	2	1
Doncaster	1	1	0	Scarborough	3	2	1
Dumfries	3	3	0	Sheffield	4	2	2
Dundee	2	2	0	Shrewsbury	5	3	2
Edinburgh	9	7	2	Southampton	1	0	1
Exeter	5	4	1	Stafford	2	2	0
Glasgow	12	11	1	Swansea	4	2	2
Hull	4	3	1	Taunton	1	1	0
Inverness	2	2	0	Truro	3	2	1
Leamington	2	2	0	York	2	2	0
Leeds	12	5	7				

BOTANICAL PRIZE FOR 1877.

A Silver Council Medal is offered for the best Herbarium, collected in any part of the United Kingdom between the first day of May, 1876, and the first day of June, 1877 ; and should there be more than one collection possessing such an amount of merit as to entitle the collector to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Honour and Merit, will be given at the discretion of the Council. In the event of none of the collections possessing such an amount of merit as to warrant the Council in awarding Medals or Certificates, none will be given.

The collections to consist of British Flowering Plants and Ferns, obtained in a wild state, and arranged according to the Natural System ; the collections to be accompanied by lists, arranged according to the same system, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, Hooker, or Bentham), and to state the work which he adopts. The name of each plant, its habitat and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note, containing a declaration, signed by the collector, and certified by his employer, or a Pharmaceutical Chemist to whom the collector is known, to the following effect :—The plants which accompany this note were collected by myself from wild plants, between the first day of May, 1876, and the first day of June, 1877, and were named and arranged without any assistance but that derived from books.

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved ; and should a specimen be wrongly named it will be erased from the list.

The collections to be forwarded to the Secretary of the Pharmaceutical Society, 17, Bloomsbury Square, on or before the first day of July, 1877, indorsed "Herbarium for Competition for the Botanical Prizes." After the announcement of the award, they will be retained one month, under the care of the Curator of the Museum, for the inspection of persons connected with the Society, and then returned to the collectors, if required.

No candidate will be allowed to compete, unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

Provincial Transactions.

LEICESTER CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A lecture in connection with the above Association was delivered at the Rooms, Halford Street, on Thursday evening, April 28th, 1876, by Mr. S. H. Cadoux, subject "Electricity." The lecturer after preliminary remarks, with regard to the electric fluid, etc., proceeded to notice those bodies that act, 1st, as conductors, and, 2nd, as insulators of electricity. An interesting experiment was performed, showing the action of excited glass, sealing-wax, and ebonite, upon a small suspended pith ball, or electrical pendulum, and from which was clearly demonstrated that electricity should be divided into two kinds, namely, vitreous, and resinous. Positive and negative electricity were referred to and illustrated. The working, etc., of the following machines were next explained, namely, the plate and cylindrical, also the voltaic, Grove's, Daniel's, Smee's, Bunsen's, Oehne's, and other batteries, several of which were exhibited, and their advantages and disadvantages explained. A leyden jar was also shown, and the peculiar aid it renders to this branch of science defined. After further remarks with regard to the generation of the electric fluid, etc., the lecturer referred to the uses of electricity, and the electric spark, performing several experiments, such as the decomposition of water, the ignition of gunpowder, and showing its application to the explosion of torpedoes. The electric telegraph came next under consideration, illustrated by a miniature apparatus, which enabled all present to comprehend the statements advanced. The exhibition of handsome vacuum tubes, stationary and revolving, together with further general remarks, brought the lecture to a close, it having been received with much attention.

A motion by Mr. Hammond, that a very hearty vote of thanks be presented to Mr. Cadoux, for his interesting and instructive lecture, was seconded by Mr. Shakespeare, supported by Mr. Raynor, and carried unanimously. The lecturer briefly responded.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Professor Andrews, F.R.S., in the chair. After the usual business of the Society a paper on "The Manufacture of Sulphuric Anhydride," by Dr. R. Messel and Dr. W. Squire, was read by the latter. The authors prepare the anhydride by decomposing ordinary sulphuric acid at a white heat into water, oxygen and sulphurous anhydride, removing the water by suitable means, and then passing the mixed gases over platinized pumice heated to low redness; the oxygen and sulphurous anhydride then reunite to form sulphuric anhydride. After this paper the adjourned discussion on Dr. H. E. Armstrong's paper on "Systematic Nomenclature," read at the last meeting, was continued, in which Professor Odling replied at length to the criticisms on the article recently published by him on the same subject in the *Philosophical Magazine.* The meeting was then adjourned until Thursday, May 4, for which several papers are announced.

Parliamentary and Law Proceedings.

PROSECUTION UNDER THE PHARMACY ACT.

Sheriff Court of Lanarkshire, Glasgow.

Tuesday, 25th April, 1876.

(Before Sheriff Substitute Scott Moncrieff.)

THE PHARMACEUTICAL SOCIETY *v.* YOUNG.

This was a complaint under the Summary Procedure Act, 1864, at the instance of the Pharmaceutical Society of Great Britain and their Registrar, Mr. Bremridge, against William Young, tenant of and carrying on business as a retailer of drugs in the premises known as "The Apothecaries' Hall," No. 107, Eglinton Street, Glasgow. The complaint set forth that the respondent had contravened the Pharmacy Act, 1868, and particularly section 15 thereof, in so far as not being a duly registered pharmaceutical chemist, or a chemist and druggist, or a legally qualified medical practitioner within the meaning of the said Act and of the Act 32 and 33 Vict. cap. 117, entitled "An Act to amend the Pharmacy Act, 1868," he did in the month of November last keep open shop for the retailing, dispensing, or compounding poisons within the meaning of the first mentioned Act, and made two sales which were specified, the one of laudanum and the other of oxalic acid.

The respondent pleaded guilty and was fined in £5 and £4 of costs.

DEATH THROUGH DRINKING PATENT MEDICINE.

An inquiry into the circumstances attending the death of Sarah Ellen Beeley, five years of age, living with her parents in Victoria Street, Reddish, was held at the Houldsworth Arms, by Mr. F. Price, coroner, on Saturday afternoon. About a fortnight ago the father of the deceased was troubled with a cough, and on the recommendation of a friend his wife purchased for him a bottle of Towle's Chlorodyne from Mr. Learoyd, a chemist in the village. The medicine had been partly consumed, and on the mother entering the kitchen on Thursday morning last she found the daughter sitting on a chair drinking the remaining portion of the chlorodyne, which had been left within her reach. She immediately took the bottle from the child, who in a minute or so went into a comatose state, and her mother placed her on a couch. Subsequently she was taken to Mr. Learoyd's, and medical assistance sent for, but she died about half-past one the same day. Robert Francis Tomline, assistant to Dr. Ball, Wellington Road North, Heaton Norris, said that on being summoned to the aid of the deceased on the morning in question, he found her pulse indistinct, breathing slow, and the pupils of the eyes were strongly contracted and insensible to light and feeling. Her jaws were stiff, and he had some difficulty in getting her to swallow anything. Witness adopted remedies but without effect. All the appearances he saw were consistent with prussic acid and laudanum combined, and to the best of his belief and according to the formulas published, these two drugs were ingredients in Towle's Chlorodyne. A teaspoonful would be sufficient to cause the death of the child.—The jury returned a verdict of "Death by misadventure."—*Manchester Courier.*

ADMINISTRATION OF DRUGS TO ANIMALS.

A farm servant named William Keyworth was charged before the Newark county magistrates with killing a valuable horse belonging to his employer, Mr. Charles Hunt, a farmer of Besthorpe; and a labourer named George Cook, of North Scarle, was charged with aiding in the commission of the offence. Keyworth admitted the charge, but Cook pleaded not guilty, and the former was examined as a witness.

On Monday last Mr. Hunt's horses—six in number—appeared ailing, and in consequence Mr. Proctor, veterinary surgeon, Newark, was called in. From the symptoms Mr. Proctor was convinced that the animals had been subjected to foul play, and as one of them died on the 6th a *post mortem* examination was made, resulting in the finding of traces of mineral poison. Keyworth admitted that he had given the horses some powders which Cook had given him, with a view of making their skins shine. He said he did not know what the powders consisted of, but Cook told him there were three ingredients, one of which was copperas. Mr. Proctor said he believed the powders contained a considerable quantity of arsenic.

The Bench ordered Keyworth to forfeit the wages due to him, about 20*l.*, and sentenced Cook to three months' hard labour.

The prosecutor said the horse he had lost was worth 50*l.* Another worth 70*l.* would no doubt die that day, and three other animals were ill. If they all should die he would be a loser of about 300*l.*—*Stamford Mercury.*

A WRONG BOTTLE.

A narrow escape from death by poisoning is reported from Lincoln, a man named Joseph Dixon, brickmaker, having mistaken a bottle and swallowed a dose of a liniment composed of belladonna and a strong solution of ammonia with camphor. Shortly afterwards he exhibited symptoms of violent poisoning. Dr. Peacock was at once sent for, who applied the usual remedies, but the sufferer remained in a state of insensibility for nearly 14 hours. At the end of that time a change took place, and he gradually recovered.

PAPERS PRESENTED TO PARLIAMENT.

REPORT ON THE WORKING OF THE ALKALI ACTS.

The intermediate report by Dr. Angus Smith, Chief Inspector under the Alkali Acts, 1863 and 1874, to the Local Government Board, to which we referred last week, is due, as then mentioned, to an apprehension that an attack had been made on the working of the Act at a time when it was being most energetically pushed forward. Dr. Smith expresses sorrow that any should say in the very midst of most anxious labour that the work is not finished; as although it is not done, it is well begun, and advanced to such an extent as the most influential and best informed of the manufacturers declared to be impossible before the passing of the Act, and still consider impossible as an enduring state.

It has been said that more gas is now escaping from the works than before. This Dr. Smith says he knows to be impossible. Additional works are put under inspection, and send off little gas; at others there is less escape than usual. One of the most experienced of the alkali makers has given an account of his expenses for repairs, which are twice as much as under the old Act. Another, in order to bring his work under the new Act, is obliged to condense down to one per cent. Dr. Smith considers that a system of gradually increasing pressure is the only mode of procedure promising any success. We know exactly what is wanted, but invention is gradual and often expensive.

The only definite clause in the Act is that demanding that the amount of muriatic acid should be not more than one-fifth of a grain per cubic foot of the escaping gases. This result Dr. Smith reports has been obtained, and the escape from every alkali maker's chimney in the kingdom has been reduced, if reduction was necessary, to the amount required. A great difficulty therefore has been overcome, and one that threatened for a time to cause a collision with the manufacturers.

But when the reduction has been made it is not always continuous; the same process conducted in apparently the same way and in the same furnaces does not produce the same result; and in the west of England as well as in Scotland and Ireland, where the close furnace is used, the cause of this is the same, namely, the frequent rents in the arch of the furnace causing a difficulty never yet overcome. It has not been found possible to make an arch which will resist the influence of heat and occasional cooling without cracking. The result of this is that the acid gas passes into the smoke flue, or rather the fire which envelops the furnace, and the gas is therefore taken to the chimney. The evil seems ridiculously small, but it is one which causes the chief trouble to manufacturers, inspectors and the public. Trials have been made to overcome the difficulties as yet not with full success. One method is to cause a pressure on the fire flue, so that there may be an inclination for the gases of combustion to pass into the furnace containing the acid gases, instead of the contrary; this has been tried with steam, but not successfully. Another plan is by using gas for combustion instead of coal, and having the entrance of the gas several feet below the portion where the flame heats the arch, thus causing a pressure upwards. This is successful, but gas is not favoured by all manufacturers, and the universal introduction of this plan is hopeless. It was attempted also to cause a pressure of the coal gases by putting a difficulty in their passage after they had left the fire, and to some extent, but not to a full extent, this answered.

Instead of causing pressure of the fire gases, it seemed better to draw out the acid gases, and Dr. Smith expected a jet of steam to do this, and it did so perfectly; but an objection occurred here also, because more air was drawn through the furnace and carried hot onwards to the condensers, heating them too much. This, so far, has also been a failure.

The exertions made in the direction of solving this problem constitute of themselves a success, because it is pleasant to see the earnest desire to have the work well done, even if it does not produce all the end desired.

When the Alkali Act was introduced, few of the alkali makers had good laboratories, still fewer had chemists sufficiently free to test the gases for themselves, and probably few had chemist fit to do so. Now things are entirely changed, and the frequent entrance of the inspector has caused him to be watched, imitated, or criticized, and nothing is commoner than a comparison of results with him. In some cases the works are tested daily. The escape book is kept as regularly as the ledger, and the chemist opens it to the inspector, and shows the work done by him on this subject since the last visit.

As to sulphur acids, a good deal has been done, and the gain to the more careless manufacturers is not small. Dr. Smith believes it would be easy to diminish it to nothing, and sees no reason why the last traces of this and muriatic acid should not be washed with lime-water whenever the outlets of the latter acid are fully under control. The nitrous gases used in the manufacture of sulphuric acid are treated at the same time.

Against the escape of chlorine nothing novel has been done of consequence in the changing of apparatus, but when the amount has been decided, attention has been called to it, and it has been stopped. But the gas is very subtle and difficult to manage, and it is also the cause of complaints which have often been referred to muriatic acid. It travels a great distance, and can be let off and stopped readily by the men; the first Act is said sometimes to be carried out in revenge.

No definite directions as to sulphuretted hydrogen are given under the Alkali Act, but the gas is the real cause of some of the complaints made against acids. The town of Widnes is very frequently, if not at all times, subjected to the influence of sulphuretted hydrogen. This arises not from anything that occurs in the numerous alkali works there, but from the waste products. The tank waste, composed of sulphur and lime in various states of oxidation, is used for raising up the low lands on the Mersey, and forming a foundation for future buildings. The drainage of lands thus treated is offensive; it has a yellow colour, and on exposure to the air gives out the gas. At certain spots the streams meet with acid streams, and the gas is then given out in enormous quantities. Acid is continually flowing from the alkali works, as a consequence of the condensation. This acid must find its way to the Mersey, and the streams from the tank waste must find their way also. The purification of the air from acid has therefore the effect of increasing the sulphuretted hydrogen, and this evil has greatly increased of late, and will probably increase with the great accumulations of the waste laid down. This extension of the waste must be a difficulty so long as the present mode of working lasts, and the accumulation must soon become so great that the problem how to find room will be difficult to solve.

The same material is causing offence in an extensive manner at St. Helen's, and to a less degree in some other places. In Newcastle it is in most cases shipped out into the ocean and thrown overboard. It is impossible to find convenient room for it on land, and where it has been deposited it has been found inconvenient.

There are modes of extracting some of the sulphur from the waste at a profitable rate, but these are adopted by very few; the actual effect in diminishing the sulphur of the drainage water has not been fully ascertained, but it must be considerable. There is also a mode of working so as to reduce the amount of lime used in the black ash furnace, and the result of this will probably be to allow much more sulphur to be removed profitably. There is hope that by these inventions the inconvenience of putting tank waste on land may be very much diminished.

The complaints made by shipbuilders on the Tyne, alleging that the paint is spoilt by the gases, has been confirmed by the examination of a specimen; the discoloration was caused by sulphuretted hydrogen, and not by muriatic acid.

With respect to the pressure exerted by the inspectors under the new Act, Dr. Smith contends that he has done better than mere fining. For instance, an alkali maker who was told that he had not condensing power sufficient, is not only building new condensers, but has had a new manager at a higher salary, and believed specially to understand condensation, and he has besides diminished his amount of manufacture in order to be within the Act. All these items are a serious expense, and at a time when trade is bad it is an open question with some whether it would not be better to stop altogether. One manufacturer says that he has spent in changes caused by the new Act as much as 5*s.* per ton on the alkali made. Dr. Smith justly says that he does not know a more severe mode of fining or one that can be equally advantageous to the community. At other works it was said that the additional strictness of the new Act caused an entire stoppage.

This new Act has facilitated a long desired change; in some works the analyses are now made every day, in others twice a day, by chemists employed there. Several openings are made in some chimneys, so that an average of every spot can be taken readily.

At first it appears as if the treatment of every work were the same by the new Act. It is not entirely so, because some must condense to one per cent. in order to limit the amount per cubic foot to one-fifth of a grain, others do not require this, but the public gains the benefit and cares little about per-centage so long as the air is pure.

The owners of one of the largest works in the kingdom informed Dr. Smith that after the most careful trials it was found impossible to comply with the requirements of the new Act. This threatened a dead lock or failure of the Act. All that could be done therefore was to advise more attempts, and to be as reasonable as possible. The same quality of pressure was extended to all who were similarly desirous of doing their best. Encouraged by the reasonable delay, the owners set again to work; made many trials and changes, and kept two chemists continually testing their numerous furnaces and reporting the rate of progress. Every few weeks brought an improvement, and the escape has been reduced to such an extent, that it is expected it soon will be much less than the maximum allowed.

In carrying out an Act of this kind a struggle must be expected. If it were a mere order to shut an office at five o'clock instead of six, it might be done as an act of obedience at once, but when the work must be carried on under new conditions, these must be studied, and the study is severe as well as expensive, deranging also much of the usual routine. Of course, it may be asked, when all is done is it enough?

Dr. Smith reports that there is a general agreement that an improvement has taken place this year in the vegetation. A letter from Eccleston, near St. Helen's, is very decided, and confirms an announcement in a former report, that fresh and healthy as well as clean leaves had been obtained from a spot which even twelve years ago appeared doomed to destruction.

At Newcastle, a petition was received signed by several hundred workmen of the Hebburn Colliery. Typhoid fever had broken out, and although the gases were not altogether blamed for it, it was believed that they might have done harm. The complaint was against one of the newly included copper works, but chiefly against the chimney of the smelting furnace which was not under control. Dr. Spear, officer of health in South Shields, who investigated the matter, says in his report: "I cannot imagine that acid gas can have anything to do with the prevalence of fever; although of course it is possible, as Dr. Angus Smith says in one of his reports, that they lower the general health and so become a predisposing cause. On the other hand, I am quite sure that the gases in the diluted state in which they are breathed in the works do not act as preservatory agents against fever, for fever is, to say the least, quite as prevalent in the near neighbourhood of the works as in any other part of the district, and lately I have met several instances where the labourers themselves have suffered from typhoid fever."

Dr. Smith is inclined to believe that there are great escapes of gas at particular times; and points out that escapes at irregular times are not under the control of the inspectors. Even an inspector at every work could scarcely prevent this if the men were not fully under control. Inspection can only take care of the general condition of a work, can see that the apparatus is suited for the requirements, and that, as a rule, the whole is well conducted. Accidents must be left to the observation of those who are in the neighbourhood.

The inspectors of alkali works meet with the continual excuse that other chemical works and not those under their examination are the really guilty. This is sometimes true.

Dr. Smith points out that the late Act is expansible and can be carried out much further than it yet is, but considering the demands of the public he is inclined to think it would be well early to include the remaining chemical works in a supplementary Bill. He proposes that all chemical works or works giving out offensive gases, such as acids sulphuric, sulphurous, muriatic, or nitric, nitrous gases, sulphuretted hydrogen, chlorine, or offensive compounds of any of these gases, or of fluorine, should, on complaint being made, be put for a certain time under inspection.

Review.

PROCEEDINGS OF THE SOCIETY OF PUBLIC ANALYSTS, Vol. I. London: 79, Great Tower Street, E.C. 1876.

Although from its title this volume might be supposed to consist simply of a report of the papers read and business transacted at the meetings of the recently-established Society of Public Analysts, it nevertheless includes much more, inasmuch as it likewise contains correspondence on subjects connected with analytical chemistry or otherwise of interest to Public Analysts, reprints of the draught of the "Sale of Food and Drugs Act" with discussions on the successive alterations introduced in this bill in its progress through committee and the two Houses, and numerous other analogous papers. Although not so stated, yet the book bears internal evidence of being reprinted from the columns of the *Chemical News*; and as the services of an editor seem to have been dispensed with and the various articles, etc., to have been simply taken in the order of their appearance in our contemporary, the result is a kind of *olla podrida* of matter pitchforked together without any visible attempt being made to classify and arrange the subjects at all. Thus even in the correspondence discussing the analysis of milk, other subjects are introduced in between the various letters, so that without an attentive perusal of the index it is impossible to see when the correspondence closes. Inasmuch as on the first page the names of the council and officers of the Society of Public Analysts are given, it might naturally be supposed that the work is brought out under the auspices of that Society, and that its Secretaries are responsible for this want of arrangement, the more so as on page 3 the reader is informed that although it is probably pretty well known that the Public Analysts have formed an Association, yet "as this is our first appearance in a literary form it becomes us, in this place, to justify our existence"; on the other hand in various other portions of the book the editorial "we" is employed to indicate, not the Society of Public Analysts or its officers, but the *Chemical News.*

Several of the papers read before the society and appearing in the work are of considerable interest to analysts in general, more especially those engaged in the examination of articles of food and drink; thus the papers on the "Natural Constituents of Wine," by Dr. Dupré, on "Two New Forms of Tubes for Collecting Air for Analysts," by G. W. Wigner, etc., deserve to be more widely known than they would be were the reports of the Society simply perused by the members thereof.

In the course of the correspondence published on the "Milk Question," severe criticism is passed on the results obtained by Dr. Voelcker and published by him in 1863. The mode of analysis adopted, although perhaps the best known at the time, does not appear to have been remarkable for accuracy; the precautions adopted for securing the genuineness of the samples examined seem to have been insufficient; the cows operated on were during part of the time on a starvation diet; and finally the results actually obtained, even with all these defects, do not bear out the conclusions attempted to be drawn from them by many interested in the upholding of the adulterators' side of the questions. It would seem that no reply to any of these critiques has been vouchsafed by Dr. Voelcker, and the inference to be drawn from this circumstance and the reprinted correspondence is, that many of the conclusions arrived at in Dr. Voelcker's pamphlet are really untenable, and that no injustice can be occasioned by the employment of the "Milk Standard" of the Society, *i.e.* by the condemnation of no milk save such as contains less than 2·5 per cent. by weight of butter fat, and 9·0 per cent, of "milk solids not fat." It may be noticed in passing however, that the establishment of this standard is supposed by many to have led to a more general and more scientific style of adulteration being practised now than was formerly the case: it is said that little or no milk is sent into the large towns from the country of a higher standard than the limiting composition of the Society of Public Analysts, and as this limit is considerably below the *average* composition of genuine milk, the inference is that the milk supply from the cows is regularly and systematically tested, and toned down with just so much water as will escape condemnation; indeed it is whispered that milk analyses are regularly made for some of the large dairies for the express purpose of finding out what amount of "toning down" is just permissible under the Act. Although it is clear that practices such as these were certainly not intended to be legalized, yet there is a certain amount of fairness in the argument that if the milk from a cow which is on the point of ceasing to give milk, or which for any other reason gives milk of quality below the average though not below the public analysts' standard, is allowed to pass muster, there can be little or no difference occasioned to consumers if instead of allowing the ratio of milk solids and water in the milk to vary through natural causes connected with the health of the animals, etc., it be made to vary artificially. On account, however, of the liability to contamination with sewage matter which any watering of milk will bring about, and of the disastrous consequences which may follow such contamination, it is clear that such practices ought to be discouraged, and if practicable to be stopped altogether; which result is not likely to be brought about by the use of a fixed standard invariable for all breeds of cows and at all seasons of the year.

Various papers, such as those on "Improvements in Butter Analysis," by A. Angell; on "Tea," by G. W. Wigner; on "Adulterations of Tartaric and Citric Acids," by A. H. Allen; on "Piper Nigrum," by A. W. Blyth, etc.; show that at least some of the members of the Society are conscious that there is much to be done in the way of investigation as to questions of natural variations in food, in the detection of impurities, and the examination of the methods of quantitative analysis of such substances, etc., and are moreover anxious to give time and labour for the elucidation of such questions, and the putting of food analysis on a par with other branches of analysis. We trust that this good example will be followed by other public analysts who have hitherto done little or nothing in this direction, and that in future the

Society of Public Analysts may become a really useful subsection of that larger Association of Professional Chemists now in course of formation. A promise of this is indeed held out by the circumstance that the Council of the Society have commenced the necessary purification of their body by the ejectment from the society of members whose professional procedure and knowledge is objectionable and insufficient. We may suggest, however, that as long as any gentleman who may happen to have been chosen as public analyst by a vestry, parish, bench of magistrates, or other appointing body utterly incompetent to judge of the respective merits of candidates, is eligible for membership irrespective of whether he is really a trained chemist or not, so long must there always be at least a percentage of members of a kind that will necessarily retard the development of the Society and its usefulness; and that as long as persons not duly trained and qualified for the special work requisite are eligible for election, so long will there be a competition even for the most egregiously underpaid posts amongst medical officers of health, unsuccessful medical men, and other insufficiently qualified persons; and so long will the salaries attached to public analystships remain at their present ridiculously low average, and consequently it will be impossible for many analysts to devote *time* to the investigation of problems in the analysis of food, etc., who otherwise would be delighted so to do.

Obituary.

MICHAEL DONOVAN, M.R.I.A., ETC.

In Mr. Michael Donovan, of Dublin, whose death is announced by the *Medical Times and Gazette*, has passed away one who many years ago rendered good service to scientific pharmacy. Mr. Donovan's observations, however, were not always confined to pharmacy, he having amongst other subjects published several on galvanism and electricity, one bearing date as early as 1811, and entitled "Observations and Experiments Concerning Mr. Davy's Hypothesis of Electro-chemical Affinity." His attention was also turned at one time to the production of an illuminating gas from hydrocarbons, similar to what has more recently been termed "air gas." Mr. Donovan's name, however, will be best known to pharmacists by its connection with "Donovan's Solution," the Liquor Arsenici et Hydrargyri Hydriodatis of the Dublin Pharmacopœia, the formula for which he published in 1839. In 1843, a paper by Mr. Donovan was read at an Evening Meeting of the Pharmaceutical Society, on the extemporaneous preparation of hydrocyanic acid from cyanide of potassium. In 1861 he published the result of some experiments made on himself with tincture and extracts of herbane, which he considered proved their inefficiency as usually prescribed, and he suggested the substitution of the seeds for the leaves in their preparation. Besides these, Mr. Donovan was the author of numerous other papers, several of which have been printed in this Journal.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

TABLESPOONS, ETC.

Sir,—It would be a pity to allow the discussion on tablespoons, etc., to terminate without bearing fruit. I beg, therefore, space for a few lines to point out what I think ought to be the result of the correspondence which you have published.

Some of your correspondents have seen no difficulty worth naming; others have seen the difficulty and suggested easy modes of overcoming it—perfect cures in fact, but like most other infallible remedies, good only so long as untried. Most have acknowledged the difficulty and several have made suggestions which would be useful if carried out, but which have comparatively little worth while only partially adopted. I must confess, the whole light thrown upon the matter by your correspondents has not left my path much more clear than it was when I opened the subject,—what one has built up another has pulled down, and if I were with all judicial skill and impartiality to extract the logical verdict from the mass of testimony I should probably have as many witnesses differing from me as agreeing with me, and no one acknowledging my right or authority to lead the way to any change. I would therefore suggest that a sub-committee of the Pharmaceutical Society should be appointed from the incoming Council, who should consider the evidence and endeavour to come to some conclusion as to what course it would be desirable to pursue, probably conferring with the Medical Council as to some code of instructions which should be a guide to prescriber and dispenser, and which should be published in medical and pharmaceutical periodicals, and in a future edition of the Pharmacopœia.

It may not be out of place, while making this suggestion, to point out some of the conclusions to which I think they would be likely to come and some of the difficulties which would have to be surmounted.

I should have felt little hesitation in recommending the total disestablishment of spoonfuls as measures for medicine if I had viewed the subject from its pharmaceutical side only; but bearing in mind the millions of labels printed for surgeons and hospital use upon the spoonful scale, I cannot but feel that the pharmacist has only a secondary interest in the matter, and yet an interest which so deeply affects him that he cannot do otherwise than seek a reform if the medical profession do not.

Reverting to the circumstance which originally induced me to take up this subject, I think the pharmacist has a right and reason to protest against the writing of "ʒss. ter die" with the intention of the label being written "a dessertspoonful thrice a day."

Were we to write our labels on this plan (or upon any other assumed size of spoons, as some have suggested, ʒv. or ʒvi. as a tablespoon) we should find it necessary to caution our patients against the use of glass measures, for the measure would then become the unreliable guide and the source of error.

Some correspondents have suggested that pharmacists should not trouble themselves about the matter, so much more does it belong to the prescriber; but if disastrous consequences should follow from a misunderstanding between the prescriber's and the dispenser's directions, what pharmacist could feel that the death of the patient was no business of his?

The first article in the 'Code of Instructions' I think ought to be that where medicine is ordered by spoonfuls the dispenser should write the label by spoonfuls also, and understand the quantity to be according to the scale upon which all our graduated glasses are made, and that he should advise the use of graduated measures.

The second article should be that in view of the great disparity between the size of spoons now in use, and their reputed capacity, it is desirable to discontinue the use of the term spoonful in directions for taking medicine, and that ounces and drachms be the terms used by both prescriber and dispenser, the latter being at liberty to use such additional instructions as he deems necessary to guide the patient.

No doubt cheap forms of measures would spring up to meet the requirement of the poorer classes, the giving away or selling of which would be very safely left to the tradesman to decide according to circumstances.

The importance of the subject which has called forth twenty-one letters in your own pages, and sundry communications in the pages of your medical and pharmaceutical contemporaries, is surely not too small to claim the attention of the Council now about to be elected.

BARNARD S. PROCTOR.

Grey Street, Newcastle.

SALE OF PATENT MEDICINES.

Sir,—There are two or three subjects at the present time which seem to threaten an alteration in the business of chemists throughout the country. These matters are of the greatest importance to the whole trade, and should be at once met, if possible, by discussion, by meetings and resolutions. There are the patent medicine and the sale of poisons questions, concerning which there is the question of expense in proceeding at law against infringements of the Pharmacy Act, as pointed out by the Journal recently, as well as the expense necessary for opposing any Parliamentary measure obnoxious to the trade generally. The Journal of the 25th ult. says, "that action will be taken independently by the Government, and it would be well to have something to say about the measures proposed before, rather than after, they have become part of the law of the land." This challenge as to having "something to say" I, for one, take up, and if my suggestions should prove of any service to the trade I shall be more than repaid for the trouble and time I have taken. I am a perfectly independent member, having not the slightest knowledge of any one of the Council, and having never once attended a meeting at the Society's house. My first suggestion, then, would be that a Permanent Defence Fund be established, and I cannot think many members would object to pay a few shillings a year for this purpose when they saw that the money was spent only in furthering their interests. Should money accumulate by this means beyond what would be necessary for its object, a certain sum might be given occasionally from it to the Benevolent Fund. It is impossible for the Society to carry out any work for the benefit of the trade unless the trade give it support. To those who grumble and say "What is it doing for us?" I would reply "Try it, by giving to the Society a little gold and silver ammunition," and our battles, no doubt, will be fought. I have been one of the class of grumblers, but after reading the Editorial Article I can no longer grumble, but shall give the Society what support I am able, and I think every practical member who reads it will be inclined to give his support likewise. The perusal of this article has induced me to sit down at once and write this letter. I also think that when the Society acts, or appears to act, contrary to the interests of the trade generally, it is because it has not the opinion of the trade. We keep aloof and content ourselves with a grumble, where as we should at once let the Society know, by meetings, etc., what is and what is not to our interest.

I will now leave to others the next suggestion, which must occur to some when they read the following short account of the state of the trade in my own neighbourhood. More than seventeen years is the duration of my experience here; seventeen years ago, and up to the time that co-operation in trade began, there were in a distance occupied by about two hundred shops of every description, in a straight line on each side of the street, eleven chemists. Every one had been established for many years, and all doing, I believe, a very good business. This same distance is now supplied by five chemists, of whom one is obliged to remove from the high road into a court; one grocer, who sells drugs and labels his bottles as a chemist would, selling "Lamplough's" at 1*s.* 10*d.*, "Cockle's" at 10½*d.*, etc.; and two co-operative stores, where dispensing is carried on rather extensively. I was told the other day by a customer that he procured at one of these stores a mixture at one shilling for which I had charged two. Of the five chemists who occupy this two hundred house distance, one only does a dispensing business; the others, with myself included, principally depend upon prescribing and special preparations.

With regard to special preparations or patent medicines which perhaps form the main question at present, I wish to offer a few suggestions. I am proprietor of more than a dozen such preparations, and therefore perhaps may be heard on the subject. Some such plan as the following I should suggest. Do away entirely with the patent medicine stamp and the license. Let every article that now comes under the Patent Medicine Act be registered and adjudged worthy or unworthy of being sold as a registered medicament by a properly constituted body, composed, say, of one or two gentlemen appointed by the Privy Council, a physician or two, two or three chemists in business, and the officers of the Society. Let the constituents be placed before this authorized body, but not to be made public. Let a registration fee be imposed for every article, and a small yearly subscription be paid so long as such article is sold by the maker. If any article containing poison should be approved of, let such poison or poisons, with the quantities, be printed upon the wrapper of each article. This may appear hard to some proprietors of special preparations, but when considered without prejudice will be found to be a boon to the trade, and of infinite benefit to the public, especially the youngest portion, provided the chemist can get some protection from the inroads of grocers, drapers, and barbers. For this purpose it might be provided that no one, unless he be a chemist, should sell any drug for the purpose of administration in the relief or cure of any human ailment; or, if this should be considered too impracticable, none of these articles should be sold, but by a chemist, without a license, which should not be a small one; also that no one, unless he be a chemist, should be allowed to sell any drug or medicament, however small the parcel, unless full particulars as to dose, administration, etc., be printed upon every packet or bottle, and these to be prepared and supplied by a chemist (with his name and address upon every packet or bottle) acknowledged as such by the Pharmacy Act.

It appears to me that we are fast drifting towards a state of things which is the very opposite to that intended or contemplated by the Society. We now have barber druggists, grocer druggists, and draper druggists, and this will gradually go on till we see a preponderance of physic in their respective shops; for as the law stands what is to hinder them? The reduction of the patent medicine license has assisted them and they are now going largely into the sale of every kind of medicine. Some may say that they cannot sell much because they cannot sell poisons, but this is untrue, they can sell almost any poison if put into the form of a patent medicine, but if some such suggestion be adopted as I have above stated these sales could not be so easily carried on. As to poisons which none but chemists can sell, this is ridiculous, if I may judge of my own "poison book." On looking at it I find for the last seven years forty-six entries and twenty-five of these are for prussiate of potash, which, I believe, need not have been entered. Can it then be said that I do no business, and that like others in the neighbourhood shall soon shut up? I have stated that my business is not principally a dispensing one. On this point it may be enough to say that my rent is £250 a year, and I have a large family to bring up and educate. So that, as far as I am concerned the Pharmacy Act does not protect me; indeed, with grocer druggists around me, and the reduction of the patent medicine license, things have gone in the opposite direction, and now that fresh legislation is talked of I think there is no time to be lost, but that by discussion we should come to some understanding as to what is for the benefit of the trade and use all the influence we can to bring that good about, as also to check any obnoxious measures. There is one thing certain; that "unity is strength." Let us then, as one man, concentrate our powers upon one head—that head is the Pharmaceutical Society. It is given us, we have no other, and whether we will or not we must acknowledge it; therefore give up grumbling. Support the Society and we shall succeed in every good point we wish carried. If a defence fund be established upon a proper foundation I shall be happy to be an annual subscriber of a guinea.

April 12, 1876. G. P. P.

J. C. W.—The business could not legally be carried on under the conditions you describe, either with or without a qualified assistant.

"*Associate.*"—For formulæ of the different preparations of pepsine, including the wine, see vol. iv. [3], p. 695. A similar answer was given to you, before, p. 680.

"*Crystal.*"—The crystals are selenite, crystallized sulphate of calcium. They are frequently found in clay.

S. S.—The chief medicinal properties claimed for jaborandi are that it is a powerful sudorific and sialogogue, and remarkable results have attended the administration of an infusion of the leaves. We do not know that any general definite conclusion has been arrived at as to the dose or the best mode of administering the drug. Dr. Harley, however, gives as the dose (Royle's 'Mat. Med.') half to one oz. of the infusion (one in ten), of "pilocarpia," half grain by the mouth or one-eighth grain subcutaneously.

"*Tadpole.*"—We hardly understand what kind of book you require, but perhaps Proctor's 'Lectures on Practical Pharmacy,' would suit your purpose.

COMMUNICATIONS, LETTERS, ETC., have been received from Dr. Farr, Mr. Piper, Mr. Druce, Mr. Strachan, Mr. Willmott, Mr. Wilkinson, Mr. Miles, Mr. Langberk, Mr. Mount, Mr. Forster, Student of the Pharmaceutical Society, Censor, Teuton, Cristopher, Pharmaceutical Chemist, Beta, S. F., S. B., B. S.

GLYCEROLE OF THE SUBACETATE OF LEAD.

BY BALMANNO SQUIRE, M.B.

Surgeon to the British Hospital for Diseases of the Skin.

The Pharmacopœia already contains a certain number of glyceroles. The exceptional solvent powers of glycerine, its property of preserving for a very long time various substances, such for example as tannic acid held in solution by it, which cannot be kept for long unchanged in the form of aqueous solutions, and the adhesive properties of glycerine, have commended this menstruum already as a convenient vehicle in the composition of certain preparations. However, in my belief it has not yet obtained the consideration it fairly merits, and more especially as a vehicle for applying remedies to the skin. Greasy preparations and aqueous preparations are in many cutaneous diseases alike unsuitable as therapeutic agents, but glycerine seems to me to hold a convenient middle place between the two as a vehicle. But to enter into details on that head would be out of place here. I have to add to this, that I have found that lead in the form of the basic acetate is of more avail, speaking generally, than the remedy which is on the whole the most popular one in the treatment of cutaneous disease, namely, oxide of zinc, for achieving those ends for the furtherance of which zinc is most commonly employed. In short, I believe that the glycerole of subacetate of lead, as soon as it shall have come into extensive use, as I believe it will when it has once been generally tested by practitioners, will be an article in very large demand. If general medical opinion should prove to endorse a very long experience on my part of the action of this application in chronic eczema, a disease which is the commonest of all of that very common class of disorders—the diseases of the skin—then without question the demand for this remedy will at least equal the enormous demand which has long existed for zinc ointment. I think it therefore not unnecessary that I should describe in this Journal the mode of preparing it, since it is a preparation which although simple enough in composition requires certain special precautions in its manufacture, and is moreover a material which cannot readily be manufactured at the moment, but requires to be kept in stock. The preparation consists simply in making the plumbi subacetatis liquor with glycerine instead of water. The article thus obtained serves as a stock solution, to be diluted with seven times or three times its quantity, or even with a less proportion of pure glycerine, and to be thus used as an application to the diseased skin.

In the preparation of the substance the direction of the Pharmacopœia in reference to liquor plumbi, that the liquid shall be boiled, can scarcely be carried out, since glycerine, unlike water, decomposes at the boiling point, evolving acrid fumes, and the result would be scarcely a simple solution of the basic acetate in unmodified glycerine. On the other hand I find that if the process be conducted in a boiling water bath, the white insoluble residue left is more considerable than if the process be conducted, as I subsequently directed it to be done, in a boiling glycerine bath; although in either case the residue is less than that left in the preparation in the ordinary way of the plumbi subacetatis liquor. In other words I find glycerine to be a somewhat more ready solvent than water of the basic acetate of lead. However, the acrid fumes evolved by the boiling glycerine bath, although they do not affect the purity of the preparation itself, since the glycerine actually used in the preparation does not of course reach the boiling point, are nevertheless a cause of considerable personal inconvenience to the pharmacist, and I am indebted for a useful suggestion to my brother Peter. He has adopted the simple expedient of using an oil-bath in place of a glycerine bath, and thus while attaining the requisite temperature, keeping it a little below the boiling point of glycerine, has avoided the drawback of creating an unbearable atmosphere. A solitary fact remains to be told. The solution when made has a much greater viscidity than that of pure glycerine; indeed the solution is very viscid indeed. If filtered in the ordinary way, that is to say at the ordinary temperature, it would take a week or two at the least to filter even a small quantity of it, but if filtered at a tolerably high temperature the solution, like pure glycerine itself, temporarily loses its viscidity and runs readily through the filter. It is necessary, therefore, that the filtration should be performed in a hot chamber, a gas-oven, or steam-oven of moderate heat, so as not at least to char the filtering-paper, since in that case the filtered solution will be found to have acquired a disagreeable dark brown colour; but the filtration of course should be conducted below the boiling point of glycerine.

In conclusion I may say that the preparation has the advantage of being what in pharmaceutical phrase is termed an "elegant," that is to say an acceptable, preparation. It has the sole drawback of being somewhat, but by no means distressingly "sticky" in feel when spread over the skin, but it is not objected to nearly so much as greasy preparations of any kind by those who have had to use it. It is a clear, almost perfectly colourless solution, resembling, except as to its greater viscidity, pure glycerine, whereas the speedy relief it affords in the numerous class of cases to which it is suitable readily excuses any trivial discomfort its first application may occasion.

THE EMPLOYMENT OF PHOSPHATES IN MEDICINE.*

BY M. C. JEHL.

The important part played by phosphorus in the animal economy has induced search for various methods by which it can be rapidly diffused through the organism in cases where a sufficient quantity is not supplied by the ordinary food.

Among its compounds the French Codex mentions the—

Tribasic phosphate of lime.
Ferrous phosphate.
Phosphate of soda.
Citro-ammoniacal pyrophosphate of iron.
Pyrophosphate of soda.

The German Pharmacopœia replaces the basic phosphate of lime by the neutral phosphate with two equivalents of lime and adds—

Pyrophosphates of iron and soda.

The non-official phosphated preparations are more numerous; amongst the more usual are—

Acid phosphate of lime.
Pyrophosphate of lime and magnesia.
Hypophosphites of lime and soda.

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* *Bull. de la Soc. de Pharmacie de Bordeaux*, xvi., 44.

This list has recently been increased by preparations designated under the names of—

Lactophosphates Chlorhydrophosphates Citrophosphates	of lime or iron.

The phosphates of lime and iron are insoluble in water and consequently attempts have been made to render them soluble, frequently losing sight of the fact that the gastric juice is able to effect this, with an exception perhaps in the case of the calcined phosphates.

Persoz, professor of chemistry at Strassburg, was the first to indicate the employment of pyrophosphate of iron and soda, which was afterwards specialized by Leras under the form of a solution. It may be remarked in passing, that this mania for specialization leads to the moral and intellectual ruin of pharmacy.

The hypophosphite of lime, introduced into therapeutics by Dr. Churchill, is now much neglected. This salt is soluble in water and unalterable in the air. It can be administered in powder or in syrup.

As a general rule, all the phosphates are soluble in dilute acids. This fact suggested to Dusart the idea of preparing a syrup of phosphate of lime with lactic acid, which he called syrup of lactophosphate of lime. It is not, however, a simple physical solution, but a chemical solution.

When phosphate of lime is treated with dilute hydrochloric acid a liquid is obtained composed of acid phosphate of lime and chloride of calcium; in treating with lactic acid a solution is obtained of acid phosphate and lactate of lime. These two salts are in solution separately and it is easy to reproduce identically these two solutions by a simple mixture of the salts. In fact, if either a lactic or hydrochloric solution of phosphate of lime be neutralized with caustic potash or soda a precipitate of dicalcic phosphate of lime is formed, whilst the supernatant liquid contains chloride or lactate of lime, oxalate of ammonia causing an abundant calcareous precipitate.

Ferrous phosphate is no exception to the rule; treated with dilute acid it dissolves, and the solution which is called lactophosphate of iron is a mixture of lactate of iron and acid phosphate of iron. The gelatinous phosphate of iron is, in fact, soluble in phosphoric acid.

The improper names of chlorhydrophosphates, lactophosphates and citrophosphates, therefore, have been applied not to definite compounds, but to mixtures of salts previously known and investigated.

M. Falières, a pharmacist at Lilbourne, has stated in a recent article entitled, "Pharmacologie du phosphate de chaux," that after having found that the most hydrated phosphate of lime dissolved the best in acid liquors,—the most soluble being the freshly precipitated gelatinous phosphate and the least the calcined phosphate,—he modified the formula in such a manner that he obtained a tricalcic phosphate which dried rapidly at the ordinary temperature, crushed easily between the fingers, and yielded an impalpable powder retaining 25 per cent. of hydration. The solubility of this phosphate is nearly the same as that of the gelatinous precipitate; 1·25 parts (equal to 1 part of anhydrous phosphate) dissolving in 1·45 parts of hydrochloric acid (sp. gr. 1·17), the gelatinous requiring 1·41 parts.[*]

According to the same author, the dicalcic or neutral phosphate presents marked advantages over the basic salt for therapeutic purposes. This salt is official in the German Pharmacopœia. Obtained by double decomposition it appears as a very white crystalline powder, containing when dried at the ordinary temperature 26 per cent. of water of hydration. In these conditions this salt is more soluble than the basic.

1 part dissolves in	0·65	parts	HCl.
1 „ „	1·05	„	lactic acid.
1 „ „	1·25	„	citric acid.

Commercial preparations do not correspond to this degree of solubility, they being dried in a stove at too elevated a temperature.

The basic phosphate dissolving in acid liquors, the gastric juice, for instance, diminishes their acidity; the neutral phosphate, on the contrary, dissolves without modifying their acidity: this can be proved by estimating the free acid in the two solutions with a titrated alkaline solution.

The pulverulent or pasty lactophosphate should be banished from therapeutics. It is generally either partially or entirely insoluble, and the phosphate of lime it contains is an extremely variable quantity. The following formula yields a syrup containing an exactly definite quantity of phosphate:—

Syrup of Lactophosphate of Lime.

Basic Phosphate of Lime (Falières)	13·30	grams
Concentrated Lactic Acid . . .	24·00	„
Distilled Water	300·00	„
White Sugar	625·00	„
Alcoholate of Lemon (Codex)[†] .	15·00	„

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[*] The following is M. Falières' method of preparing the phosphate of lime referred to, as described in the *Bulletin de la Société de Bordeaux*, for April, 1875, p. 104:—

Bone Ash, white and finely powdered .	20	parts.
Hydrochloric Acid (sp. gr. 1·17) . . .	32	„
Crystallized Phosphate of Soda . . .	10	„
Water	80	„
Solution of Ammonia (sp. gr. ·923, free from carbonate	15	„

Mix the bone ash in a dish with twenty parts of water, and add the hydrochloric acid, stirring from time to time. After some days' contact, add the phosphate of soda dissolved in the remaining sixty parts of water, and filter. Add the ammonia to the liquor obtained and agitate vigorously with a boxwood spatula, or better still, with a strong osier besom. The mass soon assumes the appearance of mixed plaster. By the beating the solid mass is brought to the consistence of a thick soup. A strong ammoniacal odour shows that the point of saturation has been exceeded. The precipitate is suspended in 200 or 300 parts of cold water, allowed to settle, and then decanted; this operation is repeated five or six times, so as to wash methodically the precipitate with about one hundred times its weight of water. The precipitate is then thrown upon a previously moistened linen cloth, and allowed to drain. When it can be removed in one piece i is placed in a dish, where it is again beaten vigorously with the osier besom. If necessary, a little water may be added to thin the paste. Next divide the mass rapidly into lozenges, taking care to beat it each time before charging the mould. The lozenges exposed in the open air dry more or less rapidly according to temperature and humidity of the surrounding atmosphere; in dry weather, at the end o seven or eight days they will not contain more than 30 to 35 per cent. of their weight of moisture. The phosphate o lime can now be reduced to an impalpable powder by gentle pressure with the fingers, and with slight trituration it yield a powder that will rapidly pass through a sieve of 120 meshes to the inch. This phosphate retains fixed at th ordinary temperature at least 25 per cent of moisture.

[†] Fresh Peel, 1; Alcohol, 80°, 2: macerate eight day and filter.

20 grams of this syrup contain the elements of 0·20 gram of anhydrous tricalcic phosphate.

With neutral phosphate 15 grams of lactic acid, instead of 24, are required.

Solution of chlorhydrophosphate of lime (liqueur de Coire) can be prepared instantaneously according to the following formula:—

Basic Phosphate of Lime (Falières)	26·50 grams
Hydrochloric Acid (sp. gr. 1·17) .	30·00 „
Distilled Water	945·00 „

Dissolve.

20 grams of this solution contain 0·40 gram of anhydrous phosphate.

The following formulæ represent the so-called syrups of lactophosphate of iron and lactophosphate of iron and lime:—

Syrup of Lactophosphate of Iron.

(1) Ferrous Sulphate	50 grams
Distilled Water	750 „

Dissolve and filter.

(2) Crystallized Phosphate of Soda	150 „
Distilled Water	750 „

Dissolve and filter.

Unite the two solutions and wash the precipitate on a filter with distilled water until all the sulphate of soda is removed. Place the gelatinous precipitate in a capsule with—

Concentrated Lactic Acid . . . . 60 grams.

Agitate, and leave the solution to clear; then dilute with sufficient distilled water to bring the quantity up to 1882 grams. Add—

Sugar . . . . 3586 grams.

Make a syrup, which can be flavoured with—

Alcoholate of Lemon (Codex) . . 50 grams.

20 grams of this syrup contain 0·10 gram of dry ferrous phosphate.

Syrup of Lactophosphate of Iron and Lime.

Solution 1.

Ferrous Sulphate (pure) . . .	9·25 grams.
Distilled Water	150·00 „

Dissolve.

Crystallized Phosphate of Soda .	27·00 grams.
Distilled Water	150·00 „

Dissolve.

Unite the two solutions; wash the precipitate on a filter; and let it drain until it weighs only 100 grams. Then dissolve it in—

Concentrated Lactic Acid . . . . 11 grams.

Next take—

Solution 2.

Tricalcic Phosphate (Falières) . .	13·30 grams
Concentrated Lactic Acid . . .	24·00 „
Distilled Water	100·00 „

Dissolve.

Unite solutions 1 and 2, and complete with sufficient distilled water to bring it to a total weight of 388 grams. Filter and add—

Sugar	625 grams.
Alcoholate of Lemon	15 „

20 grams of this syrup contain 0·20 gram of anhydrous phosphate of lime and 0·10 of ferrous phosphate.

It is now generally admitted that the acidity of he gastric juice is due to hydrochloric acid, and as it is desirable to obtain phosphated compounds approaching as nearly as possible to the compounds believed to be formed in the liquids of the system, it is more advantageous to make these preparations with hydrochloric acid. Independently of their assimilation, which is at least equal to that of lactic solutions, they are superior in stability.

The following is a formula for—

Syrup of the Chlorhydrophosphates of Iron and Lime.

Ferrous Sulphate (pure) . . .	18·50 grams.
Phosphate of Soda	54·00 „
Distilled Water	q.s.
Hydrochloric Acid (sp. gr. 1·124)	20·00 ,

Tribasic Phosphate (Falières) . .	40·00 „
Distilled Water	q.s.
Hydrochloric Acid (sp. gr. 1·124)	55·0 ,

Filtered Liquor	1450
White Sugar	2500
Alcoholate of Lemon	50

Mix. Make a syrup.

The ferrous sulphate is dissolved in sweetened distilled water. The solutions are filtered. The bluish white precipitate of ferrous phosphate is washed with sugared distilled water, then dissolved in the hydrochloric acid. The phosphate of lime, rubbed up with water, dissolves rapidly in the acid. The united solutions are diluted to a total weight of 1450 grams, in which the sugar is dissolved in a porcelain capsule with the heat of a water-bath. When the solution is completed the syrup is filtered through paper and the alcoholate of lemon added.

This syrup contains 0·12 per cent. of metallic iron and 1 per cent. of dry phosphate of lime, held in solution by 0·50 per cent. of hydrochloric anhydride (HCl). The syrup has an agreeable taste.

THE EFFECTS OF CUCA, OR COCA, THE LEAVES OF ERYTHROXYLON COCA.*

BY SIR ROBERT CHRISTISON, BART., M.D., ETC.

A brief notice in an introductory address by Sir Robert Christison to the Royal Botanical Society of Edinburgh, of the restorative and preservative virtues of the cuca leaf against bodily fatigue from severe exercise, has led to many requests for more information. Although, therefore, Sir Robert considers the inquiry to be at present far from complete, he has thought it desirable to refer to the matter more fully, especially as he considers the results already obtained set at rest all doubts that the more important of the effects of cuca experienced by the inhabitants of its native country, may be equally produced in Europeans at home, and that the virtues of the leaf may, with due care be preserved for many years.

The paper in which Sir Robert Christison states his results was read at a meeting of the Botanical Society of Edinburgh on April 13th, and is printed in *The British Medical Journal*, for April 29th. The opening portion is devoted to a *résumé* of the accounts that have been given from time to time by travellers of the use of the cuca in Peru and surrounding countries. Notices of many of these have already appeared in this Journal (see especially an article in the present series, vol. i., p. 43). The original information is as follows:—

My first trials were made in 1870, when I was not aware that any one else in Europe had experimented with it. My specimen was sent to me by a London mercantile gentleman, Mr. Batchelor, six years before, and must therefore have been kept for seven years at least. The leaves had been excellently dried, flat, unbroken, and green; and they had been equally well preserved by sprinkling a little quick-lime among them before being shipped. Even in 1870 they were green, brittle, and strongly scented. Two of my students, out of the habit of material exercise for five months, tired themselves thoroughly with a walk of sixteen miles in the month of April. They returned home at their dinner hour, having taken no food since a nine o'clock breakfast. They were very hungry, but refrained from food, and took each an infusion of two drachms of cuca, made with the addition of five grains of carbonate of soda, which was added to imitate the Peruvian method of chewing the leaves along with a very small quantity of lime or plant ashes. I am satisfied, however, that any such addition is superfluous. Presently hunger left them entirely, all sense of fatigue soon vanished and they proceeded to promenade Princes Street for an hour; which they did with ease and pleasure. On returning home their hunger revived with great intensity; they made an excellent dinner; they felt alert all the subsequent evening, slept soundly all night, and next morning awoke quite active and refreshed. One of them, in setting out for the evening promenade, felt very slightly giddy, as if he had taken just a little too much wine. But the other experienced no other sensation than the removal of fatigue, and ability for active exertion.

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* From *The British Medical Journal*, April 29, 1876.

Having subsequently received from Dr. Alexander Bennett a larger supply, obtained by him in Paris, I made further trials in the spring of last year, 1875. This sample was more broken, less green, less scented than the other, less strong in taste, and scarcely producing any sense of warmth in the mouth when chewed. Obviously it was of lower quality. Ten of our students made trial of it under conditions precisely similar to those observed in the prior experiment; and they reported the results to me severally in writing. Their walks varied between twenty and thirty miles, and three cleared the latter distance on a rather hilly road at nearly four and a half mile pace over all. Two were unable to remark any distinct effect from the cuca. Several felt decided, but only moderate relief from fatigue. Four experienced complete relief, like their predecessors in 1870; and one of these had walked thirty miles without any food. All found their hunger cease for a time; but shortly afterwards neither appetite nor digestion was at all impaired. No disagreeable effect was produced at the time or subsequently, except that a few felt a brief nausea after their dose, owing probably to the form of infusion in which it was taken.

I then determined to make some careful personal trials with the scanty remains of my best specimen. For this purpose I thought it best to adopt the Peruvian method of chewing, but I discarded their lime and ashes. For not only was I unable to discover, in the nature, composition, or effects of the leaf, any chemical or physiological reason for such addition; but likewise I found that the Llipta, as the addition is called, which was presented to me with one of my specimens from Peru, has no alkaline or calcareous taste, and therefore cannot effect decomposition of the leaf while it is masticated. The result confirms the view I had thus taken.

I had first to ascertain what amount of exercise was required to cause very thorough and permanent fatigue. At the same time, I made such observations on certain of the functions as seemed desirable and easily practicable. In the beginning of May, under a day temperature of 58°, I walked fifteen miles in four stages with intervals of half an hour, at four-mile pace, without food or drink, after breakfast at half-past eight, and ending with a stage of six miles at half-past five in the afternoon. I had great difficulty in maintaining my pace through weariness towards the close, and was as effectually tired out as I remember ever to have been in my life, even after thirty miles at a stretch forty or fifty years before.* Perspiration was profuse during every stage, particularly the last of all. I took the urine solids every two hours and found a decided increase of the hourly solids during the forenoon's exercise, and a decrease during the evening's rest after dinner. The pulse, naturally 62 at rest was 110 on my arrival at home; and two hours later it was still 90. I was unfit for mental work in the evening but slept soundly all night, and awoke next morning somewhat wearied and disinclined for active exercise, although otherwise quite well. Two days afterwards I repeated this experiment, and obtained precisely the same results except that the urine-solids were not so abundant during exercise as before, although my food had been precisely the same.

Four days later, with precisely the same dietary, I walked sixteen miles in three stages of four, six, and six miles, with one interval of half an hour, and a second of an hour and a half. During the last forty-five minutes of the second rest I chewed thoroughly eighty grains of my best specimen of cuca, reserving forty grains more for use during the last stage. To make assurance doubly sure, I swallowed the exhausted fibre, which was my only difficulty. On completing the previous ten miles, I was fagged enough to look forward to the remaining six miles with considerable reluctance. I did not observe any sensible effect from the cuca till I got out of doors and put on my usual pace; when at once I was surprised to find that all sense of weariness had entirely fled, and that I could proceed not only with ease, but even with elasticity. I got over the six miles in an hour and a half without difficulty, found it easy when done to get up a four and a half mile pace, and to ascend quickly two steps at a time to my dressing room, two floors upstairs in short, had no sense of fatigue or other uneasiness whatsoever. During the last stage, I perspired as profusely as during the two previous walks. On arrival at home, the pulse was 90, and in two hours had fallen to 72; the excitement of the circulation being thus much less, and its subsidence more rapid, than after the same amount of exercise without cuca. The urine solids hourly were much the same while the exercise lasted as during exercise on the day of fifteen miles' walking without cuca, although the breakfast dietary was precisely the same. During the evening's rest, the urine solids were almost the same as during the preceding period of exercise—a fact which is capable of more interpretations than one.† On arriving at home before dinner, I felt neither hunger nor thirst‡ after complete abstinence from food and drink of every kind for nine hours; but on dinner appearing in half an hour, ample justice was done to it. Throughout the evening I was alert, and free from all drowsiness. Two hours of restlessness on going to bed I ascribed to the dose of two drachms being rather large; and after that I slept soundly, and awoke in the morning quite refreshed, and free from all sense of fatigue, and from all other uneasiness. Another effect, not unworthy of notice, was that a tenderness of the eyes, which for some years has rendered continuous reading a somewhat painful effort, was very much mitigated during all the evening.

I reserved what remained of my good specimen of cuca for further trial during my autumn holidays in the country. On September 15th, while residing at St Fillans on Loch Earn, I ascended Ben Vorlich. The mountain is 3224 feet above the sea, and 2900 feet above the highway on the loch side. The ascent, is for the most part easy, over first a rugged footpath, and then through short heather and short deep grass; but the final dome of 700 feet is very steep, and half of it among blocks and slabs of mica-slate, the abode of a few ptarmigan, of which a small covey was sprung in crossing the stony part. On the whole, no Highland mountain of the same height is more easily ascended. The temperature at the side of the lake was 62°; on the summit, 52°. In consequence of misdirection, I had to descend an intervening slope on the way, so that the whole ascent was 3000 feet perpendicular. I took two hours and a half to reach the summit, and was so fatigued near the close, that it required considerable determination to persevere during the last 300 feet. I was richly rewarded, however, by an extremely clear atmosphere, and a magnificent mountainous panorama, of which the grandest object was Ben-Nevis, forty miles off, shown quite apart from other mountains, and presenting the whole of its great precipice edgeways to the eye. My companions, who, as well as I, were provided with an excellent luncheon, soon disposed of it satisfactorily; but I contented myself with chewing two-thirds of one drachm of cuca leaves. We spent three-quarters of an hour at the top, during which I looked forward to the descent with no little distrust. On rising to commence it, however, although I had not previously experienced any sensible change, I at once felt that all fatigue was gone, and I went down the long descent with an ease like that which I used to enjoy in my mountainous rambles in my youth. At the bottom, I was neither weary, nor hungry, nor thirsty, and felt as if I could easily walk home four miles; but that was unnecessary. On arriving home at five o'clock, I still felt no fatigue, hunger or thirst. At six, however, I made a very good dinner. During the subsequent evening, I was disposed to be busy, and not drowsy; and sound sleep during the night left me in the morning refreshed and ready for another day's exercise. I had taken neither food nor drink of any kind after breakfasting at half-past eight in the morning, but I continued to chew my cuca till I finished the sixty grains when half-way down the mountain. I had not with me in the country any apparatus for observations on the renal secretion.

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* The degree of fatigue thus occasioned by no great amount of exercise was owing partly to the experimentalist having been quite out of the habit of much exercise for five months, and partly to his having to carry the weight of seventy-eight years.

† See Supplement, p. 885.

‡ Perhaps it should be mentioned that at all times I have been exempt from thirst under a long day's continuous exercise.

Eight days afterwards, I repeated the experiment, but used ninety grains of cuca. Being better acquainted with the way, no ground was lost by any intervening descent, so that the perpendicular height to be reached from the highway was 2900 feet. I took two hours and a quarter to ascend, and on reaching the summit was extremely fatigued. The weather had changed, so that the temperature 51° at the loch-side, was 41° at the top. A moderate breeze consequently caused so much chilliness that my party were glad to redescend in half an hour, by which time I had consumed two-thirds of the cuca, taking, as formerly, neither food nor drink. The effects were precisely the same, perhaps even more complete, for I easily made the descent without a halt in an hour and a quarter, covering at least four miles of rugged ground; and I walked homewards two miles of a smooth level road to meet my carriage. I then felt tired, because nearly three hours had elapsed since I consumed the cuca, and in that time the Peruvians find it necessary to renew their restorative. But there was no more cuca left, and I was tempted to substitute a draught of excellent porter. I suppose this indulgence led on to the unusual allowance of four glasses of wine during dinner, instead of one or none; and the two errors together, with possibly some discordance between cuca and alcohol, were the probable cause of a restless feverish slumber during the early part of the night; but quiet sleep succeeded, and I awoke quite refreshed and active next morning.

One of my sons, who accompanied me on both occasions, used cuca the first time, but also took luncheon on the summit. Though not in good condition for such work, he made it out without fatigue; and on the second occasion, when there was no more cuca to give him, he felt decidedly the want of it when he reached the highway at the foot of the mountain.

These trials have been described particularly, because I feel that, without details, the general results, which may now be summarized, would scarcely carry conviction with them. These are the following. The chewing of cuca removes extreme fatigue, and prevents it. Hunger and thirst are suspended; but eventually appetite and digestion are unaffected. No injury whatever is sustained at the time or subsequently in occasional trials; but I can say nothing of what may or may not happen if it be used habitually. From sixty to ninety grains are sufficient for one trial; but some persons either require more, or are constitutionally proof against its restorative action. It has no effect on the mental faculties, so far as my own trials and other observations go, except liberating them from the dulness and drowsiness which follow great bodily fatigue. I do not yet know its effect on mental fatigue purely. As to the several functions, it reduces the effect of severe protracted exercise in accelerating the pulse. It increases the saliva, which, however, may be no more than the effect of mastication. It does not diminish the perspiration, so far as I can judge. It probably lessens the hourly secretion of urine solids. On this point I cannot yet speak with any confidence, because it appears to me that the investigation of the action of *paratriptics*, or those substances which seem to lessen the wear and tear of the textures of the body in the exercise of their several functions, involves considerations and precautions which have escaped the attention of experimentalists on this interesting question, and which my own experiments hitherto have not taken completely into account.

I have made no trials of the influence of cuca on disease, or the consequences of disease. Some notices in the journals on this subject show that it is attracting attention; but, so far as I see, it is a difficult one, and may prove extensive, and therefore it ought to fall into the hands of some able inquirer, who will be in no hurry to rush into print. I have been asked by correspondents in the south of England if cuca will do good to a weak heart, to an old paralysis, to the feebleness of advancing age, etc. My reply has been, that I know nothing of all this, and that no one should use it medicinally, but under the advice and observation of his medical attendant.

A more convenient form for use than that of a quid is very desirable. M. Laumaillé, who rode, or on very bad roads led, his bicycle 760 miles from Paris to Vienna in little more than twelve days, in the month of October, carried with him, as part of his scanty baggage, "a small supply of the liqueur de coca, an Indian tonic, by which he was always able to assuage the sudden and painful hunger which sometimes accompanies continued exertion."* Unfortunately, he gives us too little of his experience with it; but he observes that, when about sixty miles from Vienna, "continuing his way along a road of fluid mire, fatigue and sleep at length told upon him, but the marvellous liqueur de coca again supported him and gave him strength."* I have made by rule of thumb a very palatable liqueur, with only a fourth of rectified spirit, and containing in half an ounce the soluble part of sixty grains of leaves, but I have not yet tested its virtue. Pharmaceutical chemists, however, will soon solve this problem, and, it may be hoped, without looking for a patent.

SUPPLEMENT.

Since producing the preceding account to the Botanical Society, it has occurred to me that, on its appearance in a medical journal, there ought to be some notice of the experiments alluded to on the urinary secretion, although they are incomplete. During their performance, I took exactly the same breakfast—always at half-past eight, viz., twelve ounces of tea, containing 300 grains of sugar, and one fluid ounce of cream, not over rich, one egg, weighing two ounces and a half, seven ounces of brown bread, and 360 grains of butter. No food or drink of any kind was taken after that till dinner, about six o'clock. I did not reduce that to positive rule; but, being simple, the nutriment was easily kept nearly equivalent, which was all that was necessary for my immediate object. I ascertained the urine solids separately every two hours during the interval between 8½ A.M. and 4½ or 5 P.M., but at longer intervals in the evening and night. It was sufficient for my purpose to ascertain the solids from the volume and the density, which I took very accurately by the weighing bottle; and in the calculation I used the formula proposed by me many years ago, and found by others to be correct for healthy urine, and which I again verified. This allows 2·33 grains per 1000 of volume for every degree of density above that of distilled water. I have no doubt this estimate is correct in my own instance, when living, as on the occasion in question, regularly in all respects. More refined results require laborious chemical analysis; but that is not necessary for determining simply the relative wear and tear of the organs of the body, under a few simple conditions, as denoted by the secretion from the kidneys.

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* 'Paris to Vienna by Bicycle.' By W. Saunders. Tinsley Brothers, London, 1875, pp. 7 and 28.

The following is a tabular view of my best observations —1, nearly at rest; 2, under hard exercise; 3, under the same hard exercise, but with the aid of cuca.

	Hourly Solids of the Urine under		
	Rest.	Exercise.	Exercise with cuca.
8½ A.M. to 10½ A.M.	27·1 grs.	40·1 grs. 3 miles	32·6 grs. 4 miles
10½ A.M. to 12½ P.M.	31·7 ,,	40·0 ,, 3 ,,	32·5 ,, 6 ,,
12½ P.M. to 2½ ,,	32·9 ,,	40·7 ,, 3 ,,	32·0 ,, rest and cuca
2½ ,, to 4½ ,,	30·8 ,,	28·6* ,, 6 ,,	,, 6 and cuca
4⅓ ,, to 11 ,,	29·0 ,,	32·0 ,, rest	33·5 ,, rest
11 ,, to 4 A.M.	30·7 ,,	36·0 ,, sleep	39·5 ,, slp. distbd.
4 A.M. to 8 A.M.	33·3 ,,	32·0 ,, sleep	27·1 ,, sound sleep.

It is fruitless to attempt to explain all the deviations here indicated from what might have been anticipated according to received doctrines. I think I see how further experiment may clear them up. At present, I may only observe that great fallacies surround all inquiries in which the condition of the urine is taken only in the aggregate for four and twenty hours; and that the sudden decrease of urine solids noted thus* raise a suspicion that, under a sense of much fatigue, such as was felt at this period of exercise, the action of the kidneys may languish like other functions.

RECOVERY OF PHOTOGRAPHIC WASTE PRODUCTS.*

BY CHARLES A. PITKIN, A.B.

Having had occasion to recover some photographic waste, and being unable to find anywhere a concise abstract of various methods that have been suggested, the writer thought that the following collection which he hastily made, might possibly be of service to others.

1. Nitrate bath. *α.* Recovered. *β.* Renovated.
2. Hyposulphite bath.
3. Reduction of silver chloride, oxide, or sulphide.
4. Gold waste. *α.* Recovered. *β.* Separated from silver.
5. Paper waste and washings from positive prints.
6. Cyanide solution.
7. Developer.

I. *Nitrate Bath.* *α. Recovered.*

(1.) Add solution of caustic potash by lime as long as there is a brown precipitate. Allow to settle, pour off liquid, and accumulate silver oxide for reduction; *vide* III. below.

(2.) For 1 lb. silver, add 1 oz. sulphuric acid and ½ lb. zinc, and allow to stand two days. Precipitate as chloride, wash eight or ten times by decantation, and dissolve gradually in nitric acid.

(NOTES.—Test complete washing by chlorhydric acid. Wash with water till zinc nitrate is removed. If zinc clings to silver, wash with chlorhydric acid.)

(3.) Suspend sheet of copper in bath for two or three days.

(4.) Acidify with nitric acid, precipitate as silver chloride by sodium chloride or chlorhydric acid, and reduce as *vide* III. below.

(5.) Immerse in bath two strips of copper attached to the poles of a Daniell's or Smee's cell. Silver deposited on the copper as in (3) above.

(6) Add sodic bicarbonate or sodic hydrate. Reduce as III. below, or, if pure enough, dissolve precipitate at once in nitric acid.

(7) Concentrate bath, make alkaline by sodic carbonate, and add aqueous solution of oxalic acid, neutralized with sodic carbonate. Filter, dry, and fuse with equal weight sodic bicarbonate.

(8.) Deposit, either with battery or without, on iron. (Iron can be obtained purer than zinc or copper, and possesses the additional advantage that the iron salts, as iodides, etc., are all quite soluble.) Fuse with potassium nitrate and sodium carbonate.

β. Renovated.

(1.) Dilute with three volumes of distilled water. Expose to sunlight, filter, add sodic carbonate till slight turbidity. Expose to sunlight six hours more, filter, add sodic carbonate till silver all thrown down. Wash precipitate by decantation, and dissolve in nitric acid. Filter again, make up to 35 grms. to oz., neutralize, expose to sun a week, and bath is ready for use.

(2.) Neutralize with ammonia till just alkaline, boil till black; let cool, filter, acidify with pure nitric acid. and evaporate to crystallization, then fuse. When cool, add distilled water, shake, and let stand exposed to light. Filter, and add drained crystals. Dissolve, and make solution acid with pure nitric acid. Expose again to sunlight, filter, and bath is ready for use.

(3.) Add potassic permanganate, expose to sunlight, filter, acidify, put in clean bottles four-fifths full, cork, and freeze in a tray; thaw gradually, till ball of ice one-eighth size of bottle remains. This contains impurities, to be reduced as III. below. Use rest for new bath at once.

II. *Hyposulphite Bath.*

(1.) Precipitate as silver sulphide, by potassium sulphide. Reduce as III. below, or dissolve in nitric acid.

(2.) Precipitate by hydrogen sulphide, and reduce as III.

(3.) Decompose hyposulphite by waste nitro-sulphuric acid from manufacture of gun-cotton for collodion. Have silver sulphide and sulphur, with sodium nitrate and sulphate in solution. Suspend zinc in solution, then boil two or three hours, wash on filter, dry, fuse with borax and sodic carbonate.

(4.) Suspend sheet copper in bath.

(5.) Add chlorhydric acid, which sets free sulphur and precipitates silver chloride. Oxidize sulphur by aqua regia, and reduce silver chloride as in III.

(6.) Add sodic hypochlorite to the alkaline solution. Wash precipitate, and fuse with mixed carbonates. This gives sodic bisulphate and chloride as by-products, no sulphur, no fumes.

III. *Reduction of Silver Chloride, Oxide, or Sulphide.*

(1.) Mix with one-third weight of colophony. Heat moderately in crucible till greenish blue flame ceases, then suddenly increase heat, and obtain a button of metal.

(2.) Melt with alkaline carbonates enough to cover surface from air; then mix with 75 per cent. of chalk and 4 per cent. of charcoal and heat.

(3.) Ignite with nitre on red hot plate, carefully and in small quantities to avoid explosion, run down to button with borax and sodic carbonate.

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* From the *American Chemist*, for February, 1876.

(4.) If *chloride*, reduce to *oxide* by boiling with strong potash, then reduce by glucose; or boil the chloride with glucose and sodic carbonate.

(5.) Add silver *chloride*, dissolved in ammonia, to a boiling solution of one part glucose and three parts sodic carbonate in 40 per cent. of water, keeping up the boiling all the time.

(6.) Add to silver *chloride*, sodium hydrate in solution and grape sugar, and expose to sunlight in open dish, with occasional stirring. Reduces to dark brown oxide of silver, soluble in nitric acid.

(7.) Mix with five times weight of sodium carbonate. Fill Hessian crucible half full, and sprinkle sodium chloride over top. Heat slowly in anthracite fire. After half an hour increase heat till crucible is white hot. When complete fusion has taken place, allow to cool and break out button of silver.

(8.) Fuse with two parts mixed carbonates (soda and potash).

(9.) Add pure zinc and dilute sulphuric acid, and let stand two days. Wash silver off with water acidulated with sulphuric acid, to remove all zinc; finally fuse to a button.

(10.) Mix with half weight dry sodic carbonate and one-fourth weight clean dry sand, and ignite.

IV. *Gold Waste.* α. *Recovered.*

(1.) Make just acid with chlorhydric acid, add solution containing 2 oz. pyrogallic acid, shake, let stand 24 hours, filter. Dissolve in aqua regia, and product after evaporation will be found better for toning than that precipitated by iron.

(2.) Acidify toning bath, and add sulphate of iron (2 grms. to 1 grm. chloride of gold).

β. *Separated from Silver.*

(1.) Treat button obtained by fusing waste from hypo-toning and fixing baths with dilute nitric acid. Wash insoluble part with ammonia to remove silver chloride, if present, and dissolve in aqua regia.

(2.) Digest 20 grms, in flask with 1 fl. dr. chlorhydric acid, 15 mm. nitric acid, and 2 dr. water. After quarter of an hour boil, add 2 oz. water, filter. Silver chloride with organic matter, etc., left undissolved. Reduced as III. above.

(3.) Add excess pure potassium hydrate, and then boil in flask with excess of solid oxalic acid.

V. *Paper Waste.*

(1.) Soak paper in strong solution of saltpetre, and burn.

(2.) Treat with nitric acid, precipitate with sodium chloride or potassium hydrate, then put with III. above for reduction.

Washings from Positive Prints.

Precipitate by sodium chloride, potassium hydrate, or on copper plates, etc., etc., as above, and reduce as in III.

VI. *Cyanide Solution.*

(1.) Dilute with water, precipitate by (1) potassium sulphide, (2) sodium chloride, and reduce as III.

(2.) Decant bath into iron kettle, warm, add ferrous sulphate slowly, till slight precipitate of oxide. Make alkaline, and add solution of grape sugar till brownish-yellow colour. Allow to settle, siphon off liquid. Wash sediment on filter, and ignite to recover silver.

(Note.—Ferrous sulphate forms ferrocyanide; therefore no free alkaline cyanide should be present.)

VII. *Developer.*

(1.) *Vide* II. (3), (4), (5), (6), with hypo bath. II. (1) and (2) not applicable, for sulphide of iron would be formed.

(2.) Reduced by its own iron (if ferrous sulphate).

Note. — The above methods were taken from the *Philadelphia Photographer*, the *British Photographic Journal*, *Hardwich's Photographic Chemistry*, etc., etc. I. α 8 and IV. β 3 were suggested by Professor W. N. Hill.

PRIORITY OF DISCOVERY OF PILOCARPINE. OR JABORANDINE.

The following correspondence upon this subject appears in the *Journal de Pharmacie et de Chimie* for May:—

"To the Editor of the *Journal de Pharmacie et de Chimie.* "London, March 9, 1876.

"Sir,—In the *Journal de Pharmacie et de Chimie* for February last, you gave an extract from my researches upon jaborandi, and you infer that my results confirm those of M. Hardy. As this statement gives to M. Hardy the priority of the discovery, will you have the kindness to point out to me in what publication and at what date M. Hardy made known his discovery?

"The method of obtaining this alkaloid was published by me in the *Pharmaceutical Journal*, May, 1875.

"I should be much obliged if you furnish me with this information. Accept, etc., "Gerrard."

In reply to this letter, M. Hardy requested the Editor of the above journal "to insert an extract from the note that he published in the *compte rendu* of the sitting of the Société de Biologie, on the 13th of March, 1875:"—

"The different principles of jaborandi are easily obtained in the following manner:—Make an infusion of the leaves or stalks, and evaporate to the consistence of an extract; treat the aqueous extract with alcohol, evaporate, and dissolve the new alcoholic extract in water, add ammoniacal solution of acetate of lead, and filter. Remove excess of lead from the solution by a current of sulphuretted hydrogen, again filter, and evaporate the solution, at first at a low temperature, afterwards in a vacuum. An abundant crystallization of a salt of potash is thus obtained; there remains an uncrystallizable liquid in which the jaborandi (*sic*) occurs combined with acetic acid and mixed with a little salt of potash. These two substances are separated in various ways. . . .

" . . . A better process, based upon the property the alkaloid possesses of combining with the salts of mercury consists in converting the alkaloid into a hydrochlorate. Bichloride of mercury is added to the aqueous solution obtained after the action of the sulphuretted hydrogen; a white precipitate is formed immediately by the union of the alkaloid with the mercurial salt, whilst the acid passes into the mother liquor. The precipitate is washed and decomposed with sulphuretted hydrogen, and a solution collected containing the hydrochlorate.

"The presence of the alkaloid can be detected by the reactions suited to this group of compounds, and particularly by the precipitates produced by the double iodide of mercury and potassium, iodized iodide of potassium, and phosphomolybdic acid. The alkaloid itself can be liberated by treating a solution of the hydrochlorate with ammonia and shaking with ether; the evaporation of the ether gives the free alkaloid. There is obtained then . . . a particular alkaloid which may be called 'jaborandine,' or, preferably, 'pilocarpine,' after the name *Pilocarpus pinnatus* given to the plant by M. Baillon. It possesses the properties of the extract of jaborandi. Acetate of pilocarpine injected under the skin of a dog in the laboratory of M. Claude Bernard rapidly caused the death of the animal. The same experiment, repeated by M. Bochefontaine in the laboratory of M. Vulpian, caused the death of a guinea pig in an hour and a half. M. Bochefontaine also found that acetate of pilocarpine, injected into the veins of a dog, provoked salivation, tears, diarrhœa, and caused death with the characteristic symptoms and lesions."

THE HANBURY MEMORIAL FUND.

On Thursday morning, at eleven o'clock, a meeting of the Committee formed for the purpose of establishing a memorial in honour of the late Daniel Hanbury, was held at 17, Bloomsbury Square. The chair was taken by Mr. Thomas Hyde Hills.

Professor Attfield (one of the provisional honorary secretaries) having read the minutes of the previous meeting and reported the work done since that date, several gentlemen who had expressed their willingness to join the Committee, were elected.

It was then proposed by Dr. B. W. Richardson, F.R.S., seconded by Mr. Hemingway, and resolved unanimously—

> "That this Committee—composed of more than 200 gentlemen, including many Fellows of the Royal Society, Chemical Society, and Linnæan Society, several Members of the London Institution, and a large number of Members of the Pharmaceutical Society, and other Pharmacists—approve of the action taken by the Council of the Pharmaceutical Society in resolving to raise a memorial in honour of the late Daniel Hanbury."

It was next proposed by Mr. Thomas Adams, Member of the Board of Managers of the London Institution, seconded by Professor Bentley, and resolved unanimously—

> "That the members of this Committee approve of the suggestion respecting the form which the Hanbury Memorial should take, namely, a Medal or Medals to be offered (annually or otherwise) for high excellence in the prosecution or promotion of original research, in the Natural History and Chemistry of Drugs."

The following gentlemen were then elected as the Executive of the Fund :—

President.

Thomas Hyde Hills, F.C.S., F.L.S., President of the Parmaceutical Society of Great Britain.

Vice-Presidents.

Professor Abel, F.R.S., President of the Chemical Society.
Dr. Allman, F.R.S., President of the Linnæan Society.
Professor Balfour, F.R.S., University of Edinburgh.
Dr. Bennett, F.R.S., President of the Royal College of Physicians.
Professor Bentley, M.R.C.S., F.L.S.
Sir George Burrows, Bart., F.R.S., late President of the College of Physicians.
Sir Robert Christison, Bart., F.R.S., President of the British Medical Association.
Charles Darwin, F.R.S., F.G.S., F.L.S.
Warren De la Rue, D.C.L., F.R.S., F.C.S.
Dr. J. E. De Vrij, The Hague.
Josef Dittrich, Bohemian Pharmaceutical Society, Prague.
Dr. George Dragendorff, Professor of Pharmacy in the University of Dorpat.
Dr. Hermann von Fehling, Professor of Chemistry in the University of Stuttgart.
Dr. F. A. Fluckiger, Professor of Pharmacy in the University of Strassburg.
Dr. A. W. Hofmann, F.R.S., Berlin.
Dr. Hooker, C.B., President of the Royal Society.
Dr. Thomas Sterry Hunt, F.R.S., Boston, U.S.
J. Gwyn Jeffreys, LL.D., F.R.S.
Sir John Lubbock, Bart., M.P., F.R.S.
Daniel Oliver, F.R.S., F.L.S., Royal Gardens, Kew.
Sir James Paget, Bart., F.R.S., President to the Royal College of Surgeons.
Professor Redwood, President of the British Pharmaceutical Conference.
John Simon, D.C.L., F.R.S.

Treasurer.—John Williams, F.C.S.

Hon. Secretaries.—Professor Attfield, M. Carteighe, F.C.S., Elias Bremridge.

Sub.-Committee.

T. Adams.
J. Attfield.
A. Bottle.
H. B. Brady.
M. Carteighe.
T. H. Hills.
J. Mackay.
B. W. Richardson.
J. Williams.

General Committee.

Abraham, John.
Ainslie, William.
Aitken, William, M.D., F.R.S.
Allchin, Alfred.
Atherton, John Henry, F.C S.
Baildon, Henry C.
Baker, William.
Barnes, J. Benjamin, F.C.S.
Barron, Frederick,
Baynes, James.
Benger, F. Baden, F.C.S.
Bernays, A J, Ph.D., F.C.S.
Betty, Samuel C.
Bishop, Alfred.
Borland, John.
Bowerbank, Joseph.
Bowman, W., F.R.S., F.R.C.S.
Brend, Thomas.
Broad, John.
Brown, William Scott.
Brunton, T. L., M.D., F.R.S., D. Sc.
Buchanan, James.
Buckman, J., F.G.S., F.L.S.
Bull, Wm., F.L.S., F.R.G.S., F.Z.S.
Bullock, John Lloyd.
Busk, George, F.R.S., F. G.S.
Carruthers, William,. F.R.S., F.L.S., F.G.S.
Clapton, Edward, M.D., F.L.S.
Clarke, Hyde F.S.S., F.A.S.L.
Coleman, Alfred.
Colvile, Sir James W., F.R.S.
Constance, Edward.
Cooper, Thomas.
Corder, Octavius.
Cortis, Charles.
Cottrill, Gilbert Jones.
Cracknell, Charles.
Craig, William, M.D., F.R.S.
Craik, George Lillie.
Davis, D.
Deane, James, F.L.S.
Delves, George.
Down, J. L., M.D., F.R.C.P.
Duncan, Alexander.
Evans, Henry Sugden, F.C.S.
Faulconer, Robert Steed.
Flux, William.
Fox, Wilson, M.D., F.R.S.
Francis, William, F.C.S.
Frankland, Edward, F.R.S. D.C.L., Ph.D.
Franks, Augustus {Wollaston, M.A., F.R.S., F.G.S., F.R.A.S.
Frazer, Daniel.
Gale, Samuel, F.C.S.
Garratt, John Colpman.
Gilmour, William.
Gladstone, J. H., F.R.S., Ph.D.
Glaisher, James Whitbread Lee, M.A., F.R.S., F R.A.S.
Gostling, Thomas Breston.
Greenhow, Edward Headlam. M.D., F.R.S.
Greenish, Thomas, F.C.S., F.R.M.S.
Groves, Thomas Bennett, F.C.S.
Gurney, S., F.R.G.S , F.L.S.
Guy, W. A., M.B., F.R.S.. F.S.S., F.R,M.S., V.B.S.S.
Guyer, James Brett.
Hampson, Robert.
Hanbury, Cornelius, F.C.S.
Hargraves, Henry Lister.
Haselden, Adolphus F., F.L.S.
Havill, Paul.
Hayward, William G.
Hemingway, Alexander.
Henslow, Rev. G., M.A., F.L.S.
Hogarth, William.
Hooper, Bartlett.
Hopkin, William King.
Howden, Robert.
Hudson, Robert, F.R.S., F.G.S., F.L.S.
Humpage, Benjamin.
Hurst, John Becket.
Hutchinson, Jonathan.
Jackson, Thomas.
Jackson, William.
Jago, James, M.D., F.R.S.
Johnson, John Borwell.
Johnson, William.
Jones, Michael.
Jones, Samuel Urwick.
Kemp, David.
Kinninmont, Alexander.
Langford, John Brown.
Levier, A.
Linford, John Samuel, F.C.S.
Lloyd, James R.
Longstaff, G. D., M.D., F.C.S.
Macdonald, A., M.D., F.R.C.P.
Maclagan, D., M.D., F.R.C.P.
McLeod, Herbert, F.C.S.
Macmillan, Alexander, F.L.S.
Marreco. Professor A. F.
Martindale, William, F.C.S.
Masters, M. T., M.D., F.R.S.
Mee, George.
Moinet, F. W., M.D., F.R.C.P.
Morland, Charles Coleby.
Moss, John, F.C.S.
Napier, James R., F.R.S.
Odling, William, M.B., F.R.S.
Owen, John.
Parkinson, Robert, Ph.D.
Paul, Benjamin Horatio, F.C.S.
Payne, Sydney.
Pedler, Alexander, M.R.C.S.
Pedler, George Stanbury.
Penney, William.
Perkin, Wm. H., F.R.S , F.C.S.
Prince, Arthur George.
Prior, George Thomas.
Prior, R. C. A., M D., F.L.S.
Procter, Wm., M.D., F.C.S.
Proctor, Barnard Simpson.
Proctor, M.
Radley, William Valentine.
Randall, Wm. Brodribb, F.C.S.
Ransom, William.
Rees, George O., M.D., F.R.S., F.G.S.
Reynolds, J. R., M.D., F.R.S.
Reynolds, Richard, F.C.S.
Rimmington, Felix M., F.C.S.
Robbins, John, F.C.S.
Salter, S. J. A., M.B., F.R.S., F.L.S., F.G.S.
Sanderson, J. S. B., M.D., F.R.S.
Sandford, George Webb.
Saunders, Wm. Wilson, F.R.S., F.L.S.
Savage, William Dawson.
Schacht, G. F., F.C.S.
Schweitzer, Julius, F.C.S.
Senier, Alfred, M.D., F.C.S.
Shaw, John.
Shillitoe, B., F.R.C.S., F.L.S.
Smith, Edward, F.C.S.
Smith, William Frederick.
Smith, Worthington G., F.L.S.
Sorby, Henry Clifton, F.R.S., F.L.S., F.G.S.
Southall, William, F.L S.
Sowerby, William, F.L.S.
Spencer, Thomas.
Squire, Peter.
Stevenson, T., M.D., F.C.S.
Sutton, Francis, F.C.S.
Taylor, A. S., M.D., F.R.S.
Taylor, George Spratt.
Thomas, W.
Thompson, Andrew.
Thompson, John Thomas.
Thresh, John Clough
Tichborne, C. R. C., M.R.I.A., F.C.S.
Tilden, W. A., D.Sc., F.C.S.
Tomlinson, C., F.R.S., F.C.S.
Trimen, Henry, M.B., F.L.S.
Troake, Marler Hamilton.
Turner, John.
Tuson, Richard V., F.C.S.
Tylor, Edward Burnett, F.R.S.
Umney, Charles, F.C.S.
Veitch, Harry James, F.L.S.
Voelcker, A., F.R.S., Ph.D.
Walker, William Henry.
Walsh, Edward.
Waring, E. J., M.D., F.L.S.
White, James Walton.
Whitfield, John, F.C.S.
Williams, C. J. B., M.D.
Wilson, Edward.
Wright, C. R. A., D.Sc.. F.C.S.
Wright, E. Perceval, M.A. M.D., F.L.S.
Young, James Robert.

Subscriptions not exceeding One Guinea each—a list of which will be published in the next succeeding numbers of the *Pharmaceutical Journal*- may be sent to either of the Honorary Secretaries.

The Pharmaceutical Journal.

SATURDAY, MAY 6, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PROPOSED HANBURY MEMORIAL.

RATHER more than a year has now passed since the death of DANIEL HANBURY, and although the sense of how great the loss was to pharmaceutical science was immediate, it promises to be no less lasting. The recognition of the value of the services of the life thus apparently prematurely closed has proved to be as wide-spread as the use of drugs amongst civilized nations. It is not remarkable, therefore, that in many minds the thought was formed that some plan should be adopted to give utterance in a lasting form to this general tribute of respect.

Mr. GREENISH only put this thought into words when at the December meeting of the Council of the Pharmaceutical Society he suggested that a "HANBURY Gold Medal" should be founded, to be awarded for original research in connection with materia medica and pharmacy. The proposition was brought into a more definite shape in a communication to this Journal from Professor DRAGENDORFF, of Dorpat. That gentleman proposed that a gold medal should be founded by the Pharmaceutical Society of Great Britain, with the co-operation of all other English and foreign pharmaceutical associations, and that an award of it should be made annually, under the name of the "HANBURY Medal," to a scientific man who has especially distinguished himself by genuine original research in the domain of pharmaceutical science, or the natural sciences bearing upon pharmacy.

The subject being thus ripe for discussion, it was brought before the Council of the Pharmaceutical Society at its February meeting by the PRESIDENT, who proposed that a Committee should be formed, consisting of the Council, Examiners, Professors and others, who should be charged with the carrying out of the details for the establishing of a HANBURY Memorial Fund.

The proposition was adopted and after two or three preliminary meetings of this Committee a general meeting of gentlemen favourable to the project was held on Thursday morning with the results described on the opposite page. It will be seen that the Committee was able to announce the adhesion of the Presidents of many of the learned Societies and of a considerable number of scientific men at home and abroad; indeed there appears every prospect of success. Two resolutions were passed by the meeting; one approving of the action taken by the Pharmaceutical Society, and the other approving of the suggestion that the memorial should take the form of a "HANBURY Medal, to be awarded for high excellence in the prosecution or promotion of original research in the chemistry and natural history of drugs by investigators in any part of the world."

We hope and believe that the decision will meet with a hearty and cosmopolitan response. As has been well said by Professor DRAGENDORFF, "He who labours for the advancement of pharmaceutical science acquires an international importance. An Englishman by birth, HANBURY lived and worked for all civilized peoples. If therefore his memory is to be honoured his international reputation should be taken into consideration." Foreign pharmaceutical societies in which his name was always mentioned with respect, and pharmacists at home, are alike privileged in being able to associate in this tribute to a man who has honoured their common calling.

Subscriptions to the HANBURY Memorial Fund, which must not exceed one guinea, are now invited by the Committee. These subscriptions may be sent to either of the Secretaries. Post Office Orders should be made payable at the West Central District Office, Holborn.

THE DISCOVERY OF PILOCARPINE.

ON p. 887, will be found some correspondence in reference to the priority in the isolation of the alkaloidal principle of Jaborandi, which appears in the *Journal de Pharmacie* for May. From this it would seem that M. HARDY claims to have published the discovery at a sitting of the Société de Biologie, on the 13th of March, 1875; Mr. A. W. GERRARD'S announcement was printed in the *Pharmaceutical Journal*, for May 1. It is not quite clear, however, when M. HARDY'S communication was first made known to the outside world. At any rate we cannot congratulate our French colleague on his success in making his discovery known, for the ignorance which we ourselves before expressed concerning it was evidently shared at the commencement of the present year by at least one of the editors of the *Journal de Pharmacie*, Dr. MEHU. In his *Annuaire de la Pharmacie*, dated January, 1876, Dr. MEHU, writes (p. 327), "C'est à M. W. GERRARD, d'University College, à Londres, que l'on doit la découverte de la pilocarpine, et l'étude de quelquesuns de ses sels cristallisés. C'est dans le *Pharmaceutical Journal* qu'il a publié ses premiers résultats."

ILLEGAL COMPETITION.

Many of our readers will probably rejoice to learn that some effort is likely to be made to put a stop to the illegal trade in poisons which has, during the last few years, occasioned so much dissatisfaction to the trade generally, and has led to such frequent complaints. According to an announcement which appears in our advertisement columns this week Messrs. Southall Brothers and Barclay have long been urged to take the initiative in devising some means of bringing the provisions of the Pharmacy Act to bear upon unqualified dealers in drugs, and with that object they have resolved to submit to the consideration of the trade a proposal to hold a trade conference next July in Birmingham. In the first place they invite communications from all chemists and druggists throughout the kingdom, and we have no doubt that their invitation will be abundantly responded to. For our own part we regard the proposed step of forming a trade defence or protection society as being one particularly well adapted to meet existing requirements.

So far as the illegal trade in drugs is concerned it promises to be eminently useful, for though the duty of enforcing the provisions of the Pharmacy Act devolves upon the Council of the Pharmaceutical Society, there are, under existing conditions, so many difficulties in the way of obtaining the requisite precise information necessary for dealing with particular cases, that without the aid of some organization such as that contemplated by Messrs. Southall, Bros. and Barclay, the chances of escaping detection are greatly in favour of those who systematically infringe the Act. Moreover the only ground upon which the Pharmaceutical Society can prosecute offenders is that of regard for the public good, but a trade association may with propriety take into consideration the detriment caused directly and indirectly to the interests of the trade and, having special funds to devote to their protection, may be of great service in preventing illegal trading as well as in removing causes of complaint which have been a source of much annoyance to individual members of the trade and of much embarassment to the Council of the Society. We therefore heartily wish success to the proposed Association.

PERSIAN OPIUM.

During the last few years Persian opium, which according to the authors of the 'Pharmacographia,' was formerly seldom met with as such in the European market, has been imported in considerably increased quantities. Some specimens examined in 1860 by Dr. Reveil yielded only from 5 to 8·15 per cent. of morphia. In 1873 M. Carles found only 8 3 per cent. But a short time since Mr. W. D. Howard reported in this Journal that he had obtained 10·40 per cent. of morphia from a specimen of "perfectly pure Persian opium."

A memorandum included in a recent consular return to Parliament on the trade of Muscat and Persia gives some interesting information respecting the cultivation and exportation of opium in Persia.

Persian opium is cultivated principally in Yezd and Ispahan, and partly in the districts of Khorasan, Kerman, Fars, and Shushter.

The opium grown in Yezd is considered to be better than that in Ispahan and elsewhere, owing to the climate and soil of that place being better adapted for the growth of the drug. But the district of Yezd, notwithstanding the existence of a large cultivable area, is not capable of any considerable extension of the cultivation of opium, owing to the insufficiency of the means, both natural and artifical, of irrigation.

Ispahan, however, differs from Yezd in this latter respect, as it abounds in streams and rivers, and is capable of greater extension of the cultivation of the drug. But the cultivation of cotton and cereals takes up a large part of those resources and tends considerably to reduce the culture of opium.

A few years ago, the profits of the opium trade having attracted the attention of the Persians, almost all the available or suitable ground in Yezd, Ispahan, and elsewhere was utilized for the cultivation of opium, to the conclusion of all cereals and other produce. It was then supposed by some that the opium cultivation would be indefinitely extended in Persia. But the desire of the natives to enrich themselves by the cultivation and growth of a profitable article of trade caused them to neglect to provide for the necessaries of life, and this combined with drought and other circumstances, resulted in the famine of 1871–72. The costly experience then gained has made the Persians more careful and provident, and they are now using a limited space for the cultivation of opium.

The largest produce of opium in Persia, in one years, occurred in 1869–70; it then amounted to 2600 cases. In 1871–72, consequent on the drought and famine, it fell to 870 cases; in 1874–75, it again reached 2000 cases.

The quantity exported between 1st January and 31st December, 1874, was 2002 cases. Of these 1339 cases were shipped to Hong Kong, 80 to Singapore, and 583 to London. 583 cases were the produce of the crop of 1873—74, and 1419 that of 1874–85. The probable export for the year 1874–75 is estimated at 2030 cases.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, May 11, where the following papers will be read:—"On Ferns," by Mr. E. B. Walton; "Note on Guarana," and "Ext. Nucis Vomicæ, B.P., A Cumulative," by Mr. R. W. Houghton.

BOTANICAL LECTURES AT THE GARDENS OF THE ROYAL BOTANIC SOCIETY.

It will be seen, by reference to the advertisement of the School of Pharmacy of the Pharmaceutical Society of Great Britain, that Professor Bentley will commence his course of lectures and demonstrations on systematic and practical botany, at the gardens of the Royal Botanic Society, in the Regent's Park, on Saturday morning, May 13th, at eight o'clock. These lectures will be continued on the succeeding Friday and Saturday mornings, till the end of July.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, May 3, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Betty, Cracknell, Frazer, Greenish, Hampson, Rimmington, Robbins, Sandford, Savage, Shaw, and Williams.

The minutes of the previous meeting were read and confirmed.

Resignation of Members of Council.

The President stated that in accordance with the desire of the Council, he had seen Mr. Hanbury, who had consented to withdraw his resignation.

The Secretary read a letter from Mr. Baynes saying he felt obliged from pressure of business, and his health being also delicate, to resign his seat at the Council.

The President suggested that the matter should remain in abeyance for the present, in the hope that Mr. Baynes would reconsider his determination.

This was agreed to, the Secretary being desired to write to Mr. Baynes on the subject, and if he adhered to his resolution to place his resignation on the agenda paper for the next Council Meeting, in accordance with the bye-laws.

Honorary Members.

Professor G. Planchon, of Paris, and Professor J. Dewar, of Cambridge, were unanimously elected Honorary and Corresponding Members of the Society.

Elections.

The following being duly registered as Pharmaceutical Chemists were respectively granted a Diploma stamped with the Seal of the Society :—

Barrett, Josephus Teague.
Case, William.
Ekins, Arthur Edward.
Gadd, William Fletcher.
Gresswell, Arthur.
Hannah, Charles.
James, George.
Laing, Richard William.
Loney, Thomas Slade.
Read, William.
Wills, Joseph.

Elections.

MEMBERS.

Pharmaceutical Chemists.

Barrett, Josephus Teague	Devonport.
Case, William	Cockthorpe.
Davidson, James Noble	Elgin.
Ekins, Arthur Edward	South Norwood.
Gadd, William Fletcher	London.
Gresswell, Arthur	Spilsby.
Hannah, Charles	Pensarn.
Husband, John Cecil	Berwick-on-Tweed.
James, George	Llanfallteg.
Keer, Thomas Henry	London.
Laing, Richard William	Cape Town.
Loney, Thomas Slade	London.
Read, William	Portsmouth.
Wills, Joseph	London.

Chemists and Druggists.

Gardner, Thomas	Morecambe.
Haffenden, James	Ramsgate.
MacCreath John	Newton Stewart
Wootton, Edward Staple	Margate.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations and being in business on their own account, were elected "Associates in Business" of the Society :—

Minor.

Barnes, William James	Dover.
Berry, Henry Burton	Gloucester.
Betts, Alick Stephen	Woodbridge.
Butler, William Harsant	Old Brompton.
Chadwick, George Nicholas	Leeds.
Coleby, Frederick	Poplar.
Forewell, Henry	Helensburgh.
Gordelier, William Gibbs	Sittingbourne.
Gower, Alfred John	Battersea.
Greaves, Abraham Walter	Chesterfield.
Griffiths, Evan	Padstow.
Hale, Albert Henry	Broadstairs.
Higginson, Alfred	Great Bolton.
Kemp, George	Chester.
Lamble, John Alfred	Devonport.
Marten, Cruttenden	London.
Newey, John Taylor	Upper Norwood.
Oliver, John Gerry	Holsworthy.
Peacock, Walter	Dalston.
Phillips, James Arthur	London.
Potts, Robert Alfred	London.
Saul, William Benjamin	Northampton.
Shum, Arthur George	Mortlake.
Ward, Charles Thomas	Southwick.
Wigginton, Alfred	Bow.
Willson, Alfred	London.

Modified.

Barton, Septimus William	Southport.
Binge, Alfred	Kilburn.
Bingham, Robert	Kirton-in-Lindsey.
Boor, Frederick	Manchester.
Garry, George	Glasgow.
Green, William Gunthorpe	Hoddesdon.
Hall, Frederic John	Worcester.
Harley, Edward Thomas	London.
Hewitt, Joseph Saunders	Rochester.
James, Henry	Ross.
Lewis, Thomas	London.
Miller, William Edwin	London.
Pill, Edwin	Brighton.
Welborn, Robert Walker	London.
Wright, John Walter	Burnley.

ASSOCIATES.

The following having passed their respective examinations were elected "Associates" of the Society.

Minor.

Bartle, William Frederick	Tyldesley.
Best, John William	Darlington.
Bolton, Joseph Hook	London.
Brown, Alfred Duncombe	Halstead.
Brumwell, William Preston	Newcastle-on-Tyne.
Crang, Walter	Bath.
David, Albert	Neyland.
Drysdale, Joseph	Edinburgh.
Flemons, Joseph	Northampton.
Gardner, William	Barnard Castle.
Glegg, John	Edinburgh.
Gregson, James Kenyon	Blackburn.
Harris, Frank William	Newark.
Hartridge, James Hills	Woodbridge.
Heaton, William Everard	Colne.
Irving, Peter	Dumfries.
Jones, Llewelyn	Chester.
Kerr, William Henry	Honiton.
Lawson, William	Glasgow.
Leslie, George	York.
Maggs, Frederick Richard	Yeovil.
Mill, George	Edinburgh.

Milton, Thomas Clement	Exeter.
Mumford, Richard	London.
Newbury, Samuel	Dorking.
Owen, William Henry	Newcastle-on-Tyne.
Peacock, William Henry	Durham.
Perry, Horatio Nelson	Wakefield.
Plumbe, Charles Marshall	Mansfield.
Price, Rees	Shepherd's Bush.
Reece, Thomas	Llandilo
Rowe, John	Landport.
Sandell, John Tyack	Wellington.
Saville, William	Leeds.
Searle, Samuel	Newton Abbot.
Smith, Charles	Heywood.
Smith, William Octavius	Gosport.
Snartt, Frederic Marcham	Horncastle.
Snell, Charles Henry	York.
Turtle, William Gillingham	Hammersmith.
Weatherley, Richard John	Teignmouth.
Wood, Henry	Bury.
Wright, Thomas David	Lancaster.

Modified.

Bambridge, James Williams	East Dereham.
McDonald, Angus	Glasgow.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary Examination were elected "Apprentices or Students" of the Society:—

Allsworth, Norman	Havant.
Bevis, Walter	Newport.
Brereton, John	London.
Cluckie, Andrew	Greenock.
Elkington, Thomas Valentine	Spalding.
Garrett, John Henry	Notting Hill.
Jones, William	
Medd, Henry	Gloucester.
Place, Thomas	York.
Price, Frederick	Liverpool.
Richards, Jonah Palmer	Cardigan.
Taylor, Henry Patrick	London.

Several individuals were restored to their former status in the Society upon payment of the current year's subscription and a fine.

REPORTS OF COMMITTEES.

FINANCE.

The report of this Committee was received and adopted, and various accounts ordered to be paid.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grant:—

£15 to the widow of a chemist and druggist having four children. Applicant had received a grant of £10 in 1874.

The name of a widow, aged 77, of a deceased Member, was recommended to be placed on the list of appproved candidates for an annuity.

A letter had been received from Mr. Abraham, of Liverpool, calling attention to the hardship and expense imposed on poor candidates for annuities, in consequence of the practical necessity for their sending a card to each voter, and suggesting that the Council might undertake to send the appeals of all the candidate in one packet to each voter.

The SECRETARY said he had written to Mr. Abraham, pointing out that the Council already did, to a great extent, what Mr. Abraham suggested by publishing the names and cases of the candidates in the Journal for some months previously to the election, and that particulars were also fully stated in the voting papers.

Mr. SHAW said he had taken a great deal of interest in this subject, but it appeared to him that to adopt the suggestion made by Mr. Abraham that the cases of the applicants as stated by themselves should be circulated by the Council, was both unnecessary and undesirable. If the various candidates could be relieved from the necessity they felt placed upon them to issue these cards it would be very desirable it should be done. Though he had been unsuccessful in the motion he brought forward some time ago he had not lost sight of the subject; he was still convinced that it was desirable something should be done, and he thought the sooner it was done the better.

Mr. WILLIAMS thought it would be impossible to prevent the practice referred to.

Mr. SHAW said it might be stated more plainly that this additional expense was unnecessary. He should not, however, take any action at the present moment.

The report and recommendations were then received and adopted.

LAW AND PARLIAMENTARY.

This Committee reported that it had held a meeting at which a letter was read from the Solicitor giving the result of a prosecution at Glasgow, the particulars of which have already been published.

The SECRETARY also stated that he had been in communication with several persons on the subject of breaches of the Pharmacy Act. Some had taken steps to fulfil the provisions of the Act; with others the correspondence was still in progress, and two cases had been placed in the hands of the Solicitor.

Mr. SHAW asked if any report had been made by the Committee with respect to the Exeter Memorial. It appeared to him something should be done in reference to it before the term of office of the present Council expired.

The PRESIDENT said the matter would no doubt come before the Committee again. The Committee had not yet been able to come to any decision, and following the example of the House of Commons, the business which could not be got through in one session must stand over to the next.

Mr. SHAW thought it would have been well if some reply were made to the memorial, if only to the effect that the Council had not yet been able to come to any decision.

Mr. HAMPSON said the matter had been placed in the hands of the Committee, and until it made a report nothing more could properly be done.

The report was received and adopted.

THE CONVERSAZIONE.

The minutes of this Committee were read, stating the arrangements which had been made for the Conversazione on May 18 next.

LIBRARY, MUSEUM, AND LABORATORY.

The report of this Committee was read stating that—

Professor Attfield had reported that there had been 113 entries since the commencement of the session, and that 60 students were now working.

Professor Bentley had reported that 55 students had entered for the present course of lectures.

The Librarian had reported the average attendance in the library for the preceding month to be, in the day, 32; evening 9. The circulation of books had been, in town, 212; country, 65, to 34 places. The following books were recommended for purchase:—

General Fund:—

Hager's 'Manuale Pharmaceuticum,' latest edition.

Hanbury Fund:—

Guibourt's 'Histoire Naturelle des Drogues Simples,' by Planchon, latest edition.

STATEMENT OF ATTENDANCE OF MEMBERS OF COUNCIL ON COMMITTEES FOR THE YEAR 1875-76.

	Committees held Once a Month or Oftener.		Committees held Occasionally.				Special Committees appointed to draw up Reports, etc.	Total Number of Attendances.
	Finance.	Library, Museum, and Laboratory.	House.	Benevolent Fund.	Law and Parliamentary.	General Purposes.		
Number of Committee Meetings held.	13	15	12	12	18	3		
Atherton (*Nottingham*)	*	*	*	6	6	2	0	14
Baynes (*Hull*)	*	*	*	*	5	3	1	9
Betty (*London*)	*	14	12	4	13	3	4	50
Bottle (*Dover*)	11	15	11	11	14	3	4	69
Brown (*Manchester*)	*	*	*	2	2	0	0	4
Cracknell (*London*)	11	*	*	6	*	1	0	18
Frazer (*Glasgow*)	*	*	*	7	*	1	0	8
Greenish (*London*)	11	14	11	9	13	2	1	61
Hampson (*London*)	1	12	9	*	13	3	2	40
Hanbury (*London*)	2	8	5	*	3	0	0	18
Hills (*London*)	*	12	8	4	11	1	4	40
Mackay (*Edinburgh*)	*	*	*	3	3	1	0	7
Owen (*London*)	6	*	*	6	6	1	0	19
Rimmington (*Bradford*)	*	*	*	4	4	2	0	10
Robbins (*London*)	12	14	11	12	11	2	3	65
Sandford (*London*)	*	14	9	3	11	1	4	42
Savage (*Brighton*)	*	*	*	1	6	1	0	8
Schacht (*Clifton*)	*	1	*	2	6	2	1	12
Shaw (*Liverpool*)	*	*	*	10	*	3	0	13
Sutton (*Norwich*)	*	*	*	*	*	0	0	0
Williams (*London*)	*	14	9	*	13	1	4	41

* Not appointed on this Committee.

NUMBER OF ATTENDANCES OF MEMBERS OF COUNCIL AT COUNCIL MEETINGS FOR THE YEAR 1875-76.

Atherton, John Henry	8	Greenish, Thomas	11	Robbins, John	12
Baynes, James	9	Hampson, Robert	12	Sandford, George Webb	10
Betty, Samuel Chapman	11	Hanbury, Cornelius	8	Savage, William Dawson	9
Bottle, Alexander	11	Hills, Thomas Hyde	12	Schacht, George Frederick	8
Brown, William Scott	3	Mackay, John	6	Shaw, John	10
Cracknell, Charles	11	Owen, John	9	Sutton, Francis	8
Frazer, Daniel	8	Rimmington, Felix Marsh	10	Williams, John	12

Number of Council Meetings during the year, 12.

The Librarian had also handed to the Committee a letter from the late Mr. Daniel Hanbury, dated 1860, as to the purchase of certain periodicals. The letter was entered on the minutes of the Committee. It was addressed to the late Mr. Morson, then President of the Society, and referred to the importance of furnishing the library with certain foreign scientific journals which were very difficult of access in London, and of ensuring the constant supply of these periodicals, as difficulty might be found in making up deficiencies afterwards. A list of the periodicals referred to was appended.

Mr. Greenish said the Committee had determined that inquiry should be made in regard to the expense of obtaining the back numbers of the works referred to.

The Curator had reported that the average attendance in the museum during March had been, in the day, 20; evening, 3; the highest number being 16.

The final proof of the Annual Report was examined and approved, and the report of the Committee was received and adopted.

Unlicensed Sale of Poisons.

The Secretary read a letter from a member, saying that he found there were many small shopkeepers in his neighbourhood who were in the habit of selling laudanum and other poisons in small quantities, to the detriment of chemists on the register, and that they were supported in this course by wholesale houses, the proprietors of which ought to know better.

Mr. Rimmington said it was no doubt true that some wholesale houses did encourage this illegitimate trade, and assisted grocers, drapers, and others, to sell drugs.

Mr. Greenish said they could not deal with the matter in any way except under the Poison Regulations.

Mr. Shaw remarked that twenty years ago, before the Pharmacy Act was passed, there was great reason to complain of the way in which some wholesale druggists cultivated a trade with grocers and others. A representation was made to one of these houses; but the only reply the firm made was, that it should conduct its business as it thought fit. It appeared to him there was nothing to done.

Mr. Sandford said the course in this case was perfectly clear, and that was to prosecute those men who were selling poisons, but he did not like the phrase in the letter, which referred to "the detriment of chemists on the register." In prosecuting offenders they could only consider the danger to the public. It was quite useless trying to interfere with the wholesale houses. When an unqualified man was found selling poison he should be prosecuted without stopping to inquire where he got it from.

Mr. Hampson thought the expression referred to quite justifiable, because it was the duty of the Society to protect all registered men against illegal traders, as they had passed their examinations in order to comply with a law made for the safety of the public and for their own protection.

Mr. Sandford said the remark might be justifiable, but it was certainly not a wise one.

The Pharmacy Act.

The Secretary read a memorial which he had received from a gentleman who had been in business in Australia at the time of the passing of the Pharmacy Act, and who now wished to avail himself of the Modified Examination to commence business in this country, though he had omitted to make application to do so within the specified time. He said that he thought that however much the Council might sympathize with the applicant, it was quite evident it could not assist him, as he could only commence business legally after passing the Preliminary and Minor Examinations.

Report of Examinations.

April, 1876.

ENGLAND AND WALES.

		Candidates.		
		Examined.	Passed.	Failed.
Major	26th	7	5	2
"	27th	7	7	0
		— 14	— 12	— 2
Minor	26th	21	13	8
"	27th	22	16	6
"	28th	26	10	16
		— 69	— 39	— 30
Modified		3	2	1
		86	53	33

SCOTLAND.

	Candidates.		
	Examined.	Passed.	Failed.
Minor	14	8	6
Modified	4	0	4
	18	8	10

Preliminary Examination.

Candidates.		
Examined.	Passed.	Failed.
287	194	93

Five certificates received.

3 College of Preceptors.
2 Royal College of Surgeons.

The Secretary read a letter from the Leicester Chemists' Association, thanking the Council for the recent grant of 15*l.*, and enclosing a statement of the manner in which the money had been expended.

He also read a letter from the Secretary to the Royal Botanical Society stating that the Council of that Society would accord the usual privilege to the students attending Professor Bentley's class, of visiting the Botanical Gardens, in the Regent's Park.

EXAMINATIONS IN LONDON.

April 26th, 1876.

Present—Mr. Bottle, Vice-President; Messrs. Allchin Barnes, Benger, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Taylor and Umney.

Dr. Greenhow was present on behalf of the Privy Council.

MAJOR EXAMINATION.

Seven candidates were examined. *Two* failed. The following *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Ekins, Arthur Edward	Cambridge.
Hannah, Charles	Abergele.
Husband, John Cecil	Berwick.
James, George	Haverfordwest.
Loney, Thomas Slade	London.

MINOR EXAMINATION.

Twenty-one candidates were examined. *Eight* failed. The following *thirteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bartle, William Frederick	Tyldesley.
Eliott, Samuel	Liskeard.
Gardner, William	Barnard Castle.
Heaton, Wilmer Everard	Colne.
Kerr, William Henry	Honiton.
Newbury, Samuel	Dorking.
Owen, William Henry	Newcastle-on-Tyne.
Peacock, William Henry	Durham.
Smith, Charles	Heywood.

Smith, William Octavius	Gosport.
Snell, Charles Henry	York.
Wood, Henry	Bury.
Wright, Thomas David	Lancaster.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's examination:—

Certificates of the College of Preceptors.

Bateman, Arthur	West Cowes.
Dampney, John	
Pemberton, Joseph	Pimlico.

Certificates of the Royal College of Surgeons.

Harris, Walter Thomas	Old Kent Road.
Turtle, William Gillingham	Hammersmith.

April 27th, 1876.

Present—Mr. Hills, President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Taylor and Umney.

MAJOR EXAMINATION.

Seven candidates were examined. *All* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Barrett, Josephus Teague	Devonport.
Case, William	Norwich.
Gadd, William Fletcher	Oxford.
Gresswell, Arthur	Spalding.
Laing, Richard William	Cape Town.
Read, William	Havant.
Wills, Joseph	Carlisle.

MINOR EXAMINATION.

Twenty-two candidates were examined. *Six* failed. The following *sixteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bolton, Joseph Hook	London.
David, Albert	Neyland.
Harris, Frank William	Newark.
Horsman, Arthur	Manchester.
Jeffries, Benjamin	Brixton.
Jones, Llewelyn	Chester.
Langbeck, Hugo Waldemar	London.
Lewis, David	Cardigan.
Mackenzie, Charles Anderson	Plymouth.
Milton, Thomas Clement	Exeter.
Mumford, Richard	London.
Plumbe, Charles Marshall	Mansfield.
Price, Rees	Shepherd's Bush.
Rowe, John	Landport.
Snartt, Frederic Marcham	Horncastle.
Turtle, William Gillingham	Hammersmith.

April 28th, 1876.

Present—As on the 27th.

MINOR EXAMINATION.

Twenty-six candidates were examined. *Sixteen* failed. The following *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Best, John William	Darlington.
Bond, James Benjamin	Hull.
Brown, Alfred Duncombe	Halstead.
Flemons, Joseph	Northampton.
Fox, Thomas Augustine	St. Helen's.
Keeling, Charles James	Stafford.
King, John William	Bolton.
Reece, Thomas	Llandilo.
Searle, Samuel	Newton Abbot.
Weatherley, Richard John	Teignmouth.

MODIFIED EXAMINATION.

Three candidates were examined. *One* failed. The following *two* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bambridge, James Williams	East Dereham.
Negus, Samuel Thomas	Northampton.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The thirteenth and concluding general meeting of the session was held at the Royal Institution, on Thursday evening, the 27th ult., the President, Mr. A. H. Mason, F.C.S., in the chair.

A discussion took place as to the cause of iodide of potass becoming yellow. Mr. Thomas Garside, F.C.S. had thought it was due to the presence of free iodine or of iodate; he had examined a sample for these but failed to detect them and he asked for information. It was suggested the coloration was due to the action of ozone, or of light, and methods of examination were proposed, but Mr. Garside had tried all the experiments suggested; he also found the sample free from bromine.

The President then delivered his valedictory address in which he gave a *résumé* of the proceedings during the past session. There had been an increased average attendance over several previous sessions. Of the papers read, eight had been contributed by members, two by friends by invitation, and a successful popular lecture had been delivered by Professor Barratt at the grand conversazione held in January last. He reviewed the papers which had been read, specially referring to that by Mr. Charles T. Kingzett, F.C.S., on the "Relation of Chemistry to Physiology and Pathology." He deplored the fact that not one of the papers during the session had been read by pharmaceutical members. The discussions at the meetings had been well maintained. The question box had been made use of more than during the previous session. During the session seventeen members and one associate had joined, six had resigned, otherwise the roll remained intact, but there had passed away one who, although not a member at the time of his death, always took an active interest in the affairs of the Association—Mr. Clay.

Through the kindness of an esteemed friend the President stated he was enabled to give the following obituary notice:—Mr. Clay was President of the Association during the first two sessions of its existence. He was born in 1791, and died January, 1876, in his 85th year. He began business in Ranelagh Street, in the year 1813, thence he removed to Bold Street, where he was in business at the time of his death, having been thus engaged during the long period of 62 years, although he had long ceased to take any active part in it. At the time when he entered upon the responsibilites of the business anything like regular study or scientific training was unknown. A little Latin was all that was supposed to be necessary. But the light of modern chemistry had dawned and Mr. Clay was not a man to ignore it, on the contrary he took, and continued to take during his life, a warm interest in scientific, literary, and social developments, although he never could have been said to be a severe student. For this his habits were too social, and his company too much in demand. He had a cultivated ear for music and was devotedly fond of it, was one of the founders of the Philharmonic Society and continued a director. He was much liked in society, enjoyed a rubber greatly, and was considered by his friends as great an authority on it as his well known namesake. He was conspicuous for his kindness to young men, and warmly devoted himself to their interests.

The museum has been considerably enriched by contributions of rare chemicals of scientific and pecuniary value. The donations to the library consist of the usual periodicals and proceedings of kindred societies. The course of chemical lectures in the School of Pharmacy are just completed, seven students have attended; the Council have placed a prize, value one guinea, and the President a second prize, value half a guinea, at the disposal of the first and second students who shall be approved by Professor Attfield as having satisfactorily answered a series of questions which he has kindly consented to send down and adjudicate. The lectures on materia medica and therapeutics will be delivered at the Royal Infirmary School of Medicine, by Dr. Nevins, and will consist of a course of sixty lectures. The following is the syllabus:—This course of sixty lectures embraces all the officinal agents employed in medicine, and such others as deserve notice. It is experimental throughout, whenever practicable; the most important preparations of mercury and the other metals, etc., being made and explained before the class, and the drugs tested for their most probable adulterations. The various medicinal substances are described with respect to their natural history and their external and chemical character, their medicinal or poisonous effects, and the diseases in which they are used. They are first classified as acids, alkalies, vegetable preparations, etc., and are subsequently grouped according to their most prominent medicinal effects. A museum of materia medica is open for the use of the students. The botanical lectures will be delivered by Dr. Carter, B.Sc., LL.B., M.R.C.P., etc., the syllabus is as follows:—

1. Structural and morphological botany—general and microscopical characters. Structural modes of growth, and formation of the vegetable tissues, etc.

2. Physiological botany—the physiology of the various parts of plants and flowers.

3. Systematic botany—methods of classification, artificial and natural. Botanical characters and properties of the principal natural orders. Descriptive botany.—The technical description of plants is specially attended to in the case of those who are preparing for examinations. Practical instruction is given in this branch and plants are regularly given out to be described, the descriptions being revised by the lecturer. The lectures are illustrated by recent and dried plants, diagrams, and microscopic specimens.

The alteration of time of commencing the meetings, at 8 o'clock instead of 8·30 as previously, has proved desirable and satisfactory.

The President concluded by saying—

"Although this meeting terminates the general business of the session there is plenty of work for your Library and Museum Committee during the recess, and I hope the work of renovating our museum will be continued during the summer evenings. A catalogue of the library has to be compiled, and copies of the rules reprinted; before this expenditure is decided upon it seems to me to be a favourable opportunity to discuss the desirability of changing the name of our Association. We are locally undoubtedly looked upon as a trade body, and socially we are without that scientific status which we merit; on this account many scientific men and students in the science classes in the town and neighbourhood keep aloof from us. I have given this matter careful consideration and I feel convinced if we were to style this Association "The Liverpool Chemical and Pharmaceutical Society," we should possess a title more fairly representing its members, its objects and its work, and one which would certainly be more attractive for new members to join us. The Association is essentially a pharmaceutical one, the majority of donations to the library and museum have been given with this impression and these are rights which should be reserved with all respect; but the pharmaceutical members, or chemists and druggists in business, are in a minority and do not support these things as they should do. The proposal is simply thrown out as a tentative suggestion. I should be opposed to hasty action or to the question being decided without the opinion of the whole of the members, and I invite discussion on the matter this evening. It now remains, gentlemen, for me to express my sincere gratitude for your forbearance with my shortcomings and feeble efforts to advance the prosperity of your Association. I am conscious of weakness, but your increased attendances, courteous co-operation and assistance always cheerfully given, have rendered the responsibilities and anxieties connected with the honoured office of your President, a pleasure. I thank you."

The meeting next proceeded to the election of President elect for session 1876-7, in accordance with the new law passed at the last annual meeting.—"The President shall be elected at the last general meeting by the members; his duties shall not commence until the 1st of October following," etc.

The following gentlemen were nominated:—Mr. Alfred E. Tanner, proposed by Mr. J. Hallawell, seconded by Mr. R. Parkinson; Mr. Martin Murphy, F.C.S., proposed by Mr. Charles Sharp, seconded by Mr. Thomas Garside, F.C.S; Mr. Alfred H. Mason, F.C.S. (re-election), proposed by Mr. Thomas F. Abraham, seconded by Mr. E. Davies, F.C.S.

Mr. Sumner said that the President being nominated it was rather an unpleasant position for him to remain in the chair; he therefore, moved that the Vice-President occupy the chair, and take the sense of the meeting on the nominations.

The President then retired from the room.

After some conversation it was unanimously approved that the election should be decided by ballot, which having been taken, Mr. Mason was declared re-elected by a large majority.

Mr. Abraham having brought Mr. Mason to the room the Chairman intimated that it gave him much pleasure to state that it was the wish of an unmistakable majority of the members that he should be invited to accept the office of President for next session.

The President resumed the chair amid loud applause.

In returning thanks, the President stated that when he entered the room that evening he did not anticipate the honour they were about to confer upon him by nominating him again, and if he had been personally consulted in the matter he should have preferred not to accept office, having already served the full time privileged to his predecessors. However, it seemed to be the wish of the members, and this was the first time they had the opportunity of electing their President. He bowed to their decision and in thanking them for the distinguished honour conferred, begged to assure them that he would do his utmost to promote the interests of the Association, and continue to merit that appreciation they had kindly accorded to him.

A discussion took place upon the proposed alteration in name of the Association, but as it was not to any motion it cannot be reported further than that without committing themselves the speakers did not object to the change.

On the motion of Mr. Davies, seconded by Mr. Sumner, a unanimous vote of thanks was accorded to the President for his address; and this concluded the business of the session.

REGISTERED CHEMISTS' ASSOCIATION OF LIVERPOOL.

The first Annual Meeting of this Association was held at the Royal Institution, Colquitt Street, on Thursday, April 6th, at 3 o'clock p.m., when the report of the Committee and the Treasurer's financial statement were read and unanimously adopted.

The retiring members of Committee, Messrs. Agnew, Fingland, Davies, Abraham, Dickins, Symes, Wharrie, were re-elected, and Mr. Abraham was re-elected President.

The Association was formed to promote uniformity in prices, early closing, and trade interests generally, and the report showed that these objects had been fairly carried out. A price book had been published which would doubtless promote the object in view, as it had been largely distributed among the trade. The public had been informed by advertisements in the local papers, and by printed posters over the town that, "Chemists would close their shops not later than 9 o'clock every night, except Saturday," and a great number of early-closing hand-bills had been distributed among members for circulation among their customers.

It is believed that these measures have shortened the hours of business in many parts of the town, but the Committee are prepared to make renewed efforts in the same direction. The Treasurer's financial statement showed the pecuniary condition of the Association satisfactory, there being a substantial balance in its favour.

A vote of thanks to the Treasurer and Secretary for their diligent services closed the proceedings.

The other office-bearers were subsequently unanimously re-elected: Mr. Redford, Vice-President; Mr. Shaw, Treasurer; and Mr. Wharrie, Hon. Sec.

SUNDERLAND CHEMISTS' ASSOCIATION.

The Annual Meeting of the above Society was held April 26th, 1876, when the following officers were elected for the ensuing year:—President, Alderman Thompson; Secretary, J. J. Nicholson; Treasurer, R. Robinson. Members of the Council:—J. Harrison, H. Thompson, T. Nasbet, C. S. Lord, T. Chapman, J. Priestly, J. Mitchinson, H. Turnbull, J. Sayer, D. B. Sharpe, E. Clarke.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

A special meeting of the Chemical Society was held on Friday, 28th April, at which Professor Andrews, F.R.S. delivered a most interesting lecture "On Certain Methods of Chemical Research." In the course of the lecture he exhibited and described the various apparatus employed by him in his researches on the heat developed during chemical combination; in his experiments on ozone, and on the relation between the pressure and tension of matter in the gaseous state, giving many most interesting and valuable details of the precautions necessary to be employed in experiments of this kind. At the close of the lecture, he exhibited the striking experiment of the action of heat on liquid sulphurous anhydride in causing it to pass into the "intermediate state" in which it is neither liquid nor gaseous.

Parliamentary and Law Proceedings.

Mistake in Dispensing. Poisoning by Cyanide of Potassium.

An adjourned inquest was held at the Rock Station Hotel, Rock Ferry, on Friday, on the body of Elizabeth Marfell Cambridge, wife of Mr. Cambridge, coal merchant, who died on Saturday evening, after taking a dose of medicine from a prescription given her by Dr. Laidlaw, of Tranmere. Mr. Bellringer watched the case on behalf of Mr. Sutcliffe, the chemist at whose shop the medicine was prepared; and Mr. Segar appeared for Mesrs. Evans and Co., wholesale druggists, of Liverpool.

The first witness called was the deceased's husband, Hamilton Grey Cambridge, who said he lived in Old Chester Road, Tranmere. Deceased was thirty-six years of age, and the mother of five children. She usually enjoyed good health. She spoke to Dr. Laidlaw on Friday respecting a boil she had, and he wrote out a prescription, which he left with Mr. Sutcliffe, chemist, New Chester Road. About a quarter past six o'clock on Saturday deceased brought medicine from the chemist, and about nine o'clock she took a dose of it. She said she had taken different kinds of medicine, but never anything like that, and asked whatever could it be. About a minute and a half after taking the medicine she fell back in a faint on the sofa. Witness gave her some water and bathed her forehead, and she recovered after vomiting, and the witness brought in Mrs. Billinge, a neighbour, and went for Dr. Paton, who came to the house in a few minutes. On witness's return he found his wife insensible, and she remained in that state till she died, about an hour and a quarter afterwards. No one else had any of the medicine.

Sarah Billinge, wife of John Billinge, said she found on her arrival that the neck of the deceased was rigid, and applied mustard poultices and fomentations. Witness thought there was something poisonous in the medicine; she supposed it was strychnine from the symptoms.

Dr. Paton said he saw the deceased about half-past nine o'clock on Saturday night. She was then dying, rigidly convulsed, and the spine being arched backwards. There were other symptoms of the presence of poison, the pulse being rapid and scarcely perceptible. Witness believed she had been poisoned by taking prussic acid. Witness took possession of the bottle of medicine, and detected the odour of cyanide of potassium in its contents. On the bottle was a label—"A table spoonful three times a day." Witness sealed up the bottle, and gave it to Police-constable 185. He asked for the prescription, but it was nowhere to be found. Witness administered remedies to the patient, but in vain, and she died in about an hour. A *post-mortem* examination was made on Tuesday by witness, in the presence of Dr. Laidlaw. He found no disease; the organs were healthy, but exhaling an odour of cyanide of potassium, and he found prussic acid in the pericardium and pleura, and other parts. The stomach contained a thick fluid, which also showed the presence of prussic acid. Witness also tested the medicine and found prussic acid in it. He sealed up the bottle and sent it for analysis to Dr. Campbell Brown, analytical chemist, Liverpool. Witness saw the prescription; there was nothing in the ingredients named to injure deceased. The cause of death, he believed, was poisoning by prussic acid or one of its soluble salts.

Dr. Laidlaw gave corroborative evidence as to the *post-mortem* examination. He said that the ingredients of the prescription were perfectly harmless. On Monday, after the first meeting of the jury, he went to Mr. Sutcliffe's shop and asked for the bottle from which the latter had taken the acetate of potash named in the prescription, and Mr. Sutcliffe gave him a three or four oz. bottle, labelled "Acetate of potash. Evans and Co. Liverpool." Witness examined its contents, and found them vitreous instead of fibrous, as he had expected; and, on taking out the cork, he smelt the odour of prussic acid. He at once told Mr. Sutcliffe that he had given out cyanide of potassium instead of acetate of potash. The two drugs were similar in colour, but very different in substance. The former is used chiefly in the arts, and the latter for medical purposes. He thought it quite possible that a druggist, while dealing with cyanide of potassium labelled acetate of potash, to substitute one for the other; and especially during mental abstraction like that caused to Mr. Sutcliffe by the illness of his wife.

The Coroner.—When a man is about his business he does not know what he is doing!

Dr. Laidlaw added that the original substitution of the drug was inexplicable to Mr. Sutcliffe. Cyanide gave off a peculiar odour when the bottle was opened. In answer to Mr. Bellringer, he said that Mr. Sutcliffe had dispensed for him for some time, and he had always found him very careful.

Inspector Hilton produced Dr. Campbell Brown's analysis of the medicine given the deceased, which coincided with the evidence of the two medical men.

Mr. Segar said that the drug had been supplied to Mr. Sutcliffe in 1874, by one of Messrs. Evans and Co's assistants, who was a most trustworthy man, and had been a long time in their employ. It was supplied in the same condition as it was received from the makers. Owing to the time that had since elapsed they were unable to identify it. To Messrs. Evans, the mistake appeared inexplicable.

Mr. Bellringer said that Mr. Sutcliffe ordered of Messrs. Evans and Co., in February, 1874, four ounces of acetate of potash, which he had the invoice to prove. The bottle as produced was supplied to him. He never ordered any cyanide of potassium.

Mr. Segar asked whether it was true that since receiving the drug Mr. Sutcliffe had dispensed a quantity of it to another person for whom Dr. Laidlaw had also prescribed, fortunately without harm.

Dr. Laidlaw said he could not remember distinctly if that was so. He might have prescribed acetate of potash for a patient, but had no recollection of having done so.

Mr. Segar disclaimed any hostility to Mr. Sutcliffe on the part of Messrs. Evans, who had always found him a worthy and careful man.

The Coroner, in summing up, said there could be no doubt that cyanide of potassium had been given by Mr. Sutcliffe instead of acetate of potash. The question for the jury to decide was whether it was possible for an experienced chemist, as he was, to make such a mistake without being guilty of culpable negligence. He (the Coroner) did not say that the negligence was wilful; but it was a most frightful thing to find a man in Mr. Sutcliffe's position, in whom the public had confidence, dealing out poison instead of the proper ingredients of a prescription. After such an occurrence the confidence of the public in chemists and druggists would be very much shaken, for it seemed inexplicable that an experienced man could make such a mistake as had been made in this case. Had it been made by a mere shop lad, it might not have been so much wondered at perhaps. He did not consider that Messrs. Evans and Co. were at all to blame, and he directed the jury to that effect. The whole responsibility, he said, rested on Mr. Sutcliffe.

The jury deliberated for about an hour, and returned the following verdict:—We are of opinion that the deceased came by her death through poison, and also that there has been great want of care and skill on the part of Mr. Sutcliffe."

The Coroner said he did not exactly understand the tenor of the verdict. Did the jury mean to imply that Mr. Sutcliffe had been guilty of culpable negligence, which amounted to manslaughter?

The Foreman.—No; by no means.

A Juryman said it was the unanimous opinion of the jury that deceased met with her death by misadventure—by poison administered as medicine, and that the chemist had been guilty of great want of skill and and care.

The Foreman asked if the jury might amend the verdict to that effect; but the coroner said he would record the verdict as he had received it.

Mr. Bellringer asked to have the jurymen's explanation appended, but the coroner declined.

The proceedings the terminated.—*Liverpool Daily Post*

POISONING BY OXALIC ACID.

On Friday, the 28th April, Mr. Langham held an inquiry at King's College Hospital on the body of James Bright, 43. The deceased was a theatrical costumier, in the employ of Messrs. May, Bow Street. On Thursday afternoon the deceased and a number of other men were engaged at Mr. May's in preparing theatrical armour for polishing, for which oxalic acid was used. The acid was generally kept in a mug, and a pint of beer, which was obtained from a public house, was inadvertently poured into the mug. A man named Foot drank out of the mug, and in passing the same to the deceased said the taste was very strange. Another man, named Harrison, also drank out of the mug, but on looking at the mug discovered that the beer had been mixed with oxalic acid. Harrison rushed off for medical assistance, an emetic was given to him, and he was taken to the hospital, where he now remains an in-patient in a fair way towards recovery. Soon after the deceased drank the beer he became ill, and under the advice of Dr. Mills he was taken to King's College Hospital, where he died within 20 minutes of admission from the effect of the poison. Foot took about a mouthful of the beer and was sufficiently recovered to give evidence at the inquest.

The jury returned a verdict of "Accidental Death."—*Times.*

POISONING BY HYDROCHLORIC ACID.

An inquest has been held in Clerkenwell, concerning the death of Richard Harrison, 53, who had died from the effects of poison.

Dr. Smith said he had attended the deceased for more than a year and considered him insane. He was called in about two hours after death, and had since made a *post-mortem* examination. He had tested the contents of the stomach, and found it contained acid. He also examined the gullet, and found the mucous membrane very much burnt, some of the skin peeling off. The jury agreed to a verdict that deceased died from injury to the windpipe, inflicted by using some spirits of salt as a gargle whilst in a state of unsound mind, and that the said death was from misadventure.

SUSPECTED DEATH BY POISONING.

The inquest upon the death of Lydia Chapman, *alias* Porter (see before p. 851), was resumed on Monday last, before Dr. Diplock, coroner for the western district of Middlesex.

Dr. Thomas Stevenson, M.D., F.R.C.P., lecturer on chemistry at Guy's Hospital and registered medical practitioner, of 21, Caversham Road, St. Pancras, said that on April 21, 1876, he received from the hands of Mr. Thomas Whitefield, surgeon, the following articles, all carefully sealed, and in jars or bottles:—1. A glass bottle, the mouth of which was covered and closed with brown paper. This was labelled "stomach and transcolon." The contents were a human stomach and a portion of the colon (large intestine). 2. A jam pot, covered and closed with brown paper, labelled "contents of stomach," which contained a turbid fluid. 3. A similar pot, labelled "liver," which contained nearly 6oz. of liver. He also received a brown paper parcel, containing a basin and a dessert spoon, with some remains of food. He had subjected them to a minute examination and analysis, with the view of detecting the presence of poison or poisons. He could not detect the presence of any mineral poison or noxious substance in any of the viscera nor in the stomach's contents, nor could he detect in the same the presence of any known vegetable poison or noxious substance. He made special analysis for the detection of chloroform and other volatile compounds of a like nature; but could not find any. But seeing that two days elapsed between the death and the *post-mortem* examination, and that during six days more the viscera were retained in vessels which would permit the escape of such a volatile substance as chloroform, the negative evidence respecting the presence of these substances was by no means conclusive as to their non-administration. He had himself detected chloroform in the body of a person 24 hours after his death from the administration of that anæsthetic; but he was not aware that it had ever been detected in the dead body when many days had elapsed between the death of a person and the analysis. The basin and spoon contained a small quantity of adherent food, which was free from poisonous substances, and consisted of bread or toast soaked with beef-tea. The viscera themselves presented no appearance which enabled him to state what was the indubitable cause of the death of the deceased. The stomach presented no appearance not met with in persons who have died from natural causes. It had been opened, and its contents removed. On its inner surface were a few fragments of food, containing muscular fibre (flesh) and wheaten starch altered by heat (probably from bread).

The colon or large intestine contained a considerable quantity of fæcal matter, and was healthy. The portion of liver was healthy, but decomposed and mouldy. The liquid in the jar labelled "contents of stomach" was peculiar. The amount was five ounces, or a quarter of a pint. It consisted of a turbid, yeasty-looking liquid of a very sour odour, and with oil floating on the surface. This liquid contained broken up muscular fibre and fat, probably the remains of beef-tea; altered starch, most probably in part of wheat; the peculiar structure and starch granules of a leguminous plant, probably peas or lentil, and pepper tissue. These are all articles of ordinary food. The liquid also contained a large number of the peculiar organisms known as *sarcinæ ventriculi* (burdens of the stomach)—an organism which is occasionally met with in the human stomach and in vomits. Its presence is attended with fermentative changes, resulting in vomiting, and what are popularly known as bilious attacks. The presence of these *sarcinæ* could not, however, account for the death of the deceased.

After some other evidence had been taken the jury returned a verdict of wilful murder against William Wallace and Louise Wallace.—*Times.*

SUFFOCATION IN AMMONIA WORKS.

On Monday an inquest was held at the Newland Swan, Malvern, before Mr. W. S. P. Hughes, County Coroner, on the bodies of two young men who had been suffocated at an ammoniacal salt works. From the evidence it appeared that Mr. Russell, farmer, Newland, has some sulphate of ammonia works on a small scale on his farm. He makes use of them on an average once a week, when they are used a day and a night. These works consist of a boiler, a tank, etc. Coke is used for the fire under the boiler. To make the ammoniacal salts, the ammoniacal liquid from the gas works is boiled with an acid obtained from the vitriol works, for 24 hours, and all that the man attending to the works is required to do is to keep the liquid up to a simmering condition, so that when the fire is made up it can be left for about an hour. There is no pressure on the boiler, as it has a two inch escape pipe attached to it. The works are well ventilated. On Friday last Sidney Powell, who occasionally assisted William Alloway, the man attending to these works, lit the fire in the evening and left it for Alloway, who asked Powell to stay with him for the night. Powell consented, and after leaving the Newland Swan public house at ten o'clock on Friday night, he went to the works and found the deceased and his brother, James Francis Alloway, lying on the floor in the apartment where the boiler was situated. He did not experience anything wrong in the atmosphere, and the door was open. After examining the men he believed they were asleep. He stayed there the whole night, and made up the fires when they required it. In the morning at six o'clock he again went to the deceased men, and finding them still in the same position, he became alarmed and went to the farm bailiff, Mr. James Webb, and told him what had happened. He did not return to the works. Mr. Webb went there and found both men dead and cold. He could not see what had caused their death. Mr. Wadams, surgeon had made a *post-mortem* examination of deceased and found a quantity of black blood in the lungs and hearts, and was convinced that they had met their death from the fumes of carbonic acid, sulphur, etc., from the coke fire. The poisonous gases would be more dangerous when the fire was being re-made. Mr. Russell gave evidence to the effect that he had taken instructions with regard to these works, and had them examined by a skilful gas engineer. He had never known that there was any danger arising from them. The jury gave a verdict of "Accidental death" in each case, adding that in their opinion Mr. Russell ought to engage a skilled engineer before again using the works. At the same time they exonerated Mr. Russell from blame.—*Worcester Journal.*

Review.

THE MICROSCOPICAL EXAMINATION OF CRUDE DRUGS AND OTHER VEGETABLE PRODUCTS. By MARK W. HARRINGTON, M.A.

This little pamphlet is a skeleton or outline of a MSS. work on the identification of vegetable drugs, foods, and fibre, and is intended to serve as an analytical key. It is divided into two parts. The first contains some very practical suggestions upon the use of the microscope and its appurtenances, and a list of reagents to be used in the examination or mounting of various tissues, and directions for referring a drug or fibre to its botanical or other source.

The second part consists of tables by means of which the student is to identify the object under examination.

These analytical tables are arranged under the following heads: Cellular (plants?), Cryptograms, Herbs, Leaves, Flowers, Fruits, Seeds, Roots, Rhizomes, Stems, Piths, Woods, Barks. Galls, Hairs, Fibres, Powders, Gums, Gum-resins, Inspissated Juices, Latex. The tables include 271 drugs of vegetable origin and two animal fibres.

The author has evidently taken considerable pains to select the most prominent characteristics and to put them in as few words as possible.

Provided that the name of the substance be known to the student, it may be possible to identify it easily by means of these tables, but to one unacquainted with the name of the drug the tables would be practically useless, since there are such a vast number of substances met with in commerce which have not yet been either described or examined microscopically.

It is a matter of congratulation, however, that the use of the microscope as applied to pharmacy is steadily increasing, and that in America as well as in Germany works of this class are being welcomed by pharmacists.

The variations in the structure of roots and barks has not until lately received the attention it merits, and we hope to see the day when a better knowledge of them will enable the microscopist to refer any root or bark to its natural order by means of its structural characters.

Notes and Queries.

[505]. DISPENSING QUERY.—In answer to J. B.'s Dispensing Query I dispensed the prescription in the following manner, and find up to the present the mixture is clear, although it appears to have a tendency to turning opaque:—

Dissolved pot. bicarb. and pot. iodid. in 4 ozs. water then gradually added acid. nit. dil.

Dissolved quinine in 3 ozs. boiling water and mixed the two solutions gradually, then added the syrup and found the result as above stated.—S. F. Nottingham.

[507]. TOILET VINEGAR.—*Vinaigre de Bully.*

℞	Essent. Bergamot.	gtt. 40
	Essent. Limonis	gtt. 30
	Olei Rosmarini	gtt. 20
	Olei Melissæ	gtt. 6
	Olei Caryophyll.	
	Olei Lavendul.	
	Olei Neroli	āā gtt. 4
solve in		
	Spiritu. rectif.	℥ix
Tum ad misce		
	Tincturæ Benzoas.	
	Tincturæ Styracis.	
	Tincturæ Tolut.	āā ℥i
	Aquæ distill.	℥xiv
	Acidi acetici diluti.	℥v

Misce, scpone et filtra.

H. W. Langbeck.

Correspondence.

EXAMINATION LISTS.

Sir,—I do not know upon what ground the board of examiners concluded to omit the classification of the students who successfully pass their examinations, but unless their reason be one of grave importance I think the change is to be regretted.

When having advertised for an assistant I have received in response a batch of letters from applicants calling themselves qualified men or stating that they have passed this or that examination it has often been a satisfaction to me to be able to turn to the official lists and so from an unbiassed appraisement check the applicant's estimate of his own success.

This, of course, does not supersede a character from his late employer, but when the late employer is quite unknown to the prospective employer the value of the recommendation given is much enhanced if it correspond with the evidence of the examination report.

If many members have made the same use of these lists, it is a pity that they should lose the value which classification has hitherto given them, and it is a pity that the laborious and successful student should no longer reap the advantage which he should possess by standing in a creditable position on the list, and that students generally should be deprived of the incentive to exertion which is presented by the honour and improved prospects resulting from their standing well among a hundred competitors,

Grey Street, Newcastle. BARNARD S. PROCTOR.

THE SALE OF PATENT MEDICINES.

Sir,—G. P. P.'s is a capital letter and worthy the attention and serious consideration of all of us. One thing is quite certain, we must be up and doing, and that unitedly, and at once, or we shall find a large portion of our trade vanish.

It strikes me we ought to have a form of petition prepared for an extension of the Pharmacy Act to patent medicines, etc., distributed all through England, signed by every chemist and druggist, and sent simultaneously to our various members. Surely a petition so generally signed would, if backed by the Pharmaceutical Society, have considerable weight with the House, especially as we only ask to be allowed to enjoy our own rightful business unmolested.

If the grocers, etc., sold patents at the ordinary prices, I fancy none of us would grumble, but when by their selling our articles at cost prices as a cheap means of advertisement, thereby leading the public to suppose that the goods which properly belong to them are sold at an equally low rate, and which we know is not in the main the fact, I think it quite time that we put our shoulders to the wheel and see if we cannot get relief, for it is no use shutting our eyes to the fact that a large proportion of the daily takings of the country druggist arises from the sale of patents and kindred articles. I shall be very glad to give my mite towards helping forward so desirable an object. T. A.

April 22, 1876.

CARNIVOROUS PLANTS.

Sir,—In the *Gardeners' Chronicle* of to-day it is noticed that M. E. Morren has published in a separate form his observations on *Drosera binata* laid before the Academy of Belgium. Contrary to an opinion recently expressed in this Journal they are entirely confirmatory of the results obtained in other species by Mr. Darwin and other observers.

A very interesting notice was also made by the editor some fortnight back on the power of absorbing fibres of meat possessed to a certain extent by a plant interesting to pharmacists, viz., *Helleborus niger*; the absorbing surface not being the leaves as in most other insectivorous plants, but in the peculiar tubular petals whose interior surface secretes a liquid in which muscular substance is to some extent soluble, and this solution causing a noticeable difference in the cell contents. Possibly nectaries and other abnormal organs may be found in many instances to afford similar results. G. C. DRUCE.

Northampton, April 22, 1876.

PHARMACY IN THE ANTIPODES.

Sir,—Noticing a letter in a recent Journal on the above subject, I am anxious that the real picture should be exhibited, not the gilded frame only. After which I am in a position to tell the readers of the Journal, they may come to the wise conclusion, that all is not gold that glitters. I was manager of the retail department of the oldest and one of the best establishments in Melbourne, at a salary of 20*s.* a week. Perhaps some of my younger English brethren are ready to jump at that idea, but let them understand first, what that would represent in England. For example, a waistcoat which I am now wearing, and which in this country would not cost more than 10*s*,, cost me 25*s.*; a pair of trousers, 30*s.*; washing averaged 3*s.* a week, and other expenses were proportionate.

Since my visit to Australia I have come to the same conclusion as your Brisbane correspondent, that chemists' assistants are no better off there than in our own country. I do not doubt the instance which W.D. gives of an English assistant having the preference of colonial, but I am strongly inclined to think that was an exceptional case, as I believe colonial experience is much required in most houses of business.

JOSEPH FORSTER.

Walton-on-Hill, near Liverpool, April 25, 1876.

F. F. O.—Dr. Richardson's Lectures on Alcohol are published in a separate form by Macmillan and Co.

W. M.—(1) *Ribes sanguinea*, an American plant. (2) *Ranunculus ficaria.* (3) *Anemone nemorosa.* (4) *Stellaria holostea.* (5) *Luzula campestris.*

A. Mitchell (who should have sent his address). *Geum rivale.*

"*Knaresborough.*"—Your difficulty would be easily overcome by using a mortar and adding the water gradually.

"*Christopher.*"—Dry the Ext. Taraxaci, and add about 20 grains of Pulv. Althææ. No glycerine will be needed. Send the pills out in a bottle.

"*Teuton.*"—Degrees can be obtained from German universities without a knowledge of the German language or any thing else, and this scandalous method is sometimes practised, but beyond expressing our condemnation of the system, we are unable to give any information respecting it.

"*Wolfram.*"—It is not generally considered necessary to label the preparation you mention as "poison," but considering that it is often administered to infants it is at least desirable to adopt some efficient means of preventing accidents such as have arisen from its use.

Messrs. Hirst, Brooke, and Hirst.—As the subject of correspondence forwarded has not been referred to in our columns we cannot comply with your request, but must refer you to the journal concerned. Should this, however, involve more delay than you desire, the required publicity might be obtained by communicating with our advertising agents, Messrs. J. and A. Churchill.

"*Inquirer.*"—Dynamite consists of a mixture of nitroglycerine and about 25 per cent. of its weight of silicious earth.

"*Syrupus.*"—A formula for the preparation of Syr. Ferri Brom. was published in vol. v. of the present series, p. 163. Another was given on p. 61 of the same volume.

A. B. C.—'Selecta è Præscriptis,' published by Messrs. J. and A. Churchill.

Mr. J. Abraham and *Mr. W. Wilkinson* are thanked for their communications.

"*Inquirer.*"—The provision evidently applies to the age at the time of competition.

"*Vis Unita Fortior.*"—The plan suggested would no doubt be effective if it could be carried out. It has already been tried and broken down.

J. Garth, T. W. D., F. L. Phillips, and "*Alpha.*"—The office of the "*Analyst*" is No. 79, Great Tower Street E.C., and the subscription is 3*s.* 6*d.* per annum.

D. H. G.—(1) We cannot suggest any poison that would be fatal to "rats that strychnia does not seem to affect." (2) Both subjects should be included in the teaching of pharmacy.

B. Stortford.—A statutory declaration would have to be made that the person mentioned in the certificate is identical with the person who has passed the examinations.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. Senftleben, Mr. Berridge, Mr. A. Warren, Mr. Swenden, Mr. James, Mr. Swingburn, Mr. A. W. Smith, Mr. Lincolne, Mr. Muir, Enitar, Hieroglyphic, T.D.

THE LOAN COLLECTION OF SCIENTIFIC APPARATUS.

On Monday next is to be opened at South Kensington an exhibition which, although not likely to attract so large a number of visitors as former exhibitions have done, will present innumerable points of interest to men of science, even though they have only a very small claim to the title, and also to those who appreciate the benefits which have been conferred upon mankind by modern scientific research. The exhibition had its origin in a proposal, which received the sanction of the Lords of the Committee of Council on Education about sixteen months ago, to form a Loan Collection of Scientific Apparatus that should include not only apparatus for teaching and investigation but also such as possessed historic interest on account of the persons by whom, or the research in which it had been employed.

The proposal appears to have received warm encouragement from foreign governments and the arrangements have been carried out by a general committee amongst the members of which are included many of the most eminent scientific men in this country and on the continent. The United States, however, probably too much occupied with its own centennial exhibition, is not represented at present either on the General Committee or the list of contributors. Unlike the plan adopted in previous exhibitions the articles are not grouped according to the nations of the contributors, but according to their position in the general classification. Not only is this more truly in accordance with the word "international," but it brings together most primitive—but often surprisingly perfect—apparatus used by the early workers in different sciences and the latest modifications of the same by the best makers. Thus the curious microscope—formed of a flat plate of silver about two inches long, in which the lens is set—used and probably constructed by Anthony von Leeuwenhoek (not Leewenhock, as in the catalogue) is brought into juxtaposition with the modern binocular, whilst the startlingly rude but substantial balance of Dr. Black contrasts with the finished work of Oertling and his competitors.

The classification of the collection includes twenty-one sections. These are—Arithmetic; Geometry; Measurement; Kinematics, Statics and Dynamics; Molecular Physics; Sound; Light; Heat; Magnetism; Electricity; Astronomy; Applied Mechanics; Chemistry; Meteorology; Geography; Geology and Mining; Mineralogy and Crystallography; Biology; Educational Appliances; Photographs, etc., illustrating Italian Science; and Miscellaneous.

Doubtless each of these sections will have its visitors with eyes tutored to appreciate special merits too recondite for ordinary mortals to detect. The arithmetician may wander from the "Napier bones" to the Babbage Calculating Machine; the geometrician may revel in the collection of models exhibited by the London Mathematical Society or the Munich Polytechnic School; the mechanist may measure the difference between the "Rocket" and the locomotive of to-day, or study the apparatus by means of which Dr. Thomas Young sought to obtain perpetual motion, or note how Sir Joseph Whitworth detects the difference of one ten-thousandth of an inch in the bore of a gun; the geographer will find enough to enjoy in the collection of splendid maps and charts and log-books, the latter including those of Captains Cook and Bligh. An incomplete telescope with a broken lens of Galileo, and the original seven foot telescope constructed by Sir William Herschel, will furnish "food for thought" to astronomers. The electricity section, too, includes a very interesting special collection illustrating the history of electric telegraphy, contributed by Her Majesty's Postmaster-General.

But other sections will probably contain exhibits of more especial interest to our readers, although, it will be impossible here to do more than indicate their nature.

In the Measurement section there is a splendid collection of balances. A Roman bronze steelyard, with a reversible beam 17 inches long, discovered near Chichester, contrasts with a modern steelyard, the sensibility of which is represented as 1 : 200,000. There are balances upon different principles, with long or short beams, and of varying degrees of delicacy; of one "test-balance" it is said that with a load of 2 grams it is affected by the 7100th part of a milligram! A "pharmaceutical balance" for simple chemical operations is also shown, and a set of "pharmaceutical weights," from 0·01 gram to 200 grams, in 19 pieces. Of antiquarian interest there is a balance formerly owned by Dr. Priestley; and in the Chemistry room there are the balances that were used by Cavendish, Dr. Thomas Young, Sir Humphry Davy and others. A case of handsomely finished measures of capacity according to the metric system has for its next neighbour another containing the original Winchester bushel and Winchester quart given by Henry VII. to the Corporation of Winchester in 1487. In this section also there is the apparatus used by Dr. Joule for ascertaining the mechanical equivalent of heat.

In the Molecular Physics section are numerous air-pumps, ancient and modern, accompanied by the very "Magdeburg hemispheres" which are said, when exhausted, to have excited the astonishment of the emperor and his court at Ratisbon more than two centuries ago; also apparatus for osmose, dialysis and diffusion, for the condensation and solution of gases (including that employed by Dr. Andrews in his researches on the continuity of the gaseous and liquid states of matter), alcoholometers, saccharometers, hydrometers, and other specific gravity instruments.

Many interesting forms of apparatus are exhibited in the section for Light: a stereoscope made by Brewster himself, spectroscopes and polariscopes, Wheatstone's polar clock, photometers, Crookes' radiometers, the first known photograph on glass, and other photographic objects. There is also a series of fluids to illustrate the phenomenon of fluorescence. In the Heat section there are blowpipes, burners, and furnaces; also a fine series of thermometers, including Williams's milligrade thermometer. Pharmacists will also examine with interest a very complete and compact steam pharmaceutical apparatus.

The Biological section includes a very fine and varied collection of microscopes and their adjuncts by modern makers. There are some also of historic interest. Besides Leeuwenhoek's, mentioned before, there is one microscope that was employed by Robert Brown in his botanical researches, and one that was employed by Sir William Hooker. Another illustrates Lyonet's curious mechanical arrangement for following the motion of a caterpillar. Here also is to be found a series of botanical models on an enlarged scale, constructed to illustrate the structure of the flowers, etc., of plants, a plan that would be very useful in the case of minute plants and grasses. Some very beautifully executed lithographed botanical diagrams, by Dr. King, are hung upon the walls above the cases.

Chemistry is well represented from both at home and abroad, and here probably those pharmacists who visit the exhibition will find their chief attraction. The catalogue of this section, however, is at present far from complete, a fine collection of chemicals from the firm of Hopkin and Williams, and two or three others that have been sent from Germany through the German Chemical Society, not being included in it. The unusual character of one of these collections may be judged from the fact that it contains ample specimens of aporetin, phæoretin, erythroretin, emodin, chrysophanic acid, xylol, glycyrrhizate of ammonia, coumarin, caffein, piperin, filicin, arbutin, æsculin, etc., etc. Professor Frankland contributes a series of specimens of chemicals, illustrating his researches; and another series illustrates the researches of Mr. W. M. Perkin. A collection of sixty-five vanadium compounds is contributed by Professor Roscoe. Besides these and others of a similar character there are many specimens from chemical manufacturers illustrating the different stages of progress towards the finished products. Nor must we omit to mention that here will be found the simple apparatus used by John Dalton in his chemical and physical researches; Faraday's apparatus for the condensation and liquefaction of gases, with original tubes containing gases liquefied by him; also the apparatus with which Andrews and Tait proved that ozone is a condensed form of oxygen.

It will be seen by the foregoing that the exhibition is an extremely interesting one, and one that not only cannot be permanent but is not likely to allow of repetition with such success for many years to come.

SOME PRACTICAL APPLICATIONS OF POLARIZED LIGHT.

BY HENRY POCKLINGTON, F.R.M.S.

(*Continued from p.* 843.)

The polariscope has also been employed in the investigation of a certain solar phenomenon,* "visible immediately before sunrise or after sunset, in the place where the sun is about to appear, or where he has just quitted the horizon, and known as the zodiacal light. It has a flat lenticular form, and is placed obliquely on the horizon, the apex extending to a great distance in the heavens," and is most favourably situated for observation in the beginning of March The phenomenon has been the subject of many speculations and much difference of opinion, the faintness of its light and the whole conditions of the investigations rendering precise results difficult to be obtained, and until quite recently all attempts at polariscope observations led to negative results, no satisfactory evidence of local polarization being obtained. But by means of a specially sensitive polariscope arrangement and extreme care Professor A. W. Wright† has succeeded in satisfying himself of the existence of definite polarization, and has determined its place with as much accuracy as the circumstance will admit of. The apparatus consisted of a quartz plate cut from a macle perpendicularl to the axis. "The body of the plate consists c left-handed quartz, through which passes somewha eccentrically a band of right-handed quartz, 6·5 mm in breadth. The band is not bounded by shar lines of division on the sides, but by intermediat strips about 2 mm. in breadth, which are of differ ent structure and are apparently formed by th interleaving of the strata of the two portions at thei edges. In the polarizing apparatus these strips simpl vary from light to dark, without marked appearanc of colour. When the corresponding diagonals o the Nicols are parallel, or nearly so, the bands ar white upon a deep reddish-purple ground (Fig 27; with the Nicols crossed the bands are dar upon a light greenish yellow background (Fig. 28

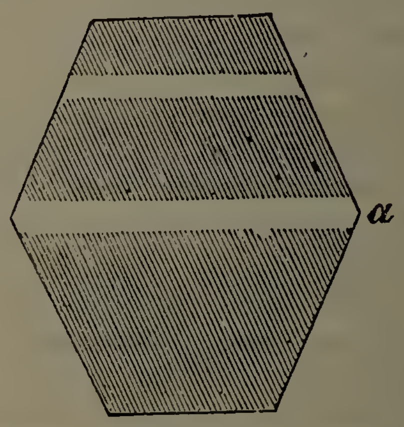

Fig. 27.

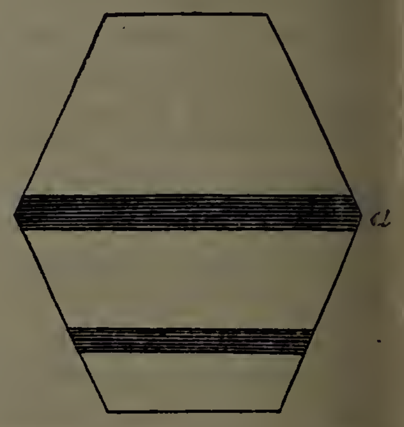

Fig. 28.

Turning one of the Nicols 45° in one directio the observer sees the central band (*a*) intensel *blue* upon a yellow ground; turning in the othe direction, a bright yellow upon a dark blue; an intermediate positions give the usual varying tint The quartz plate was placed in one end of a tub large enough to admit its full size very nearly, an eleven inches in length. In the other end was place a good-sized Nicol." The results of Professor Wright' examination are thus summarized by himself:—1 The zodiacal light is polarized in a plane passin through the sun. 2. The amount of polarization is with a high degree of probability, as much as 15 pe cent., but can hardly be as much as 20 per cent 3. The spectrum of the light is not percep tibly different from that of sunlight, except in inten sity. 4. The light is derived from the sun, and i reflected from solid matter. 5. The solid matt consists of small bodies (meteoroids), revolvin about the sun in orbits crowded together toward the ecliptic. In relation to No. 4, Professor Wrigh narrates the results of some observations made upo the nature of the light reflected from the surfaces o certain substances when placed so that the normal bi sected the angle between the lines from it to the ey and to the illuminating flame, or so that the angle of incidence and reflection were each 45°. Th following are the results*:—Porphyry, groun smooth but not polished, 35 per cent. of the tota light reflected was polarized. "Another surfac thickly covered with accumulated dust, 15·5; dar blue shade, 25·7; syenite, coarsely crystalline an rough, 16·4; gneiss, rather fine grained, 8·3; granit fine grained, 11·8; red jasper, rough broken surface 23·5; sandstone, 12·1; brick, rough fragment, 8·1 the same, smooth surface, 11·3; red Wedgwood war unglazed, 14·2; indurated clay light brown, 11·0 mortar, whitewashed surface, 12·1; the same, roug side, 6·0; white chalk, cut plane, 2·0; a fragment the great meotorite of Pultusk gave from a broken surface, 11·7; from the blackened surface, 36·0. These results show that from surfaces of this nature the light reflected has in general but a low degree of polarization, not greatly different, on an average from that found in the zodiacal light."

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* R. A. Proctor, Ency. Britt.—*sub voce*, Astronomy (8th ed.). † 'Philosophical Mag.,' vol. 43, 1874, page 13.

* *Loc. çit.*, page 20.

We have now accumulated a sufficient number of substances in which polarized light may be employed with more or less practical advantage, and are, it is hoped, in a position to select a few of the phenomena observed with a view to their discussion from the theoretical point of view, in the endeavour to obtain thence that which shall help us in our further studies especially those involving the use of circularly polarized light. In the course of the discussion I shall take occasion to describe pretty fully the various forms of polariscopes and accessory apparatus in general, or importantly special use.

MORTAR PRACTICE: A FEW NOTES ON CONTUSION.*

BY H. T. CUMMINGS, M.D.

(*Concluded from page* 865.)

We turn now to the sieves. These are of various forms and sizes and kinds, round, oval, and rectangular. Some are open at top and bottom, and the substance to be sifted is tossed into them, and the resulting powder received upon a sheet of paper. Some have box-covers to top and bottom, and the material enclosed is sifted without loss or dust. The best of all to my mind, are those rectangular sieves which are inclosed in a tight box, and operated from without either by the hand or by means of a crank. The sifting medium may consist of horsehair, bolting-cloth, brass wire-cloth, or iron wire, and all these different materials are adapted to special uses, some being better for one and some for another substance. When only one set of sieves can be afforded, I regard brass wire as far the preferable material from its cleanliness, durability, and power to resist oxidation. This may be had in pieces to suit, of mesh varying from ten to one hundred to the linear inch.

The size of the rectangular sieves above described should be adapted to the requirements of the pharmacist's business. For pharmacies of limited means and business, my own experience would suggest nine (9) inches by fourteen (14), and four (4) inches in depth, as the size best adapted for quantities varying from one (1) to thirty-two (32) ounces of material to be sifted. They might, indeed, be much smaller, but occasions will often occur in practice when a smaller size would seriously cramp the operator's action and cause great loss of time. To avoid the necessity of having a separate box for each size of mesh I have adopted the plan of a light iron frame, to which strips of wood properly "mitred" are screwed; to these strips the brass wire-cloth is tacked, and the whole is then attached to the box by screws. This enables me, by drawing a few screws, to change the mesh of my sieve from coarser to finer, or *vice versâ*, as may be desired. In my apparatus the sieve is hung upon a stout iron wire bent twice at right angles, and the ends are bent into hooks which are let into notches cut into the upper edges of the enclosing box, so that the wire keeps its place while the sieve is shaken to and fro while swinging upon it. A handle passes through the front of the box by which it is operated. I have found a good addition to be a set of buffers made of one half inch rubber packing three-quarters of an inch in length, let into the two ends of the sieve, which breaks the force and dulls the noise when the sieve strikes either end of the box while working. The sieve is entirely free, so that it can be lifted out from the box almost as easily as from a table. By this apparatus the work of sifting drugs, which evolve much dust, is carried on with comparative freedom from annoyance.

The apparatus necessary to produce the best results in endeavouring to obtain powders of any given degree of fineness has been thus minutely described, because the writer believes that the idea never enters into the heads of a large number of pharmacists that anything besides a mortar and pestle, or a drug-mill, is needed for pulverizing drugs, and that they have no conception of the process required in conducting this operation. Some pharmacists furnish only the mortar and pestle, others may add the mortar-block, but the sieves are invisible, and a dirty towel is made to do duty as a hood to catch stray particles projected from the mortar. The writer has seen an apothecary's boy seated on the floor with the mortar on the floor between his legs, which stretched out either side of it like a huge pair of tongs, hammering away with what effect might be anticipated from such an awkward position. Since attention has been attracted to the subject of powdering drugs by the discussion of percolation, it has been believed that it would be practically useful to collect the description of the apparatus best fitted to fulfil the requirements of the United States Pharmacopœia in this respect. The cost of all the articles desired would not exceed, if it would equal, that of a first-rate hand drug-mill; and with this apparatus a finer powder can be obtained with less exhaustion of the vital powers than with the best hand drug-mill ever offered.

The drying of drugs by carefully managed stove or steam heat is indispensable. Air-dried drugs, as they ordinarily occur in the market, upon being exposed to dry heat, part with from 5 to 15 per cent., and even more of moisture. Gum arabic has, in the hands of the writer, lost 10 per cent.; Rochelle salts uniformly average a loss of 18 per cent.[*]; crude soft opium 20 per cent. But the cardinal point to be observed is that if success in pulverizing the majority of drugs is expected they must be thoroughly dried. A description of the best means for effecting this is left for another occasion; but air-dried drugs, after yielding a little powder, will clog the sieves and cake under the pestle.

Strange as it may seem the part in which inexperienced operators fail is working the pestle. The action is simple enough, merely lifting the pestle and striking it down upon the substance in the mortar. But there is a difference, striking in more senses than one, between the listless, ill-aimed, perfunctory pounding of an unwilling, inexperienced neophyte, and the rapid, telling blows given by an expert operator bound to get to the end of his task quickly, wisely, and well. The one, perhaps, don't care "whether school keeps or not," and his progress is slow accordingly; the other gives his whole mind to what he is about, and makes progress that he is able to appreciate. Now, my experience has led me to the conclusion that this operation, simple as it is, like every other work that we do, requires attention in order to be well done. And this attention, momentary as it is, when paid to each single blow of the pestle, lends an emphasis to the blows that would surprise any one who has never before attentively noticed the fact. And the easiest way to secure this attention to the blows is by *counting* them. Furthermore, the system and order which the practice of counting, and changing hands at the termination of each hundred of blows, or sifting at every one or two hundred, or more, seems to impart a rate to the work somewhat analogous to that given by the oars to a boat.

The time occupied in delivering a thousand blows with the pestle, including the necessary pauses for taking breath or sifting, need not exceed one hour, and this, in most instances, will be found to be more than is necessary for executing the formulas of the Pharmacopœia in the quantities assigned. The writer undertook to pulverize 8 pounds of poppy capsules for syrup. The apparatus used was a mortar holding about 9 pints, and an eight-pound pestle, The sieve employed was number 20, and was used once in every five hundred blows. After the capsules were rid of seeds and envelopes they weighed five pounds four and a half ounces, avoirdupois. Ten thousand blows of the pestle completed the powdering, yielding 5 pounds of powder No. 20 and 2½ ounces of gruffs, with 2 ounces loss. If these capsules had previously been exposed to the heat of a drying-closet, the operations would doubtless have been much shortened as well as facilitated, but the actual working time of delivering that ten thousand blows, including the sifting and breathing-time, was only four hours. The same operation was repeated a year afterwards with nearly the same result. It is noticeable that the air-dried capsules had a tough, leathery texture, which caused them to yield very slowly under the pestle, and that No. 20 was found practically to be fine enough for their percolation. Six pounds of buchu were also pulverized with the same apparatus, sieve No. 40 being used. Sifted at each four hundred blows, time two hours, 4000 blows delivered; product, powder, 5½ pounds; gruffs, 3½ ounces; loss ¼ pound. In this last case the writer had the assistance of an *employé*, who, encouraged by his example, handled the pestle with skill and effect as he counted his blows.

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[*] From the 'Proceedings of the American Pharmaceutical Association,' vol. xxiii.

[*] Rochelle salt contains 25·5 per cent. water of crystallization, 17·5 to 19 of which are given off at the heat of a water-bath, the remainder at a temperature of 130° C. (266° F.).—EDITOR AM. J. P.

Among the refractory substances which yield slowly and reluctantly to the action of the pestle, are colchicum seeds and sago. With the former the writer's experience has been too limited to be able to offer anything of interest, with the latter, however, something positive can be said. Having occasion for some finely powdered sago, and being unable to purchase it, its pulverization was undertaken. It was supposed, in the absence of all previous experience with it, that it would yield readily to the pestle, and a charge being put into the mortar a thousand blows, well laid on with the pestle, gave only 1¼ ounce of powder No. 100. This was both discouraging and provoking; but the residue was put into the drying-closet, and kept for two days, when it was tried again. One thousand blows yielded 5½ ounces; six thousand additional blows gave 19 ounces. So that from eight thousand blows of the pestle a little less than 26 ounces were obtained. On another occasion twelve thousand blows of the pestle gave 4 pounds of powder No. 100. This was effected by having the sago hot from the drying closet, and both pestle and mortar so hot that they could not be handled with gloves.

When drugs are thoroughly dried in the closet, upon contusion in the mortar they are apt to evolve much dust, sometimes bland, sometimes irritating, and some acrid and poisonous. Examples may be found in gum arabic, which is bland; castile soap and opium, the dust of which is extremely irritating to the nostrils; aloes, calumba, and rhubarb, which are bitter; and blood-root and aconite, which are acrid and poisonous. It is for such as the latter that the hood or cap over the mortar, and the close sifting-box, are specially useful. Without these parts of the apparatus it is somewhat dangerous to attempt to pulverize such drugs as blood-root, hellebore, and aconite; and some protection for the operator is needed in the cases of castile soap and opium.

Drugs containing a large proportion of oil, whether volatile or fixed, are bad subjects for fine powdering, those containing fixed oil especially. The cells containing the oil are ruptured under the pestle, and the oil is liberated, saturating the other particles of the substance, forming a pasty mass which it is impossible to sift. This is especially true of stramonium seed. The writer has managed to pass ergot through a No. 50 sieve by brushing off the loose particles with a corn-broom whisk applied to the under side of the sieve bottom, and then burning out the oil with a Bunsen gas-flame every time the meshes became clogged. The same is true of such fruits as those of anise, caraway, and fennel.

The foregoing remarks are offered by the writer in the hope that it may encourage pharmacists who require powders in quantities so small and of such size of particles that the large drug-mills will not touch them, to make their own powders. It is believed that when the proper apparatus is provided, which is neither large nor costly, and the job is attacked with resolution, that the labour and difficulty are much less than is apprehended or anticipated. The greatest objection to this operation is the dust arising from it, and which can be obviated only by placing the apparatus in a small room expressly provided for it, where there is no other furniture besides the mortar-block and a table for sifting upon.

OFFICIAL DOSAGE, WITH SOME REMARKS ON HOMŒOPATHIC TINCTURES.*

BY ROBERT FARQUHARSON, M.D.,

Lecturer on Materia Medica at St. Mary's Hospital Medical School, etc.

It is now more than two years since our late lamented colleague, Dr. Anstie, referred, in the pages of the *Practitioner*, to the very uncertain and misleading directions of our official dosage. The text on which his remarks were founded was a case which made a good deal of sensation at the time, and provoked much varied controversy as to the best mode of obviating the disasters which might at any time arise from a similar combination of circumstances.

A physician in Ramsgate, being in attendance on a severe attack of delirium tremens, prescribed half an ounce of tincture of digitalis to be repeated if necessary in four hours, but the chemist observing that the quantity was eight times larger than the maximum dose allowed by the British Pharmacopœia, refused to make up the medicine as ordered.

The patient died, and, in the inquiry which followed, the medical man expressed his belief that digitalis used according to his instructions might have arrested the disease and saved the sufferer's life. And although the chemist had so far a good line of defence by appealing to the standard book of official reference in his particular department, he was severely censured by the coroner on the reasonable ground that it was his clear duty to have communicated with the prescriber and ascertained whether the apparently excessive dose was actually ordered with deliberate intent. Now, although public opinion at that time turned strongly against the man who, by his excess of caution, contributed to so unfortunate a result; and although it was very properly suggested that an unusual dose of any poisonous substance should always be explained by some well understood mark or symbol, it is impossible not to feel that in this, as in most cases, there is something to be said on both sides. We must remember that great responsibilities devolve on those who are empowered by law to dispense medicines, that the issues of life and death may depend on the slightest slip or mistake, that they may be at any time held liable for serious consequences. On the other hand, we are all of us liable to error, and in our younger days many of us have, no doubt, inadvertently put on paper some hurried combination of drugs in dangerous quantity, which, if made up as written, might have caused an inconvenient or even fatal result. It is clear, therefore, that the deliberate reading over and consideration of our prescriptions by skilful and highly practised dispensers, may be of essential service in correcting mistakes which carelessness or ignorance not unfrequently brings about. And although the British Pharmacopœia was not originally intended in any way to regulate dosage, although information on this score was only added to its second edition "in compliance with a generally expressed wish," and although these directions are not authoritatively enforced by the Council, and "the practitioner may rely on his own judgment and responsibility in graduating the doses of any therapeutic agents which he may wish to administer to his patients," the very fact of the doses being appended at all gives them an official sanction which it is clear was not originally intended. But these directions, such as they are, constitute all which the druggist has to rely upon for information and support under doubtful and exceptional circumstances. Supposing he is called upon to give over into inexperienced hands a bottle of medicine, which his *vade mecum* tells him is far too strong, and supposing at the same time that he is unable to communicate with the prescribing medical man, he is undoubtedly placed in a position of some perplexity. Grant also, however, that the doctor whose prescription is either rejected *in toto*, or mutilated in some way, and the patient whose interests may be gravely imperilled by such a line of action, are possibly sufferers both in reputation and in health, and the evidence begins to point pretty plainly to the necessity for some alteration in our present system. I do not suppose I can be singular in my experience in having had prescriptions referred back to me for supposed correction, because I have ordered doses which are well known to be necessary for the proper development of the action of a special drug. Thus, on one occasion when I ordered succus conii in ℥i. doses for acute chorea in a girl of ten, the dispensary prescriber considered it his duty only to give a drachm, and on my next visit pointed out with some concern what he naturally believed to be my mistake. Here no harm was done, for the patient afterwards getting her proper dose was rapidly cured, and the dispenser hailed with satisfaction this addition to his knowledge; but the recollections of my hearers will doubtless bring before them many instances of confusion and delay caused by the fact of our having no properly constituted official guide for prescribing.

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* Read before the Medical Society of London. Reprinted from the *Practitioner*.

I will only mention one more instance out of others which I have met with in practice, and that was when, on taking the hospital duty of a friend, I prescribed 20 minims of belladonna for a child of three years old. I shall never forget the consternation with which the pharmaceutical official presumed that I had dashed off at least 10 minims too many in the bustle and hurry of out-patient work, and his surprise when I told him that it was my common custom to prescribe much larger doses with benefit.

Now, although we have seen that the Medical Council did not primarily intend the British Pharmacopœia to be a rigid standard of dosage, and although they also expressly state that the quantities are "intended to represent average doses in ordinary cases for adults," we have also seen that the public have stamped a thoroughly official character on the book, and it has come to this, that the maximum and minimum quantities there enjoined are now all but universally held to represent the limits within which drugs may be safely or even legally prescribed. Let us, therefore, see in how far the teaching thus laid down is in accordance with modern therapeutics.

To begin then with conium, to which reference has already been made, we will find that the authorized dose of the succus is represented as varying from ♏x. to ℥i. Now the largest of these quantities is probably without any influence on the human frame, and it is hardly necessary for me to remind you that the experiments of John Harley have shown that we must give from one to four or six ounces before we can expect to derive real benefit from the drug, eight ounces even having been reached without ill effect.

Belladonna, again, is allowed in extract only up to half a grain, which is too small, and to ♏xx. of the tincture, which is far within the mark, as I have given from a drachm to ʒij ss. to patients suffering from incontinence of urine with marked advantage.

There is also a curious timidity shown in the directions about quinine, 10 grains of which is held to be the maximum dose. Now, I suppose no fact in medicine is better established than the necessity for administering 20 or 30 grains, or even more, in bad cases of intermittent fever, and the valuable anti-pyretic properties of the drug only come into play when the dose reached is three or four times in excess of that allowed by the Pharmacopœia.

Then in the case of aconite two mistakes occur, the minimum quantity of ♏v. is too large, for we have all seen the remarkable power of drop doses frequently repeated in checking various inflammatory conditions, and the maximum is also too large, 15 minims being far from a safe prescription in the case of most adults who have over-passed middle life. We have already seen that tincture of digitalis is restricted to ʒss., and we know that the successful treatment of delirium tremens by means of ℥ss. doses is now one of the commonplaces of medicine; and Dr. Anstie draws special attention to the insufficient quantity ʒi. of tincture of hyoscyamus allowed, telling us that ℥ss. is often required in asylum practice.

It must be within the experience of all to have prescribed pot. bromide in larger doses than 30 grains, and the absurdity of restricting iodide of potassium to 10 grains is almost too patent to require further remark. We all know that some of the most brilliant successes of medicine and surgery have been secured by the administration of 20, 30, 40, and even 60 grains.

Coming next to ipecacuanha, we find that, although its properties as an expectorant and emetic are recognized, no mention is made of its specific anti dysenteric powers; and a dispenser would therefore probably consider it his duty to cut down a prescription in which doses of from ʒss. to ʒj. of the powdered root were ordered to be taken every two hours.

The tonic dose of sulphate of zinc is put down at from one to two grains, although it is well known that more than double this quantity is often well borne in chorea; and 30 minims is considered the maximum quantity of tincture of ferri perch., although in erysipelas and acute rheumatism ʒj. is often administered with benefit. The minimum doses of liquor of morphia, hydrate of strychnia and tincture of nux vomica, are all placed too high at ♏x. gr. $\frac{1}{30}$, and ♏x. respectively; and the researches of Ringer have shown that we derive little benefit from the use of tincture of lobelia in asthma, unless we carry the dose beyond that laid down by authority at ♏30. Now, although these are undoubtedly the principal instances in which the Pharmacopœia is hopelessly at variance with the modern development of therapeutical science, there are many other examples which I will not weary you by detailing.

Enough, I hope, has been said to convince you of the necessity for some alteration in the rules laid down for our guidance in the matter of dosage. The experienced medical man of course orders his drugs according to the dictates of his own personally acquired knowledge, and often arrives at practical conclusions, for which we might look in vain in our text-books; but the beginner feels himself hampered by authority, and the dispenser has his hands tied. On his counter lies the Pharmacopœia for constant reference, and, although not originally endowed with absolutely official powers, it has had that character forced upon it, and must abide the consequences. In any court of justice, in any professional controversy, its decision may at any time be invoked; and we have a right, therefore, to expect that we shall not be misled when its influence is thus brought to bear upon us. Not only should the scale of doses be at once raised, but pains might be taken to indicate the largest quantities which may be, or have been, given with impunity. And the important question of minimum doses, on the principle which is so rapidly gaining ground, of the advantages to be derived from keeping the system saturated with a drug, prescribing it—that is, in minute quantities—at such short intervals that its influence on nervous or vascular function shall not be temporarily arrested by elimination, might also receive attention. In short, without converting the Pharmacopœia into a treatise on therapeutics, the attention of those who have so ably superintended its construction might be called to the propriety and even necessity for some alterations in the rules which it lays down for the prescribing of drugs. To this it may of course be objected that therapeutics is not in a sufficiently settled state, nor is medical opinion on the subject sufficiently unanimous, to justify any authoritative utterance on these points, and in particular the question of frequent divided doses has not yet been fully worked out. This objection was foreseen by Anstie, and it remains with you to decide whether something might not be done by us to carry out his suggestions, and thus most effectually prove our reverence for the memory of one who was ever foremost in advocating the cause of truth and progress. Let me quote the concluding words of his paper: "No greater service could be performed by the colleges or great medical societies than the formation of a committee of competent men for the special investigation of this question of dosage, for it is a subject which is only in its infancy, and the best knowledge which exists about it is undoubtedly confined to a very small section of the medical profession." Now, although it may be true that the *best* knowledge of dosage has not yet become the common property of the profession, there is no doubt that enough is known to justify a pretty complete official classification; and as the expense of frequent reprints of the British Pharmacopœia would be considerable, I venture to suggest the occasional publication of a posological table in the form of addendum, which might give effect to recent investigation, and supply the not unnatural wish which generally prevails for trustworthy and authoritative information on the subject of maximum and minimum doses.

Before leaving the subject of the British Pharmacopœia, I may lay before you another anomaly connected with dosage, which has been more especially exposed by Mr. J. A. Cope, of Derby, in the *Pharmaceutical Journal* for April 17th, 1875. He there points out how inconsistently the doses of various drugs vary according to their preparations. Thus, the quantity of tincture of ergot sanctioned by official authority is equivalent to 13½ grains of the powder, whereas that of the powder or liquid extract corresponds to 3 grains. Thirty minims of tincture of digitalis equals three grains or the dried leaves, whereas the ordinary dose of the infusion is only equivalent in value to 1½ grain.

Aloes varies in its different preparations from 3 grains to 8 grains; of tincture of belladonna, ♏30 equals gr. j. of leaf, whereas gr. j. of the extract corresponds to ʒj. of the tincture; whilst nux vomica supplies a still more glaring example, seeing that ♏20 of the tincture corresponds to 2 grains of the powdered seeds, whereas of the extract 2 grains equals ʒss. It is difficult to see that these curious discrepancies have been made with any deliberate intention, and the inference is therefore fair that they have merely crept in from some carelessness or want of method on the part of the constructors of our national Pharmacopœia. Whilst fully acknowledging the great benefits which have resulted from the pharmaceutical fusion of Scotland and Ireland, and the establishment of one national standard in the United Kingdom, it appears to me to be the duty of every one to make such suggestions for the improvement of future editions as may seem founded on reason; and it has been a great gratification to me to bring a subject before you which specially engaged Anstie's attention, and to the due futherance of which he was about to summon all the resources of his energetic intellect when his career was unhappily brought to a close. There can be no doubt, however, that caution is a safe side on which to err, and the restrictions under which our chemists and druggists are now placed are our great safeguards against accident and disaster; and we may congratulate ourselves on this all the more when we see the looseness which prevails in homœopathic pharmacy. We all know of the change which has recently taken place in the principles of this class of practitioners, and how the feeble dilutions of former years have been replaced by excessively strong tinctures. This change, however, has not been followed by any alteration in the laws regulating prescribing; and we accordingly find these deadly poisons dealt out freely to all comers without restriction, and compounded by druggists who are not necessarily possessed of any legal qualification. In a letter from "A Chemist," published in the *Pharmaceutical Journal* for June 29th, 1872, this point is strongly urged, and the anomaly exposed of permitting homœopathic druggists to evade the Pharmacy Act by practising their trade without registration or examination, and making up patent and poisonous medicines under the same conditions as when their operations were confined to sugar globules and distilled water.

That many of the modern homœopathic preparations are of dangerous strength has long been generally known, but to Dr. George Johnson is undoubtedly due the credit of bringing the matter home to us more directly. It is unnecessary for me to do more than remind you of his paper read before the Clinical Society, and which, supplemented by additional cases, is printed in vol. vii. of their *Transactions*. Dr. Johnson brings forward five cases, occurring in his own practice and in that of others, in which unpleasant and even dangerous symptoms, consisting of epileptiform convulsions, violent pain in the head and spine, nausea, stupor, etc., were caused by doses of the concentrated homœopathic solution of camphor, ranging from eight 2-minim doses up to twenty 25-minims, and a teaspoonful. In some of these entire recovery only very slowly took place, and various distressing nervous sensations were experienced in the case of a young lady for fully eight months, after a single dose of 25 drops. As a contribution to our knowledge of the actions of camphor on the healthy organism, the interest of these cases is much enhanced by the accurate way in which the various poisonous influences on brain and spinal cord correspond with the account given of the physiological action of this drug as deduced from experiment by Nothnagel. From an analysis obtained by Dr. Johnson, it would appear that this homœopathic solution of camphor contains one ounce to one and a quarter ounce of spirit, being stronger than the spt. camph. of the B. P., in the proportion of 7⅕ to 1; and, considering the freedom with which it is used in domestic medicine, Dr. Johnson has undoubtedly done good service by directing attention to its dangerous properties.

Feeling desirous of obtaining some approximate idea of the strength of the strong or mother homœopathic tinctures, I procured some of the tinc. aconiti, buying it over the counter at a chemist's shop without any difficulty, and made the following experiments:—At six minutes to three o'clock on Wednesday, January 19th, I injected five minims beneath the skin of a full-grown rabbit, and no effect being produced in five minutes I injected fifteen minims more. In three minutes violent convulsive movements of the diaphragm set in, with attempts at vomiting, and a peculiar fighting motion of the fore-paws as though trying to remove some obstruction about the mouth. A paralysed condition of the hind-legs followed, and death ensued, after a paroxysm of general convulsions, in exactly five minutes after the injection was performed. Ten minims proved fatal to a rather smaller animal in twenty-five minutes, the symptoms following exactly the same sequence and regularity. I found that ninety drops dropped from the ordinary homœopathic drachm tincture bottle, correspond to sixty minims; and we therefore see that fifteen drops is sufficient to kill a rabbit.

I have no doubt that even a smaller quantity would also have caused death, but being unwilling to multiply these experiments, I lay before you my present evidence which seems enough to show that we have here a poten and dangerous poison, sold publicly to any one, and doubtless recklessly used in domestic medicine.

So far as I can make out, the mother tincture of homœopathic practice about equals in strength our liniment of aconite, which we all know to be a very much stronger preparation than the tincture of the British Pharmacopœia.

Coming now to tincture of belladonna, I have found on personal experiment that ♏x. of the homœopathic mother tincture taken at night caused some dryness of the throat, with disturbed sleep and much dreaming; and three more doses at intervals throughout the next day were sufficient to keep up the same parched feeling about the mouth and throat, with an uncomfortable sensation of dryness and irritation over the skin generally.

This is therefore evidently much stronger than our own tincture, which may usually be given in doses of from fifteen to twenty minims, without the induction of physiological symptoms until the drug has been persevered with for some time. I have once seen ten doses of ten minims cause some discomfort to a delicate young woman; but, on the other hand, I have now a girl of fourteen under treatment for incontinence of urine who is taking with marked benefit ʒiiss. thrice daily. An unpleasant dryness and thickness about the throat always precedes dilatation of the pupil, as the first indication that the remedy is beginning to exert its constitutional influence, and the early development of these effects when experimenting on myself shows how strong the preparation in question really is. I have not made observations on any of the other vegetable mother tinctures, but find from the Pharmacopœia that they are as a rule constructed on the uniform principle of one part of the juice of the plant to one of spirit, a strength which must render their use most dangerous, unless under strict medical supervision.

As a fair sample of the metallic preparations of the homœopathic armamentarium, I have selected arsenicum and mercurius, both of which remedies are in extensive use; and being unable to obtain an accurate idea of their strength from the pages of the now antiquated Pharmacopœia, I applied to my friend Mr. Barker, who most kindly placed at my disposal the services of Mr. Brownen, the able analytical chemist of Messrs. Savory and Moore. This gentleman has favoured me with the following careful report on the amount of the active principle contained in the first potency of arsenicum and mercurius:—

Analysis of Homœopathic Solutions.—Two solutions were received for analysis.

Solution I. was labelled "Arsenicum Alb. Poison. Dose for an adult, one to five drops." This solution was examined for arsenic and arsenicum, as arsenious acid was found.

The menstruum was water, and it had a slight alkaline reaction.

The arsenic was estimated by volumetric and gravimetric methods with the following results:—

	Volumetric.	Gravimetric.
Arsenious acid . .	·994	·893 grains.
Water	100·000	100·000 ,,

Or, reduced to fluid measures, one grain of arsenious acid in 102 minims of water. The corresponding solutions in the British Pharmacopœia are each one grain in arsenious acid in 120 minims of solvent.

Analysis II. labelled "Mercurius Cor. Poison. Dose for an adult, one to five drops," etc.

This solution contained the amido-bichloride of mercury, dissolved in alcohol.

The solution was estimated volumetrically as regards its chlorine, and colorimetrically as regards mercury.

These operations gave the following results:—

Mercuric chloride	·75 grains
Water	100·000 ,,

or about one grain in two fluid drachms, and about four times the strength of the solution of perchloride of mercury as ordered in the British Pharmacopœia.

Both preparations were therefore strong solutions of potent substances, and were rightfully labelled "Poison," as they were within the scope of the Poisons Act.

Although we have seen that the precaution was taken to label these preparations, "Poison," I am not sure in how far they were freely sold, but in any case we find the ground cut from under the feet of the homœopathists, one of whose great boasts used to be that no mercury or injurious metallic substance was ever prescribed by any of their practitioners. Now, I feel quite conscious that the slight sketch just given of the strength of some of the principal homœopathic tinctures cannot be looked upon as much more than suggestive, and as a text for the remarks of others. I have not ventured to say one word upon, nor do I know anything of, the principles which regulate those who practise homœopathy. It is pretty evident, however, that to dose diseases solely by their names, and to prescribe infinitesimal dilutions, has not proved sufficiently captivating to the inquiring intellect of this sceptical age, and that, in order to sustain the principle of subdivision, excessive concentration still enables the practitioner to prescribe a minute quantity of his remedy. The strong tinctures, which, as we have seen, are freely vended to all comers, have luckily not yet been taken into very general domestic use, or one might anticipate a long series of tragical events, before which even Dr. Johnson's interesting cases would hide their diminished heads. The dangers to be anticipated would seem to me to be fourfold:

1. The free purchasing of these poisons with homicidal or suicidal intent.

2. The rash confidence engendered in the minds of old-fashioned homœopathists regarding the weakness of their drugs and the confidence with which they may be used. A mistake of this sort being made with aconite would not be likely to occur to the same patient a second time.

3. The great probability of the mother tincture being mistaken for some of the dilutions, and recommended right and left in the usual free-and-easy way by amateurs. This might also be serious.

4. And finally, the possibility of the strong homœopathic tincture being mistaken for, and used instead of, our weaker preparations; and in a competition of this nature, we, the allopathists, who are supposed to ruin the constitutions of our patients with enormous quantities of deleterious substances, must undoubtedly yield the palm of potency of dosage to those practitioners, the very essence of whose professsional existence was formerly believed to depend on the magical effect of their infinitesimal dilutions.

It is fortunate that those amateurs who delight to dabble in drops and globules use as a rule the third dilutions, which are in all probability powerless for good or evil. I have never been able to get any physiological effects from personally testing any of these tinctures, and Mr. Brownen has been unable to obtain the slightest indication of the presence of even the smallest trace of arsenic or mercury in the attenuations of that strength. But we must remember that the potent mother tinctures are quite open to the public, that any one may go in and buy any quantity for any purpose, and that they are invariably prescribed in the most effective way, by small and very frequently repeated doses. Such being the case I feel that I require no justification for having brought the case forward for your consideration and discussion.

SYRUP OF IODIDE OF IRON.*

BY ALVIN G. HAMMER.

The chemical combination of iodine and iron was first brought to the notice of the profession by MM. Bauq and Caillot (*Journal de Pharmacie*, August, 1828,) and by them recommended in the manufacture of iodide of potassium.

An aqueous solution for medicinal use was subsequently prepared by M. Durand, the formula of which was published in the *Journal of the Philadelphia College of Pharmacy*, for January, 1833. This aqueous solution was, however, not very permanent, due to the fact that the iron salt is oxidized and precipitated out of solution as a sesquioxide of iron and the iodine is liberated as free iodine. This objectionable feature of its decomposition was to be remedied by the addition of sugar to the solution, and the preservative agent was first recommended by M. Frederking, in 1839. About the same time the subject of protecting the solution of this iron salt was being investigated by Professor Procter, who published his researches "on the power of saccharine substances in general, and uncrystallizable sugar in particular, of protecting the solution of protiodide of iron from decomposition," in the *American Journal of Pharmacy* for 1840, and subsequently, in the same volume, he again referred to the same subject, stating that he had tried the following saccharine substances as protecting agencies: sugar of milk, manna, cane sugar, honey, and uncrystallizable sugar. In summing up, Professor Procter says that either uncrystallizable honey or uncrystallizable sugar (molasses) are the best protective agents of a saccharine character. What seems very remarkable is the fact that such a definite recommendation, based upon the observation of Professor Procter, should have altogether gone unheeded by the framers of the Pharmacopœia, and that subsequent investigators, who are numbered by hosts, should not have taken into consideration the results of his investigation. Another surprising fact is that much deversity of opinion still exists among investigators of this syrup, as to what causes the chemical changes are due, and in what they consist. Professor Wayne, in a communication to the *American Journal of Pharmacy*, pointed out the conversion of the cane sugar into grape sugar, which change he ascribed to the action of hydriodic acid generated during the process of decomposition of the iodide of iron, but he seems to have overlooked the very important fact that grape sugar might be the very agent to prevent a chemical change in the freshly prepared syrup. Professor Maisch, in papers published in the *American Journal of Pharmacy*, 1854–5, states that the chemical change which takes place in the preparation is due to the liberation of free iodine and the precipitation of sesquioxide of iron, and if this decomposed syrup be now exposed to the action of direct sunlight, the free iodine is converted into iodic acid, which forms with the precipitated oxide of iron an iodate of the sesquioxide of iron, which salt dissolves in the syrupy liquid, and thus forms a colourless solution. This explanation seems somewhat improbable to me, from the fact that in no specimen of the decomposed syrup that I have met with, the precipitation of the oxide of iron and the liberation of free iodine had proceeded beyond a certain degree, and then and there ceased; now whenever this decomposed syrup was exposed to the action of sunlight, it would become colourless, and thereafter not again undergo the change which takes place in freshly prepared syrup of iodide of iron. To determine the correctness of Professor Maisch's theory, I subjected a sample of the syrup of iodide of iron which had undergone decomposition, and had been exposed to the action of sunlight until it had become perfectly colourless, to the following tests for iodic acid:

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* From *The Pharmacist*, Chicago, April, 1876.

With chloride of barium, no precipitate; no reaction with starch and dilute hydrochloric acid; when the test was performed by the exclusion of air (when this exclusion was not guarded against, the iodine test was obtained), this would indicate the absence of iodic acid. Professor Maisch, no doubt, came to his conclusion by the reaction he obtained with sulphuric acid, which liberated free iodine. It seems to me, however, that this reaction does not prove the presence of iodic acid, for it is a well-known fact that sulphuric acid, if not largely dilute, will liberate free iodine in metallic iodides. In testing for sesquioxide of iron, the following were the reactions obtained which would indicate the entire absence of this oxide of iron: Ferrocyanide of potassium, a white precipitate, which, after a few moments, acquired a bluish tint; neither tannic acid nor sulphocyanide of potassium produced any change; carbonate of potassium, a whitish deposit, which soon turned to a green colour; phosphate of sodium, a whitish precipitate, which finally acquired a greenish colour. These results leave no doubt in my mind that the sesquioxide of iron, at first formed in the decomposed iodide of iron syrup, is reduced by the combined action of the sugar and sunlight to the state of a proto-iodide of iron.

I will now enumerate a number of experiments made with different processes in preparing this syrup:

No. 1. Made according to the formula of the U. S. Pharmacopœia; it began to change in about three weeks, becoming gradually dark brown; exposed to sunlight, it became colourless, having a slight sediment of a light colour.

No. 2. Made like number one, with the addition of twenty drops of a solution of hyposulphite of soda (of the strength of twenty grains of the salt to a fluid ounce of water); this specimen of syrup began to change in three weeks.

No. 3. Made like number one, with the addition of ten grains citric accid to twenty fluid ounces of the syrup; this specimen remained unchanged for about a month, then rapidly acquired a dark brown colour.

No. 4. Made like number one, substituting iron by hydrogen for iron wire, and an addition of ten grains citric acid to twenty fluid ounces of the finished syrup, retaining its colour for nearly two months.

No. 5. This specimen was made like number one, using a pure crystallized sugar (rock candy) for the ordinary crushed sugar; this syrup changed its colour and underwent decomposition in about ten days; a sample of this syrup, kept in a dark place, changed in about the same time.

No. 6. This specimen was made by the formula of the German Pharmacopœia; this syrup retained its colour some two months, when it gradually became quite dark brown.

Samples of all the above described experiments were subjected to the same favourable conditions of temperature, light, etc.; also the same sample of sugar was employed in all specimens, excepting number five, which was made with white rock candy, and I am fully satisfied by this result that the purer the sample of cane sugar the less is its preservative qualities. This fact led me to investigate the changes that had taken place in the sugar. The article employed was what is known as crushed sugar, and yielded a syrup up to all the requirements of the Pharmacopœia; when this syrup was tested for grape sugar, previous to the addition of the solution of the iodide of iron, it was found to be entirely free from it; also, it was not present for several days in the fresh prepared syrup of iodide of iron; but the moment that the preparation indicated the least change of colour, just so soon a grape sugar reaction was obtainable. When a certain per cent. of grape sugar had been formed, the change seemed to come to a stop, and proceeded no further. If, now, the syrup was submitted to sunlight or heat, the decoloration was effected, and the preparation became a permanent one. This fact led me to substitute grape sugar for cane sugar in the formula of the syrup, and although the sample of grape sugar employed was not absolutely a pure saccharine (it containing a certain per cent. of soluble starch or dextrine), yet when exposed for two months to all the varying influences of light and air, the preparation so produced has remained unchanged in colour and chemical composition. The only change that is perceptible is where the syrup has dried in the neck of the vial, which had been left uncorked; here the colour is very decidedly of a dark red, while the body of the syrup in the bottle is a light green. The query arises, what are the causes of the changes which take place, and how can the same be obviated to make a permanent and stable combination of this valuable medicinal preparation?

The following theory is based upon the results of my experimentations. An aqueous solution of iodide of iron is partially acted upon by the oxygen of the air, and changed into free iodine and sesquioxide of iron; the free iodine is converted by heat or direct sunlight into hydriodic acid, and if cane sugar is presented to this acid, decomposition takes place, grape sugar is formed, and free iodine is again liberated; the remaining portion of the unconverted cane sugar at the same time is exerting its action upon the precipitated oxide of iron, deoxidizing it, and thereby increasing the percentage of grape sugar, the liberated iodine again combining with the deoxodized iron to form proto oxide of iron, and when this is reached, it prevents further decomposition of the preparation, and it may now be exposed to oxidizing influences; provided, however, a certain percentage of grape sugar is present in the preparation. Now, the remedy to prevent this decomposition in the preparation seems an easy one, namely, to incorporate a certain percentage of grape sugar in the preparation, or to produce the same during the process of forming the chemical combination of the iron and iodine. With this latter fact in view, I offer the following formula, which will yield a syrup which, under ordinary circumstances, will remain permanent for such a period as saccharine solutions usually can be relied upon:—

Take of Iodine	2 troy ozs.
Iron, in the form of wire, and cut in pieces	300 grs.
Distilled water	3 fld. ozs.
Syrup, sufficient quantity.	

Introduce the iodine, iron and distilled water into a flask of thin glass; shake the flask occasionally until the reaction is about to cease, and is acquiring a greenish colour; now add to the mixture four fluid ounces of simple syrup, and then heat the mixture slowly, until it is brought to the boiling point; then, having introduced twelve fluid ounces of syrup into a graduated bottle, heat it, by means of a water-bath, to 212°, and, through a small funnel inserted into the mouth of the bottle, filter into it the solution already prepared; when this has passed, close the bottle, shake it thoroughly, and when the liquid has cooled, add sufficient syrup to make the whole measure twenty fluid ounces.

In conclusion, I will say that I believe that in the above modified formula of the United States Pharmacopœia I have accomplished the object of presenting to the profession a formula for this syrup which is quite permanent, due to the fact that during the chemical action between the iron and iodine, the cane sugar, which has been added in the form of simple syrup, is converted partially into grape sugar, which does away with the addition of foreign substances, like citric acid, etc., to the preparation. The formation and preservative action of grape sugar will also explain the fact occasionally cited by colleagues, regarding the success they have had at one time or another in preparing a syrup of iodide of iron which was permanent. "Due to an accident while filtering the just finished solution of iodide of iron—the paper filter gave way, the turbid liquid was thereby mixed with the simple syrup, and to rescue the preparation it became necessary to heat the mixture and pass the same again through a filter, when, lo and behold! a beautiful green coloured syrup was the product, which also left nothing wanting in way of permanency." This all is due to the fact that the iodide of iron acted chemically upon the cane sugar and converted it partially into grape sugar.

Whenever grape sugar of commerce can be obtained in sufficient purity, which will fit it for medicinal preparations, then we can easily modify the formula by simply employing this saccharine body without any further manipulation, by adding it to the solution of iodide of iron.

CASSIA OCCIDENTALIS AND NEGRO COFFEE.*

Professor J. Clonet has had occasion to examine some seeds exported from French African colonies and sent to Havre under the name which they bear in their native place, and which we will call for the present "Negro Coffee." These seeds, which have been used in some countries as a substitute for coffee, are derived from *Cassia occidentalis*, L., a native of India and Cochin China; also found in the West Indies and very abundantly on the coast of Africa. [It is sometimes called Jamaica piss-a-bed, or stinking weed.] Their chemical examination yielded the following results:—fatty matters (olein and margarin) 4·9, tannic acid 0·9, sugar 2·1, gum 28·8, starch 2·0, cellulose 34·0, water 7·0, calcium sulphate and phosphate, chrysophanic acid 0·9, malic acid, sodium chloride, magnesium sulphate, iron, silica, together 5·4, and *achrosine* 13·58 parts in 100. The latter substance was obtained by exhausting the powdered seeds previously treated with ether by means of alcohol of 60 per cent.; the alcohol is distilled off, the syrupy residue treated with absolute alcohol, which dissolves out various constituents, leaving a solid brown-red mass, having when dry a resinous fracture and being soluble in water, to which it communicates a garnet colour. It contains C, H, O, N and S, but its exact composition has not been determined. [It is most likely a mixture of various bodies.] It is soluble also in weak alcohol, and in acids and alkalies. The colour cannot be fixed upon tissues by any known mordant. This circumstance induced the author to term it *achrosine*, or "not colouring" (ἀ + χρώζω), although being coloured itself.

The whole plant is purgative like others of the genus *Cassia*, which effect is ascribed mainly to the mucilaginous and extractive matters in conjunction with the chrysophanic acid; 6 grammes (92·6 grs.) of the leaves are an average dose for an adult; a larger dose is liable to produce emesis. The seeds are more active and more rapidly emetic; some also ascribe to them a slight emmenagogue action.

One of the most useful properties of the plant is its febrifuge effect. The seeds have repeatedly been employed in France and in some West Indian colonies for this purpose, chiefly in the form of vinous tincture, containing 60 gm. per litre of Malaga wine (about ℥ij to Oij). An infusion of the root is considered by the Indians an effective antidote against various poisons.

It is not at all improbable that the use of the roasted seeds as a substitute for coffee will become extended. Torrefaction appears to destroy the purgative principle entirely, and an infusion of these roasted seeds is said to approach in flavour and taste so closely to genuine coffee as to be scarcely distinguishable therefrom. The supply is so abundant that the price will be much lower than that of coffee.

MUSTARD SEED OIL IN PHARMACY.†

BY R. ROTHER.

Within a few years past the fixed oil of mustard seed has appeared in the market, and by virtue of its cheapness and remarkable qualities has gradually found its way into numerous uses. It was originally introduced as a burning oil, and so excellently did it meet this application that its price has of late considerably increased, owing to the large consumption of it in the lighthouse service.

No less admirable is it as a substitute for olive oil; in various particulars it is even far superior to this. It appears to be insusceptible of rancidification, which property, together with its highly emolient and non-drying nature, makes it at once an acquisition to pharmacy.

With the aid of this oil, all the officinal ointments, cerates and plasters can be prepared, to the exclusion of lard and other glycerides equally variable, changeable and unsatisfactory. The chief great gain thereby is permanence of character and consistence, scarcely second to which is uniformity and cheapness. The rich yellow colour is oftener desirable than not; and since yellow wax is now officinally used for preparing simple ointment, yellow ointments are becoming more general.

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* *Répert. de Pharm.*, 1876, from *New Remedies*.

† From *The Pharmacist*, Chicago, April, 1876.

A mixture of three parts of mustard oil, one part of spermaceti, and one part of yellow wax, is in every way superior to the U. S. officinal simple ointment. The spermaceti in this mixture is not essential, as three and a half parts of oil and one and a half of wax answer equally well.

When substituted for olive oil in cerate of sub-acetate of lead, the yellow colour disappears after a few days, and the cerate becomes white. The main advantage, however, lies in the fact that the preparation does not become rancid.

Resin cerate of a superior quality results from a mixture of fourteen parts mustard oil, twelve parts resin, and four parts yellow wax.

The writer has also used it with excellent effect in the preparation of cantharidal cerate. On two occasions, by its use, it was noticed that the flies were so thoroughly extracted by the oily menstruum, of course aided by an indispensably high temperature, that on cooling the cantharadin crystallized out so abundantly that the whole mass throughout, but especially on the exposed surface, glistened with cantharidin needles. The appearance of these crystals is ocular proof that the cerate is not only good, but exceedingly active—a fact made patent by the prompt and effective vesication it produces.

Ointments containing ingredients liable to change under the influence of lard or olive oil, as, for instance, ointment of iodide of potassium, or rose water, are properly prepared with mustard oil. In the preparation of the latter ointment, the writer, whilst using almond oil, found that greater permanence and better appearance was always secured by leaving out the rose water and adding a few drops of oil of rose instead.

The writer has not yet had occasion to try mustard oil in ointment of mercuric nitrate, but believes it will be very appropriate and effective, by reason of the lesser tendency to change the mercuric salt by deoxydation. For this reason, also, the ointments of red and yellow mercuric oxide should by prepared with this oil.

The ointments of sulphur, carbonate of lead, and oxide of zinc, retain a smooth grain and the appearance of freshness perfectly when prepared with mustard oil.

For some time past the writer has used storax in place of benzoin for conserving lard and ointment liable to change; but with the use of mustard seed oil this addition is scarcely required. However, it was found that storax possessed various advantages over benzoin, when considered either in its mechanical, chemical, or therapeutical aspects. A convenient form of application the writer found in the shape of a concentrated oily solution. For this purpose the liquid storax was gently heated for one-half to one hour with half its weight of water and four times its weight of mustard oil. The mixture, while warm, was then strained through muslin, by which the exhausted gummy residue was completely separated, and a turbid oily liquid obtained. By setting this aside, the suspended water subsided, and the nearly clear styrolated oil was then decanted. This oil of storax is highly fragrant, and completely represents the activity of the gum resin. It possesses a very bitter taste. For styrolating lard or ointments, one to two parts of the oil were mixed with sixteen of the fat.

Mustard oil alone, in the preparation of liniment of ammonia, does not yield a good liniment, for the reason that its resistance to disruption is too great. It is a well known fact that rancid oils, or such otherwise easily decomposed, only produce good ammonia liniment. It is for this fact that the common olive oil gives better results than the pure and fresh. The ammonia, acting upon the free fatty acids, generates amides, to which the creamy condition is due. Therefore, if only a very small proportion of refined lard oil is mixed with the mustard oil, an ammonia liniment is formed which remains indefinitely suspended, and for fine appearance and consistency is unequalled. The writer particularly recommends this method of preparing ammonia liniment.

For the preparation of hair oil and pomade, no better than mustard oil is known. Its gloss and softness are not surpassed by the finest almond and olive oils, and its brightness and rich yellow colour, for this purpose are especially commendable. Half a gallon mustard oil, four fluid drachms oil of bergamot, two fluid drachms oil of lemon, and half a fluid drachm oil of Ceylon cinnamon, produces an elegant hair oil.

A splendid pomade is prepared from twelve to fourteen parts mustard oil, four parts spermaceti and one part yellow wax, and perfumed with the hair oil mixture, as above. The addition of a small amount of styrolated oil adds to the perfume. Cocoa fat can also be used in place of a portion of the mustard oil, in the preparation of pomade.

In conclusion, the writer will refer to an incident relating to cocoa fat. Having noticed the statement that for the use of cocoa nut hair oil a refined cocoa fat is only applicable, and that the refining is effected by heating the fat with charcoal and calcined magnesia, for the purpose of removing colour and odour, the writer warmed a quantity of the fat, as found in commerce, and added calcined magnesia, in small amounts. The magnesia, however, dissolved rapidly, and the writer began to believe that the fat under hand must be remarkably rancid. But after eight pounds of the fat had dissolved more than one ounce of magnesia, the writer concluded it was about time to discontinue this course, and the addition of magnesia was stopped. On lowering the temperature, this mixture began to throw up immense quantities of magnesium caproate and caprylate, and directly after, although quite hot, congealed to a semi-transparent jelly, from which the unsaponified oil could not be separated by compression. As the mixture still retained the peculiar odour of cocoa fat, the writer believes that magnesia helps nothing but rather acts injuriously, by unnecessarily decomposing the oil.

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Jackson, Thomas	1	1	0
Jackson, William	1	1	0
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The Pharmaceutical Journal.

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PRAGMATIC ANALYSTS.

ALTHOUGH the public analyst has hitherto, with some fitness, derived his chief pabulum from milk, indications are to be found that, with the development of his appetite, a desire is growing up for more substantial food. On several occasions we have noticed a reference to drugs as furnishing material on which his skill might be usefully exercised, and though such attempts as have been publicly made in this direction have not resulted in giving much support to that view, there can be no question that the purity of drugs is from the public analyst's point of view a most important subject. We, therefore, thoroughly concur with the proposition laid down by the public analyst for Salford that if food is not so pure as one could wish, yet it ought to be made imperative that the medicine whereon life and death sometimes depend should be absolutely pure. Such axioms may be somewhat out of place, not to say superfluous, in the official report of a public analyst, but at any rate they are sufficiently self-evident to be indisputable, and we should not have considered it necessary to make any reference to this one had it not been propounded in a case which furnishes another illustration of the indiscreet zeal and misapplied energy which we have on former occasions deprecated as being at variance with the possible usefulness of the public analyst.

In the case to which we refer the Salford public analyst has lately been engaged in the examination of twenty samples of "milk of sulphur," and the result at which he arrives is that while twelve out of the twenty samples were pure and consisted entirely of sulphur, the remaining eight contained from 50 to 60 per cent., and in one instance as much as 75 per cent. of "plaster of Paris" (*sic*). Not content with stating the facts arrived at by his examination of these samples and thus sufficiently performing his duty as an officer appointed under the Sale of Food and Drugs Act, the Salford public analyst proceeds to interpret these results according to a standard of his own and to moralize upon the enormity of the offence which he imagines to have been committed by those who sold the eight samples of "milk of sulphur," containing, as he states, from 50 to 75 per cent. of "plaster of Paris." To use his own words "the adulteration of this substance is so outrageous that it ought at once to be put a stop to, and it is also a manifest injustice to the druggist who sells it pure for 1s. 8*d.* per pound while the adulterator gets the same price for his, whereas in reality it is only worth 5*d.* per pound."

To any one sufficiently acquainted with the subject in question this censorious tirade cannot appear otherwise than puerile and ridiculous; but the misfortune is that such inflammatory material is apt to excite susceptible vestrymen or common councillors into manifestations of stump oratory, which in their turn alarm the public and produce incalculable mischief even when based, as in the present instance, solely upon unwarrantable assumption and misstatement.

The mistake that has been committed is that of confounding the popular remedy known as "milk of sulphur" with the precipitated sulphur of the Pharmacopœia, and of assuming that because the latter should consist wholly of sulphur, the former should likewise. The statement that the "milk of sulphur" contained "plaster of Paris" is also a misrepresentation of chemical fact, to which a public analyst should not have lent himself. By such proceedings truth is contaminated with injustice and delusion, and the result is as detrimental to the public as the practice of adulteration.

It is upon these grounds that we take exception to the opinions put forward by the Salford public analyst in regard to "milk of sulphur," and we contradict in the most unqualified manner his assertion that the eight samples of "milk of sulphur" referred to by him were adulterated. This preparation, as it is most commonly known to the public, consists partly of sulphur and partly of sulphate of lime (but not as the Salford public analyst sensationally puts it of "plaster of Paris,") with which the sulphur unavoidably becomes mixed in that process of preparation by which this particular material is obtained. It is this preparation of sulphur which is popularly known as "milk of sulphur" and is preferred by very many to the precipitated sulphur which does not contain sulphate of lime and, though now a Pharmacopœia preparation, is positively objectionable to many persons. It is true that many pharmacists as well as medical men give the preference to the official preparation but, in such cases, as pointed out by a correspondent of the *Manchester Examiner and Times* "the great difficulty has been with the most conscientious druggist that the public much prefer the impure article to the pure one, and not without reason. There is not a druggist of any experience in England but can call to mind instances of the genuine drug, after it had been supplied, being returned to him with the complaint that it was not good."

We will not attempt to go into any comparative estimation of the relative medicinal merits of these two preparations because that is a matter outside our proper sphere and because the facts that we have above mentioned are in themselves sufficient to refute the charge of adulteration. We rely simply upon those facts in declaring the charge of adulteration in this case to be an outrage upon those against whom it is made, and much as we have desired to see the Adulteration Act effective in securing the purity of drugs—an object first set forth as being desirable by the Pharmaceutical Society—we cannot even by silence support such a flagrant misapplication of its provisions as the attempt to make the sale of a familiar and favourite preparation a misdemeanour.

THE EUCALYPTUS GLOBULUS: ITS HYGIENIC AND MEDICAL PROPERTIES.

At a meeting of the Roman Academy of Medicine, held on the 30th ult., and presided over by Professor Carlo Maggiorani, Dr. Fedeli read a paper on the properties, sanitary and pharmaceutical, of the *Eucalyptus globulus*.

The author set out by giving the natural history of the plant, and cited from a host of witnesses the most convincing proofs of its virtues as a febrifuge. Wherever plantations of it existed there the malaria is unknown, and wherever the malaria has already been endemic, the cultivation of the plant has sufficed to mitigate, in some cases to absolutely stamp out, the disease. Physicians, foreign as well as Italian, have experimentally proved that the roots as well as the leaves of the *Eucalyptus* possess such marked absorbing powers as quickly to deprive both soil and air of excessive humidity; while its leaves contain an essential oil which has the property of destroying the microphytes and microzoa which are, according to the majority of observers, the cause of malaria.

Dr. Fedeli next proceeded to describe the curative virtues of the various preparations of the *Eucalyptus*, and especially of the alcoholic tincture, not only in cases of periodic fever and of palustral cachexia in general, but also in ailments of an atomic or anæmic character. He concluded his paper by urging on the Government and on landed proprietors the duty of cultivating the *Eucalyptus*, especially as Italy possesses a climate generally favourable to its growth. In opposition to those who maintain that the *Eucalyptus globulus* cannot withstand rapid depressions of temperature, such as are experienced in the Agro Romano, Dr. Fedeli contends that, provided the cultivation, in the first instance especially, be made with due precaution, the result cannot but be successful. For example, instead of planting the *Eucalyptus* here and there in an isolated fashion, it should be introduced into already existing plantations, and employed for the ornamentation of *boulevards* or public walks and private gardens, so as to take the place of other trees less handsome and certainly less advantageous from a hygienic point of view; it should be cultivated in the vineyards which surround the city; in short it should be cultivated with every possible care, shielding it from whatever adverse influence the climate may offer.

A general discussion followed the reading of Dr. Fedeli's paper. Dr. Colapiete ascribed the virtues of the *Eucalyptus* in malaria to its cultivation increasing the quantity of ozone; while Drs. Marchi and Terrizi opposed this view, the latter maintaining, on the strength of experiments made on bacteria and micrococci, that ozone instead of lessening increases the fermentative action of the malarial poison. The discussion finally drifted away into speculations on the origin and nature of malaria, but before the subject dropped, the meeting returned to a general approval of the febrifugal virtues of the *Eucalyptus* and of the necessity for promoting its extended cultivation.

THE ANNUAL MEETINGS.

In accordance with the official notice appearing on the front page of this Journal, the Thirty-fifth Annual General Meeting of the Members of the Pharmaceutical Society will be held at 17, Bloomsbury Square, on Thursday next, at noon. On the evening of the same day, by the kind permission of the Lords of the Committee on Education, the Annual Conversazione of the Society will be held in South Kensington Museum. Cards of admission to the Conversazione, without which no person can be admitted, may be had on application to the Secretary. It may be useful to remind intending visitors of the sterner sex that the Museum officials will on no account undertake the charge of hats.

THE ANNUAL DINNER.

We would remind those gentlemen who intend dining with the Members of the Pharmaceutical Society and their friends at the London Tavern on Wednesday next, that to-day (Saturday) is the last day upon which they can obtain tickets from the Stewards. In order to enable the Honorary Secretaries to make proper arrangements, notice has been sent to each Steward requesting him to advise them not later than the 13th of the number of tickets remaining unsold, in default of which he will be debited with the value of all that have been sent him.

PRESIDENCY OF THE BRITISH ASSOCIATION.

In consequence of the pressure of his professional and academic engagements, Sir Robert Christison, who was in August last elected to preside over the British Association during its coming meeting at Glasgow, has felt compelled to decline the honour. The Council has, therefore, nominated Dr. Andrews, of Queen's College, to the post.

It is reported that Mr. Simon is about to retire from the post of Medical Officer of the Privy Council, and that he is to be made a C.B. in acknowledgment of his services.

We are requested to say that the name of Dr. Benjamin W. Richardson, F.R.S., was inadvertently omitted from the list of Vice-Presidents of the "Hanbury Memorial Fund," published last week.

M. Berthelot, Professor in the College of France, and the Paris School of Pharmacy, has been named Inspector General of Public Instruction in France in the place of the late M. Balard.

Transactions of the Pharmaceutical Society.

NORTH BRITISH BRANCH, EDINBURGH.

Annual Meeting.

The annual meeting of the North British Branch of the Society was held in the Society's rooms, 119a, George Street, on Monday, 8th May, at 12 o'clock, Mr. William Gilmour, President of the Branch in the chair. The Chairman opened the meeting by asking the Secretary to read the following annual report:—

Annual Report, 1876.

"The Council have, as usual, the pleasure of submitting the annual report of the proceedings of the North British Branch of the Society during 1875.

"At the outset it is matter for congratulation that all the arrangements for the conduct of the real business of the Society in Edinburgh continue to give satisfaction.

"The rooms now occupied have been fairly tested, and afford every convenience. The fixed cases on the walls of the principal room, enriched as they are by many valuable specimens of drugs and chemicals, continue to be a source of attraction to many. The library and reading-room afford facilities to those who wish to refer to any of the works when studying the specimens, while the books may be had on loan in accordance with the regulations. As yet no arrangements have been made to enable members or those connected with the Society residing in the country to obtain the use of books, but as this matter has already engaged the attention of the Council, they hope, ere long, to have it in their power to intimate that this privilege has been extended to those residing at a distance.

"The cabinet of specimens, comprehending all the most important substances, raw and manufactured, contained in the British Pharmacopœia, seems to be much appreciated, and many young men take advantage of them. Drugs, as well as pharmaceutical and chemical preparations, are now arranged in systematic order, while each bottle or box has not only the distinctive name of the specimen, but also the leading characteristics plainly printed, so that the student is much assisted in studying the composition and uses of the various articles brought under his notice.

"The visitors to the museum during the year have been 876, and of these 620 attended during the day and 256 during the evening; while the number who have taken advantage of the rooms since they were opened for study in 1873 to the end of December, 1875, has been 3179. The attendance for last year does not figure so high as the preceding, because the rooms were closed during the months of August and September in consequence of the present Assistant Secretary not entering upon his duties until the 1st October, his predecessor having left at the end of July. In like manner these remarks apply to the library, as it was closed for a longer time for the purpose of overhauling the books and recovering the volumes which were found to be missing. These the Council are glad to report have been recovered, with two or three trifling exceptions. They have also much pleasure in stating that during the year upwards of sixty volumes have been added to the list, many being valuable and scientific works, and which have been from time to time noticed in the Journal in the reports of the scientific meetings. The library, which now contains upwards of 700 volumes, has been arranged and classified, while a carefully compiled catalogue is now passing through the hands of the printer, copies of which it is hoped will be ready for delivery to applicants in a few days. It is gratifying to know that during the time the library was open last year ninety-five volumes were given out, being double the number of any preceding year, and the Council have little doubt but that the privilege of using the books will be much more taken advantage of, as every year is adding to the number of useful works.

"The candidates who presented themselves for examination in Scotland during the year were:—Preliminary, 106; Major, 10; Minor, 65; Modified, 8—in all 189. The number of examinations was twenty, and the percentage of rejections nearly 36½ per cent., the result of each examination being duly recorded in the Journal.

"The large proportion of failures here indicated continues to be subject of regret to the Council, but it is hoped that the contemplated re-arrangement of the fees will induce candidates to come before the examiners better prepared, and thus lessen the number of rejections.

"The special tickets issued last year to pharmaceutical students for classes in Botany, Chemistry, and Materia Medica were twenty-seven.

"It must be remembered that the number of tickets issued specially by the secretary are quite irrespective of those students who either matriculate at the University and attend the professors, or who may have taken tickets from the other lecturers or teachers direct, and without the knowledge or intervention of the secretary.

"The scientific meetings held this session were seven, and without particularizing any of the papers, the Council have the greatest satisfaction in referring the members to the Journal, wherein most of the communications having been published will speak for themselves. To the gentlemen who have so kindly manifested their interest in the proceedings of the Society by contributing such useful and interesting papers, the Council beg to tender their most sincere thanks.

"Pharmaceutical legislation has been comparatively a blank during the last year, except in the matter of the Pharmacy Act for Ireland, which is now partially in operation. While the Council are quite sensible of the efforts made in London to obtain a union of pharmaceutical interests as well as identity of examinations in the sister kingdom, with the aid of the machinery which had so long and so successfully prosecuted the advancement of pharmacy in Great Britain, they cannot but regret, that without such an arrangement, there should have been given power in Ireland to assume a title for the acquisition of which our Society so long and anxiously fought; and that to an association only in its infancy and likely to continue so for some years to come. Still, so much more was threatened, alike destructive of fairness and justice to those who had so struggled for recognition and position, that the compromise which was made by destroying reciprocity between the two societies, must be looked upon as, in the meantime, the best that could be done. The time however is possibly not far distant when English, Scotch and Irish may unite together as one body and carry on their labours in behalf of pharmacy under similar conditions, carrying the same flag, and having the same objects in view.

"The examinations of the Society are very closely assimilated. With a laboratory such as we now have, the practical work of the Major and Minor examination in chemistry is conducted much in the same manner as in London, while the most perfect harmony exists between the English and Scotch boards.

"It is with much regret that the Council have to record the deaths of two of our most able pharmacists, Mr. David Rennie Brown and Mr. William Tait. The former was for many years one of our most efficient examiners, and took a very special interest in our museum and library. To both he contributed largely, but to the latter particularly so. His donations of books—and valuable ones too—amounted to hundreds of volumes, while his desire for the success of pharmacy, in its truest sense, was never absent from his mind. A genuine and a very talented man, he was esteemed by all who knew him, and, though in God's Providence, he was laid aside for many months, he, to the last, continued to manifest that interest in all connected with the working of our Society which he had ever felt during his days of activity and health. And, o the latter, what can we say but that he was an amiable, gentle, and lovable man, an able pharmacist, excellent botanist, and doing duty also as an examiner; he was acting Chairman of the Board when death stepped in and suddenly removed him from our midst. Of neither can it be said that they died with the dew of their youth upon them, but it may be truly affirmed that few men have passed away from among us more beloved, respected and esteemed, and, to speak of their loss a little selfishly, few could have been so ill spared, so far as the interests of our Society and the cause of pharmacy at large are concerned.

"The "Hills Prize Fund" having been united with the fund in London, and an arrangement made for prizes to successful students as already announced in the Calendar for 1876, at page 196, the balance on hand was duly remitted to London to be added to the general prize fund.

"The Society's museum has attracted a good deal of attention among students generally, and several young men studying medicine have applied to be admitted to the benefits of the cabinet of specimens. The Council, however, found, that such visits interfered too much with pharmaceutical students, and therefore have declined admission to medical students beyond looking at the various articles to be seen in the wall cases, and which are looked after by the Curator.

"Circulars for nominating the Council of the North British Branch were duly sent out to all members and associates in business residing in Scotland, and these were given effect to by the re-issue of billets sent along with voting papers, the result of which will be laid before the present meeting, showing who have been elected to act as Council in Edinburgh for 1876-7.

"The Council in closing this report has much pleasure in reporting that the assistance given to the Honorary Secretary has been all that could be desired—Mr. Stenhouse continues to discharge his duties most efficiently, and his constant attendance at the rooms is of great service to all who, from time to time, visit either the museum or library."

Mr. H. C. Baildon moved the approval of the report, and Mr. F. Stephenson seconded.

The Chairman intimated that 194 intimations for nominating the Council for the next year had been issued, and of these seventy-four had been responded to. The Committee appointed to scrutinize and count the votes laid upon the table the result of their labour, when it was found that the following gentlemen had been duly elected as Council for 1876–7. The names are published alphabetically:—

Mr. William Ainslie	Edinburgh.
„ H. C. Baildon	Do.
„ James Buchanan	Do.
„ George Blanshard	Do.
„ William Duncanson	Stirling.
„ Thomas Davison	Glasgow.
„ William Greig	Do.
„ Daniel Frazer	Do.
„ Alexander Govan	St. Andrews.
„ William Gilmour	Edinburgh.
„ David Kemp	Portobello.
„ Alexander Kinninmont	Glasgow.
„ Alexander Napier	Edinburgh.
„ A. Seath	Dunfermline.
„ James R. Young	Edinburgh.

Mr. H. C. Baildon moved that the President, Mr. William Gilmour, Edinburgh, and the Vice-President, Mr. Alexander Kinninmont, Glasgow, be re-elected. The motion was seconded by Mr. Kemp, Portobello, and carried unanimously.

Mr. Gilmour proposed and Mr. Blanshard seconded that the following gentlemen be appointed as a Committee for Museum, Library, and General Purposes. Messrs. Ainslie, Baildon, Buchanan, Gilmour, Kinninmont, Napier, and Young. Agreed to.

Mr. J. R. Young proposed that Mr. Mackay, Honorary Secretary, be re-elected. The motion was seconded by Mr. Ainslie and heartily approved of. Mr. Mackay suitably replied. There being no other business the meeting then separated.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, May 4, 1876, Dr. Gilbert, F.R.S., Vice-President, in the chair. After the formal business of the nomination and election of Fellows, eight communications were made to the Society, namely, "On Glycero-Phosphoric Acid and its Salts as obtained from the Phosphorized Constituents of the Brain," by Dr. J. L. W. Thudichum and Mr. C. T. Kingzett; "On some Reactions of Biliverdin," by Dr. Thudichum: "On the Relation between Chemical Constitution and Colouring Power in Aromatic Substances," by Dr. O. Witt; "On Certain Bismuth Compounds," by Mr. M. M. P. Muir; "A New Method for Preparing the Hydrocarbons, Diphenyl, and Isodinaphthyl, and on the Action at a High Temperature of Metallic Chlorides on Certain Hydrocarbons," and a "Note on the Occurrence of Benzene in Rosin Light Oils," both by Mr. W. Smith; "On the Action of Water and Various Saline Solutions on Copper," by Mr. T. Carnelley; and "Notes on Some Experiments made to ascertain the Value of a proposed Method of Determining the Mineral Strength of Soils by Means of Water Culture," by Mr. G. W. Hight.

For the meeting on Thursday, May 18, the following papers are announced:—(1) "The Action of Malt Extract on Starch," by Mr. C. O'Sullivan; (2) "On the Gases Enclosed in Canel Coal and Jet," by Mr. J. W. Thomas; (3) "Phenomena Accompanying the Electrolysis of Water with Oxidizable Electrodes," by Dr. Gladstone and Mr. Tribe; (4) "On the Estimation of Hydrogen occluded by Copper, with special reference to Organic Analysis," by Dr. Thudichum and W. H. Hake, Ph.D.; (5) "On some New Reactions of Hemine," by Dr. Thudichum and Mr. C. T Kingzett.

SOCIETY OF ARTS.

Some Methods of Estimating the Illuminating Power and Purity of Coal Gas.*

BY A. VERNON HARCOURT, M.A., F.R.S.,

Reader in Chemistry at Christ Church, Oxford, and one of the Metropolitan Gas Referees.

It is well known that coal gas which has been purified from sulphuretted hydrogen is not free from sulphur, but retains, chiefly in combination with carbon, a quantity of this element, varying from ten to forty grains in 100 cubic feet. It is commonly believed that the small quantities of sulphurous and sulphuric acid produced by the burning of coal gas distinguish it unfavourably from other illuminants, and hence there is a general wish among both the consumers and producers of gas to remove as far as possible the last traces of sulphur.

Sulphuretted hydrogen is one of the few substances for whose presence, even in very small quantity, we have a test which any one can apply, which is quick and conclusive. The existence of such a test has no doubt contributed greatly to the development of a system of purification, by which coal gas, at least in London, is always and absolutely freed from sulphuretted hydrogen. In his endeavour to purify gas from other sulphur compounds the manufacturer has no test so handy as the strip of lead-paper, to bear witness at once when the purifying material needs renewal. Increased facility of testing might lead, in this case also, to the discovery of better methods of purification or to a better management of existing methods.

While endeavouring to turn to account for the purification of gas the effect of heat upon it, which converts the bisulphide of carbon in gas into sulphuretted hydrogen, it occurred to me that a test might be based on the same principle.

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* Paper read before the Chemical Section of the Society of Arts, March 31st, 1876.

I have here a glass tube filled for two inches with a plug of platinum wire and foil. I am passing gas through it, but as the gas is pure from sulphuretted hydrogen it does not affect the paper moistened with solution of acetate of lead upon which the gas is blowing. Now I heat the tube, and you will soon have evidence of the presence of sulphur in the gas.

This, however, is only a qualitative test, or, at most, the rate at which the paper darkens furnishes a very rough indication of the amount of sulphur in the gas. In the case of an impurity such as sulphuretted hydrogen, which is to be wholly removed, a qualitative test of this kind is all that is required. But, as no means are known of arresting completely the other compounds of sulphur, and all that can be done is to reduce their proportion as low as possible, a qualitative test is insufficient. What is required as a guide in managing the process of purification is a rapid quantitative test.

To fulfil this requirement, I propose to substitute, for the lead-paper with the gas blowing upon it, a solution of lead, through which the gas shall pass in small bubbles. All the sulphuretted hydrogen in the portion of gas operated on is thus arrested; and, through the mixing of the liquid, an uniform colour is obtained, whose shade the eye can compare with that of a similar portion of a standard coloured liquid. If the passage of the gas is continued until the tint, which grows continually darker, matches that of the standard liquid, a definite and ascertainable quantity of lead sulphide must have been formed, containing a known quantity of sulphur, and that derived from a known volume of gas. The larger the volume of gas that must be passed before this tint is attained, the smaller, in exact inverse ratio, is the proportion of bisulphide of carbon in the gas.

To prepare a lead solution which gives a clear tint instead of becoming turbid when acted on by sulphuretted hydrogen, I dissolve litharge in caustic soda, and add a relatively large quantity of solution of sugar. For each testing, a little of the solution thus prepared is mixed with twenty or thirty times its volume of water.

For a standard of comparison I have tried various colouring matters. Any red, yellow, and blue seem to give a brown. Cochineal, caramel, and indigo, rightly proportioned, matched the tint of the coloured lead solution very satisfactorily; and the appearance of the liquid did not change perceptibly from day to day; but, after some weeks I found that my result had varied, and that the gradual fading of the standard colour was the cause. Since then I have used a mixture of the three sulphates of copper, cobalt, and iron, substances which are perfectly stable. To imitate a dark shade which the coloured lead solution has, probably owing to the sulphide of lead not being really dissolved, but rather suspended in a state of minute division, I add a trace of lampblack to the standard liquid.

Unfortunately, the coloured lead solution and the standard look differently by daylight and by gaslight, and, through the change of light, they become extremely different one from another. I have, therefore, prepared another standard for use by gaslight, and it happens conveniently that a mixture of the sulphate of cobalt and copper serves the purpose.

The volume of gas which has been operated upon is known with sufficient accuracy by reading off the volume of water which has run from the aspirator into the measuring vessel placed beneath. The standard has been made such, that to impart the same tint to the same volume of lead solution, there is required 0·0025 grain of sulphur. From this datum, and the capacity of the measuring cylinder, I have calculated a table giving the number of grains of sulphur in one hundred feet of gas corresponding to each graduation.

The apparatus in the form in which I have it here is probably familiar to some who are present, as I brought it before the meeting of the British Association of Gas Managers at Leeds last summer, and my account of it was published in the *Journal of Gas Lighting*. But quite recently a suggestion made to me by Mr. Wills has led to an improvement in the apparatus.

Mr. Wills suggested to me to use platinum as the heated material over which the gas should pass, he having observed that the development of sulphuretted hydrogen occurred at a lower temperature when the gas was in contact with platinum, than when it is heated otherwise.

Such an action of platinum upon mixtures of gases is familiar to chemists by many examples, and I can only plead in defence of the comparatively bulky and inconvenient form which my test has assumed hitherto, that I designed it, in the first place, not for laboratory use, but to illustrate a chemical fact, which I hoped to turn to account on a large scale for the purification of gas. Those who have used it must, I think, have convinced themselves that when gas is passed through a layer of heated pebbles, the sulphur contained in it, with the exception of 8 or 9 grains in 100 cubic feet, is converted into sulphuretted hydrogen, and can, therefore, be easily removed.

If any others have had this test in operation, as I have, continuously for several months, they will also have convinced themselves that the action of the heated surface upon the gas may be continued for an indefinite time, if the temperature is not allowed to rise too high, and if, at intervals of one or two months, air is drawn through the apparatus.

Experimenting with this larger object in view, I made trial only of common materials which it was practicable to use on a large scale. Perhaps it is impossible that so costly a metal as platinum should be used in gas manufacture, especially where the object in view is only a slight improvement in the quality of the article manufactured. But it is possible to employ costly materials for common uses where, as in the use of gold on paper-hangings, a little goes a long way. Substances which can be dissolved, may be spread over an indefinitely large surface, by wetting the surface with their solution. Mr. Deacon has thus applied copper to the mannfacture of chlorine. Whether or not the action of heated platinum on gas may hereafter find any more extended application, it serves exceedingly well the purpose of this test. It may be used by leading gas through either a piece of glass tube packed with platinum wire, or a bulb filled with pumice which has been steeped in chloride of platinum and ignited.

I have now in the second place to direct your attention to certain methods of estimating the illuminating power of coal gas. Such methods divide themselves into two kinds; those in which the amount of light obtainable from a given volume of gas is, by some means, directly estimated, and those in which it is inferred from some other property of the gas.

Of the latter, which I may call indirect methods, one of the best, but the most troublesome, is the complete analysis of the gas. This demands a special and somewhat complicated and fragile apparatus, and considerable manipulative skill on the part of the operator. Improvements in the methods of gas analysis have considerably reduced the length of the operation, but it can hardly occupy less than three or four hours.

Some information, but of rather uncertain value, is to be derived from the determination of the specific gravity of the sample of gas.

Absorption by bromine of the olefines, to which chiefly the illuminating power of gas is due, is an operation which can be easily and quickly performed, and which should give trustworthy, though not very exact, indications of the relative value of different samples of coal gas.

The simplest and most trustworthy of the indirect methods are those which depend upon the relation between the quality of different samples of gas burning under the same conditions, and the size of the flame which they produce. The size of the flame is most easily observed by giving it the form of a long, narrow column as in Lowe's jet photometer. The samples of gas to be compared may be burnt when issuing either at the same pressure or at the same rate. Or else the length of flame may be kept constant and the required pressures or rates of consumption compared. The last-named modes of operation are those employed in Messrs. Kirkham and Sugg's form of the jet photometer, and in the "duration" test. Still another mode of making the same comparison has recently been proposed by Mr. Sugg, who has been kind enough to lend me his illuminating power meter to show here this evening. In this instrument the gas is set to burn from an Argand burner with a flame three inches in height. It can be made either to pass through the meter or not; and in the upper part of the meter case is a minute clock. The index of the meter having been stopped at the top of the scale, gas is sent through the meter for one minute by the clock, and then turned off again, the flame being constantly maintained at the height of three inches. According as the gas is richer or poorer, the index of the meter will have travelled a less or greater distance; and the dial-plate is so graduated and numbered, that from the place at which the index has stopped, the illuminating power of the gas may be read off.

Direct observations of the illuminating power of different samples of gas have hitherto been made by a judgment of the eye, comparing under conditions favourable to exact observation the relative brightness of the flame produced by the sample of gas and of a standard light.

Within the last year, however, two substitutes for the direct judgment of the eye have been suggested, founded upon the observation of two physical properties of light. The facts which have been observed in both cases are of transcendent scientific interest; but I must here confine myself to the proposed practical applications of them to photometry.

The element selenium is a substance so incapable of conducting electricity that it has been used as an insulator in telegraphy. Three years ago Mr. Willoughby Smith observed that its power of insulation was impaired by exposure to sunlight. Since then this effect of light has been examined by Dr. Werner Siemens and Professor Adams.

Unfortunately the effect of light upon the electric conductivity of selenium varies according to the temperature to which the selenium has been exposed, and the mode of cooling; moreovor the effect of light gradually diminishes, and after prolonged exposure the selenium needs to rest in darkness for a length of time before its sensibility is fully restored. The most comparable results are obtained by observing the maximum effect produced when a piece of selenium, inserted in a galvanic circuit, comprising a battery and a galvanometer, is exposed to various sources of light for a few moments. Professor Adams employs a piece of crystalline selenium which is exposed to different sources of light successively, for ten seconds, and observes the maximum deflection of the needle of the galvanometer. Dr. Siemens arranges the ends of two fine wires in a spiral or zigzag form, so that within a small space each may close to the other, without touching, for a considerable length. By covering the interlacing spirals or zigzags with a drop of molten selenium, pressed into a thin sheet between two leaves of talc, the wires are connected throughout this length by a surface of selenium.

The sensitiveness of the selenium element thus prepared is admirably shown by an apparatus designed by Dr. C. W. Siemens. In it the selenium element plays the part of the retina of the eye; in front of it is a lens to bring the rays of light to a focus upon it, and beyond this a pair of metal eyelids closing by a spring, which preserve the selenium retina from the fatigue it would experience if constantly exposed to light.

Dr. Werner Siemens compares the light from two sources by so adjusting their distance from the selenium disc that, when it is exposed to each in rapid succession the deflection of the galvanometer remains unchanged.

(*To be continued.*)

PHARMACEUTICAL SOCIETY OF IRELAND

A meeting of the Pharmaceutical Society of Ireland was held in the King and Queen's College of Physicians Kildare Street, Dublin, on Wednesday, the 3rd inst., at 4 p.m. Sir Dominic Corrigan, Bart., President, in the chair. There were also present Drs. Aquila Smith, Vice-President, Leet, Ryan, Whitaker (Belfast), Messrs. Collins Tichborne, Allen, Hayes, Goulding (Cork), Goodwin, and Holmes.

The minutes of last meeting were read and confirmed some letters from gentlemen in the country asking for information were read; after which Dr. Whitaker moved the following resolution:—

> "That steps be taken to bring before the notice of the Chief Secretary for Ireland the advisability of having the Pharmacy Act, Ireland, amended, so as to give power to the Council of the Pharmaceutical Society to register as Druggists all who were in business as such on their own account prior to the passing of the Act, and to confirm them in the rights they then enjoyed; also to make arrangements for the future as regards the qualification of those who may wish to keep open shop for the sale of poisons and poisonous drugs, without the privilege of compounding the prescriptions of members of the medical profession, etc."

Dr. Whitaker at some length urged upon the Council the propriety of his views. He thought that the Act did interfere with and make illegal the sale of poisons by persons other than pharmaceutical chemists or apothecaries. They could not create a class of chemists and druggists without giving power to compound prescriptions to a number of persons who, however respectable, did not wish to have that privilege, and who were not qualified by their previous education or training. He believed that injustice had been done by the Act to the apothecaries of Ireland, but much greater injustice in his opinion would be inflicted upon the druggists unless some change were made by which they could legally carry on business as heretofore. He regretted that Mr. Hodgson, who first called attention to this matter, was not present to support him. In any case he thought that the Council should have control over those engaged in the sale of poisons; they should not allow, as formerly, any ignorant or uneducated man who thought proper to sell deadly poisons of the very nature or appearance of which he might be thoroughly ignorant, and concluded by urging upon them the duty of asking the Government to amend the Act, a request which, if made unanimously by them would, he thought, doubtless be granted.

Mr. Collins seconded the resolution, and stated that in his opinion there could be no doubt but that the Act interfered with the sale of poisons by unqualified persons.

The President and Dr. Smith both thought that any change to be made should emanate from the druggists themselves, and that then the Council might approve or disapprove of it as they thought proper. The druggists had not made any complaint on the subject.

Mr. Tichborne supported the resolution, especially the latter clause, which he thought was much called for.

Dr. Whitaker having replied to some of the objections urged against the motion, a show of hands was taken, when six voted for, and five against it. The resolution was accordingly lost.

The Secretary read the report of the Examiners. There was but one candidate, Mr. R. J. Legge, who passed.

As the 1st October is the last day of examination under the present rules, it was decided on the motion of Mr. Tichborne to hold two examinations previously thereto; one on the first Wednesday in July, the other on the first Wednesday in September.

Parliamentary and Law Proceedings.

DRUGGING OF ANIMALS BILL.

On Monday in the House of Lords, the Marquis of Huntly moved the second reading of the Drugging of Animals Bill, the object of which is to prevent the administration of poisonous drugs to horses and cattle by servants without the knowledge of their masters. He said the practice had arisen to an extraordinary extent in the Midland Counties, the object being to improve the glossiness of the animals' coats.

The Duke of Richmond and Gordon consented to the motion and said that he knew that great mischief had resulted in Lincolnshire from waggoners giving poison to horses to save themselves the trouble of grooming them.

The bill was read a second time.

SUPPOSED MYSTERIOUS DEATH.

The *Medical Examiner* for May 11 gives the following account of a case, in which a coroner's jury, after two sittings, returned an opén verdict:—

"The death of Mr. Charles D. T. Bravo, on the 21st ult., occurred at his residence, The Priory, Balham, under mysterious circumstances. Mr. Bravo, a rising barrister, aged 30 years, lived at the above address with his wife, to whom he had been married about four months, the lady having a companion, Mrs. Cox, also in the house. On the night of Tuesday, April 18, Dr. Moore, of Balham, was summoned to attend Mr. Bravo. He arrived between half-past nine and ten o'clock, and found Mr. Bravo lying back in a chair, breathing heavily and totally unconscious. He was partly undressed, and Mrs. Cox was rubbing his chest. Dr. Moore, who feared the pulse would cease to beat at any minute, made inquiries of those present, but could get at nothing to account for the alarming symptoms. The heart's action was so feeble that Dr. Moore had the patient immediately placed in bed, and administered an enema of brandy; a mustard poultice was applied over the region of the heart. Mr. Harrison, the usual family attendant, had arrived by this time, and the heart's action began to improve. Dr. Geo. Johnson and Mr. Bravo's cousin, Mr. Royes Bell, both of King's College Hospital, having been sent for, arrived about half-past two. Just before their arrival the patient vomited for the second time, and Mrs. Cox remarked that she had given him mustard which might account for it. The first time he vomited was just before he became ill, the vomited matter being the undigested contents of his stomach, stained with Burgundy wine; the second vomit was black, and consisted of blood. About this time the bowels were opened. He gradually improved, and at last became conscious, complained of intense pain in the abdomen, especially in the region of the stomach, and, with the assistance of those standing by, was helped on to the night-stool, when he passed a large quantity of fæces, blood, and mucus; he also vomited a large quantity of bloody fluid. After this he had constant tenesmus, which was most distressing. He took freely of iced milk and champagne, but always vomited after an interval of a few minutes, the vomit being quite free from blood. Mrs. Cox told Dr. Johnson and Mr. Bell that he had said "I have taken poison," but Mr. Bravo himself, when quite conscious, denied that he had taken anything but some opium for neuralgia of the lower jaw, from which he was suffering; Dr. Johnson and Sir William Gull both pressed him on the subject, but he gave the same account of his illness. It was suggested when he was first taken ill that chloroform or opium had been taken; but the pupils were not contracted, and there was no smell of either drug. When he came to it was clear that the symptoms were due to a powerful irritant poison. The poor fellow suffered a good deal of abdominal pain, and vomited constantly; he died at 5.30 a.m. on Friday, April 21, of exhaustion, being conscious up to the last. Opium was given from time to time, and iced milk and champagne *ad libitum*. The *post-mortem* examination was made with great care by Dr. Payne, of St. Thomas's Hospital, in the presence of Dr. Johnson, Dr. Moore, Mr. Bell, and Mr. Harrison. There was no change in the mouth, tongue, pharynx, trachea, œsophagus, stomach, or small intestines. The stomach and small intestines contained a yellowish fluid; the large intestine, however, was injected with blood in parts, and was filled with bloody mucus; the rectum also showed signs of having been inflamed. There was hypostatic congestion of the lungs, but the organs of the body were quite healthy. Portions of the intestines and organs were removed for careful examination and analysis. Professor Redwood had submitted to him for examination a sealed jar containing the undigested contents of the stomach, and a bottle containing the bloody vomit and matter passed by the bowel, also some wine and portions of the intestines and liver; in all he had no difficulty in finding antimony, and he considered that it had been received into the body as tartar emetic, and pointed out at the inquest that antimony was a poison little resorted to by suicides, but that it had been used by criminals to poison others, being generally used as a slow poison."

POISONING BY LIQUOR POTASSÆ.

On Monday, May 1, Mr. Carter opened an inquest at the "Surrey" Tavern, Wandsworth Common, relating to the death of John Nairne, aged 40, builders' clerk. The deceased, who had been drinking freely for several days previously, woke his wife up on Wednesday and told her to get a light as he had burnt his mouth. She did so and then saw a bottle on the table, which deceased had brought into the house for the purpose of getting some paint off a chest of drawers, and which had been kept in a cupboard in the room. Deceased then attempted to produce vomiting by placing his fingers in his throat. He vomited a great deal of blood. As it became daylight she looked into his mouth, and perceiving it to be burnt, and on account of his complaining of an excessive burning heat at his stomach, she went to Mr. Beck, surgeon, taking the bottle with her. He gave her some castor oil, and directed her to give the deceased plenty of milk, which she she did immediately. Deceased continued to expectorate blood up to the time of his death. She had been in the habit of keeping beer in the same cupboard as the other bottle was kept, and in a bottle similar to it. On Wednesday night she got some beer in the bottle which the deceased drank about half-past eight. He had never threatened to destroy his own life, and he never referred in any way whatever to his having drunk out of the bottle before his death. It was her (witness's) opinion that he had mistaken the bottle for the one that had contained the beer, forgetting he had drunk it before.

Mr. Henry Beck, surgeon, said that the last witness came to him on the morning of Thursday last, she brought with her the bottle produced; he found it to contain liquor potassæ, sometimes used for removing paint, etc., from wood or iron; a very corrosive poison. He saw the deceased, and found the mouth and lips very much inflamed, no doubt by his having drunk some acrid fluid. He had vomited a great deal of blood and was constantly expectorating blood and mucus. He was in a very exhausted state. In his opinion death arose from exhaustion caused by the constant expectoration caused by the lining of the membrane of the stomach being destroyed by some corrosive liquid.

After a brief consultation the jury returned a verdict of "Accidental death."—*Wandsworth and Battersea District Times.*

Poisoning by Prussic Acid.

On Friday, Dr. Hardwick opened an inquiry at the Coroner's Court, Paddington, as to the death of a man who is at present unknown. A police-sergeant said that about 2 o'clock on the previous morning, while on duty at the Kilburn police-station, he heard the handle of the door turn, and on going out saw the deceased partly leaning against the door. Finding he was insensible, he took him inside, bathed his face and head, and sent for Dr. Muller, who ordered him to be removed to St. Mary's Hospital. He was not in a fit, but smelt of bitter almonds. He was about 25 years of age, of dark complexion, and dressed in a grey coat and vest, black cloth trousers, and a black soft felt travelling hat. Nothing was found in his pockets except a gold pencil-case and a pocket-book marked "W. S. Hicks."

Mr. T. W. Sworder, house surgeon to St. Mary's Hospital, deposed that the deceased was brought there by the police, but was then dead. On making a *post mortem* he perceived the smell of bitter almonds, indicating the presence of prussic acid.

The contents of the stomach and portions of the viscera were ordered to be analysed. Some of the jury considered a rigid inquiry necessary, as the deceased might have been robbed and hocussed. The inquiry was adjourned.—*Times.*

Poisoning by Carbolic Acid.

An inquest was opened in the Cardiff prison on Tuesday respecting the death of John Sweeney, under detention to serve a term of one month's hard labour, who had died on Monday. The evidence of Major Knox, the governor, went to show that a warder named Haines had been directed to give the deceased a dose of diarrhœa mixture, and that he gave him some carbolic acid in mistake. The inquiry was adjourned for the evidence of the gaol surgeon, who had made a *post-mortem* examination.—*Daily Telegraph.*

Curious Action for Damages—Saltpetre Sold for Salts.

A somewhat curious case came before Sheriff Dove Wilson, at the Aberdeen Small Debt Court on Thursday, May 4. A girl named Christina Smith, sued Robert Sheret, grocer, for £12, as damages and solatium, in consequence of the defender having, on Saturday the 4th March last, within his shop in Shiprow, recklessly and carelessly sold to the pursuer a quantity of nitre or saltpetre in place of salts, as asked for by her, and which she used, thinking it was the article she had asked for, whereby her life had been seriously endangered, and she had been put to considerable expense.

The defence was a denial of having sold the saltpetre to the defender, and the points of the case are brought out in the following speech, with which Sheriff Wilson closed the case. After hearing parties:—

Sheriff Wilson said,—I think the pursuer has made out her case. The pursuer had occasion to take some medicine, and instead of making her better it made her a great deal worse, the consequences being such as to make her ill for a length of time. It is proved beyond doubt that it was not Epsom salts which she took, but that it was some of the saltpetre the remainder of which is produced by the doctor. It is proved that it would cause the symptoms which the pursuer felt, and it was shown to the doctor as being what she took, and that it really was so I see no reason for doubting, as it is impossible to think that the pursuer or her mother would show to the doctor some substance different from that which had really made her ill. Assuming, then, that the saltpetre was taken by mistake for Epsom salts, the question is, Whose mistake was it? I think it clear that the defender made the mistake. It was suggested that the pursuer had changed the medicine which she got from the defender, but the medicine was taken so immediately after it was got that there was neither time nor opportunity for its being accidentally changed, and an intentional change is out of the question. It being thus clear that the mistake was not made by the pursuer, the only other person who could make it was the defender. I have no doubt that the defender is quite honest in saying that the saltpetre was not what he gave her, and that he is unconscious of having made a mistake. But for all that, with substances having a general resemblance, and lying in drawers not far apart, it may not have been difficult for the defender to have made the mistake, and on the evidence I must take it as proved that he did. If he did, it follows that he must be held responsible. Some questions were put as to whether the pursuer had not showed some carelessness in taking the medicine in such a hurry, and was not in part to blame for the result herself. But she might not know the difference in appearance, and was not likely to give herself time to ascertain the difference in taste. As to the amount of damages, there must be something like reasonable compensation given. The pursuer was made seriously ill, and was away from work for awhile, and so was the mother, who was attending on her. The doctor must also be paid, and cannot have less than £1 for his trouble. Taking everything into account, the pursuer cannot get a less sum than £5 and expenses, and it will not be amiss if this decree helps to bring home to the defender and others who take in hand to dispense medicines that they require to exercise the very greatest caution, and are responsible if they do not.—*Aberdeen Daily Free Press.*

Distressing Suicide.

On Friday, May 5, Mr. Carter held an inquiry, in Bermondsey, into the circumstances attending the death of Mr. Frederick Charles Devigne, F.C.S., aged 31, proprietor of a chemical laboratory at Dockhead, who was found dead on the floor of his room on the previous Tuesday morning.

Mr. Peter Hubert Devigne, a surgeon of Hither Green, Lewisham, Kent, identified the body as that of his brother, and stated that he had lately been much engaged in the preparation of chemicals and poisons.

Mr. Allen, of Boyson Road, Camberwell, said that he had been in deceased's employment as assistant since the 4th of February. On Monday last, at 6 p.m., he shut up the place and went home. The next morning, about 9 o'clock, on going into the front room of the laboratory, he found deceased lying upon his face on the floor dead, and Mr. Powell, the coroner's officer, having been summoned, there was found a small crucible containing the dregs of some prussic acid, the smell of which pervaded the room.

William Powell, coroner's officer, deposed that there were two open letters upon the table, one addressed to last witness and the other to Mr. Farriss, a friend of deceased, and a number of other letters were discovered sealed up and addressed to various persons.

Dr. Adcock, having proved that death had resulted from prussic acid, all the letters were read, and they showed that the unfortunate gentleman had embarked his capital in chemical, analytical, and scientific pursuits, and spent much of his time and money in making experiments which he hoped would have been ultimately successful, but that having spent £500 which he had borrowed from his dearest friend, and failing to see his way to repayment, he had resolved "to pay for his foolish ways with his life," and had poisoned himself.

The jury returned a verdict of "Suicide during temporary insanity."—*Daily News.*

Reviews.

A Manual of Dyeing and Dyeing Receipts. By James Napier, F.R.S.E., etc. 3rd edition. Charles Griffin and Co., London. 1875.

Dyeing and Calico Printing. By Dr. F. Crace-Calvert, F.R.S. Edited by John Stenhouse, LL.D., etc., and C. E. Groves, F.C.S. Palmer and Howe, Manchester. 1876.

Handbook of Dyeing and Calico Printing. By W. Crookes, F.R.S. Longmans and Co., London. 1874.

These books are written with very much the same aim. Mr. Napier tells us in his preface that his object "is not to teach practical dyeing......but to explain the scientific principles of the art, to stimulate among working dyers a desire to understand their trade, and the laws regulating the various combinations producing the different colouring compounds, a knowledge more necessary now than ever it was." The editors of Dr. Crace-Calvert's work say "in a book like the present it would, of course, be impossible either to give a complete scientific account of the different chemical products connected with the various dye stuffs, or to enter into all the technical details of the art of dyeing and calico printing." Mr. Crookes' preface informs us that "the author has undertaken the task of laying before the public in a compact, and, it is hoped, useful form, a digest of the vast mass of information in the tinctorial arts found scattered in distinct works, and in the scientific and technical journals of all nations. Much has been of necessity omitted." The last mentioned book clearly puts forward greater claims to breadth of plan than either of the others.

The table of contents prefixed to Mr. Napier's volume is most formidable; it reads as follows:—

"General Properties of Matter; Heat; Light; Elements of Matter; Chemical Affinity; Elementary Substances; Metallic Substances; Mordants; Vegetable Matters used in Dyeing; Indigo, etc; Coal Tar Colours; Dyeing Receipts; Cotton Dyeing; Silk Dyeing; Woollen Dyeing, etc."

The description of the general properties of matter contains some extraordinary statements. Thus we read of arsenic and carbonic acid (CO_2) that "they have no known existence in a fluid state." Carbonic acid "may be obtained fluid by pressure," but "the particles still retain their elasticity, which a true fluid does not." Did the author ever hear of Dr. Andrew's experiments upon carbonic acid? The common mistake of confounding heat and temperature is continually committed by Mr. Napier —"Water boils at a lower heat upon a high hill than at the foot of it," "water upon the surface of oil boils two degrees of heat below water in a glass vessel," and so on.

When we come to chemistry proper the errors are still neither few nor far between. "If we take one cubic inch of hydrogen and one cubic inch of chlorine they combine and form two cubic inches of hydrochloric acid. If we take one cubic inch of oxygen, and two cubic inches of hydrogen they combine and form water, and make only two cubic inches. The first of these results is termed monad, the second is termed dyad combination."

Surely this is an entirely original application of the terms monad and dyad.

The author has apparently received his chemical education when the old system of notation and nomenclature was in vogue, and he has not been able to free himself from the ideas with which he then became imbued. He has certainly read some modern treatises on chemistry, but the result has been a curious mixture of old and new notation, old and new nomenclature, and old and new theories.

SO_2 is "anhydrous sulphurous acid," K_2O is "anhydrous potash," K_2OH_2O "hydrous potash."

"Nitrogen peroxide stands in the same relation to nitric acid that Nordhausen oil of vitroil does to sulphuric acid."

Hyposulphurous acid "is of singular composition; although it is composed of equal equivalents of sulphur and oxygen, what might be termed SO, yet it is represented double S_2O_2." Might we hint that this sentence is "of singular composition"?

In speaking of chlorine the author relates how the different names by which it was known among bleachers, in the earlier days of the art, led to many absurd mistakes. Oxygen was a bleacher's name for bleaching powder. The following order is quoted:—

"Messrs. ——— will please send at their earliest convenience a cask of their strongest oxygen, containing as near as possible 2 cwt., let it be newly made and dry; the last was damp, so that in a few days it became like as much clay and lost the most of its strength."

When we come to the chapters which deal of dye stuffs themselves we find the same want of correct chemical knowledge. In 13 pages devoted to the coal tar colours how can anything like a satisfactory account, how can even an outline, be given of the chemical history of these substances? Alizarin is dealt with very summarily, nor does aniline meet with much better treatment. Of the receipts for dyeing, occupying about 70 pages, many appear to be valuable. The specimens of dyed cloths are very brilliant; were they all produced by the actual processes mentioned in the text? Looking at this work as a whole we are afraid that the dyer would not learn from it "the scientific principles of his art"; the ground sought to be covered by the work is too large, the chemistry is sadly deficient, and the work altogether is not satisfactory.

It is a relief to turn to Dr. Crace-Calvert's singularly able, clear, and well arranged treatise.

In their preface the editors tell us that "the work consists, for the most part, of the revised MSS. of a treatise on colours, other than aniline, on which the late Professor Crace-Calvert was engaged almost to the time of his decease. In the alterations which we have made in the MSS. it has ever been our object to mould the work into the form in which, had he survived, the author himself would have wished to see it produced." The book must then be regarded as essentially Dr. Calvert's. This work has a definite plan; it begins with a short account of the nature of colour, the action of various agencies upon colours, the theory of mordants, etc.; it then proceeds to describe, in a clear, intelligent, masterly manner, the different colouring stuffs used by the dyer, beginning with madder, then passing to indigo, and so through the different groups of substances. Great attention is given to the chemical history of these colouring matters—the latest researches have been pressed into the author's service. The account of aniline colours, which from the extract from the editors' preface would appear not to be the work of Dr. Calvert, is very ably done. The history of indigo is clearly stated, nor is artificial alizarin passed over without its due share of notice.

A series of valuable tables for testing dye stuffs is annexed to the work.

Of the three books before us, Dr. Crace-Calvert's is undoubtedly the clearest, most scientific, and ablest. A considerable number of dyeing receipts are given, and these are illustrated with specimens of cloths dyed in accordance with the receipts.

If anyone wishes to gain a sound knowledge of the chemistry of dye stuffs, and to learn so much of their application as can be conveniently taught by books, he cannot do better than procure this work.

Turning to the work of Mr. Crookes, we find a mass of information, much of it valuable, but not a little bearing the unmistakable marks of paste and scissors.

Has Mr. Crookes himself read the paragraph on p. 173, which states that "benzol is a true hydrocarbon—its formula is $C_{12}H_6$"?

On the same page the formula of nitro-benzol is said to be $C_{12}H_5NO_4$. Aniline is written $C_{12}H_7N$. A few pages further on rosaniline is correctly formulated $C_{20}H_{19}N_3.H_2O$. Such a muddle of old and new notation is not what one would expect in a book written by so eminent a chemist as Mr. Crookes.

The whole account of the chemistry of the aniline colours is meagre, and has a peculiarly ancient look about it which makes one feel as if it were written by a chemist who had not thoroughly grasped the meaning of the more recent researches upon the subject. So, also, with the account of alizarin. There is no clear statement of the chemical relationship of this body to that substance (anthracen) from which it is prepared. There is a general haziness in the chemistry of many parts of the work which is astonishing. The old names, *sulphuret*, *carburet*, etc., still find a place alongside of the terms of modern nomenclature.

The want of careful intelligent revision and digestion of facts, the want of definiteness of plan and subordination of details to the general plan, give this work too much the appearance of a somewhat random collection of facts and dyeing receipts—in themselves most valuable—culled from all and sundry sources.

Notwithstanding these faults there can be no doubt about the value of Mr. Crookes' book. Information is laboriously gathered together; methods for practical dyeing are detailed, many of which appear to be most excellent, and there is thus brought within the reach of the reader a very large amount of knowledge which he would otherwise have been obliged to search for among many books and papers scattered far and wide. A most useful appendix, a list of papers bearing on subjects connected with colours, and a copious index, add to the utility of the work.

Notes and Queries.

[510]. COUGH ELIXIR.—"Ribes" would like to have a recipe for Black Currant Cough Elixir.

[511]. NEGATIVE VARNISH. —Wanted, a good receipt for a Negative Varnish, for varnishing photographic negatives.—Beta.

[509]. PERFUMES.—I enclose a formula for making New Mown Hay Perfume in answer to your correspondent's ("Lover of Perfume") inquiry:—

℞	Extract of Tonquin Bean . . .	2 pints.
	Extract of Geranium . . . , .	1 pint.
	Extract of Orange Flower . . .	1 ,,
	Extract of Rose	1 ,,
	Extract of Rose Triple	1 ,,
	Extract of Jessamine	1 ,,

Misce.

S. F. Nottingham, *Exeter*.

[506]. SYR. CALCIS ET SODÆ HYPOPHOSPHITIS.

℞	Calcis hypophosphitis	ʒss
	Syrupi simplicis	℥vi

Sodæ hypophosphitis	℈ij
Syrupi aurantii floris	℥i
Syrupi simplicis	℥v

Misce.

H. W. Langbeck.

[509]. PERFUMES.—The perfume of new mown hay may be obtained by dissolving cumarin in spirits recti Fabæ de Tonko. Herba asperulæ odoratæ and herb. anthoxanthi odorati contain cumarin, and can be extracted easily with rectified spirit.

H. W. Langbeck.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessaril for publication, but as a guarantee of good faith.*

The Sale of Patent Medicines by Grocers, etc.

Sir,—It appears from your columns that our correspondents in seeking "protectionism" have forgotten that the country is for "free trade." Why then retrogade? The past legislation has been fruitless save in a few vexatious clauses. Why repeat it?

I am quite of Mr. Sandford's view that the Parliament will only consider the danger to the public, and to my mind, in patent medicines, whether the shopkeeper or the chemist sells them, the danger is alike the same.

If the grocer or the stationer cuts in the trade, cannot the chemist retaliate? And where they are so served depend on it they will soon desist.

J. R, S.

May 10*th*, 1876.

The Liverpool Chemists' Association.

Sir,—I beg to correct a misstatement in the report o the meeting held on the 27th ult., and which appeared in your last week's issue.

Referring to a proposed change in the name of the Association, the last paragraph but one states "that without committing themselves, the speakers did not object to the change."

This is not correct, for more than one speaker warmly opposed it, and I further gave notice that if the matter were brought before the annual meeting and a change was considered advisable I should propose that the word "Pharmaceutical" stood before the word "Chemical."

I fear that if the Association were called "The Liverpool Chemical and Pharmaceutical Society," the title, which is a very long one to write or repeat, would soon be shortened, and the word "Pharmaceutical" dropped altogether. Now the Association is either pharmaceutical or nothing; the President in his address admitted so much, and the proposed change, in my opinion, is nothing more or less than a step towards the extinction of this pharmaceutical element to which the Association owes its existence. Lately influences, in my opinion, have been decidedly against the pharmacists, and their interest and attendance has declined proportionately, but I hope this question may rouse them to exertion, and that they will not part with their valuable museum and library to a virtually new society, without making an effort to prevent it.

J. Hallawell.

May 8*th*, 1876.

[*** The report referred to was supplied to us officially as a correct report of the proceedings.—Ed. Ph. Journ.]

J. A. Horton.—Your letter has been handed to the Secretary, to whom all instructions respecting the transmission of the Journal should be sent.

"*Devonia*" (who is referred to the rule respecting anonymous communications).—We cannot undertake to advise upon the subject.

T. Brown.—As linseed meal is no more linseed oil than linseed oil is linseed meal, the substitution of one for the other would be contrary to the provisions of the Sale of Food and Drugs Act.

A. Strachan.—We will endeavour to obtain the information you ask for.

W. R. S.—Proctor's Lectures on Practical Pharmacy, published by Churchills.

H. Davis.—The publisher of Mr. Harrington's pamphlet is, John Moore, Ann Arbor, Michigan, U.S. A copy of it is in the Society's library.

W. J. S.—(1) Mayne's Vocabulary. (2) The tests are described in 'Squire's Companion to the Pharmacopœia.' (3) We are not acquainted with such a book.

Communications, Letters, etc., have been received from Professor Dragendorff, Dr. Hesse, Mr. Slugg. Mr. Caseley, Mr. Barclay, Filix, Suum Cuique, Sufferer from Undersellers, Student, Knaresborough, G., L. V. W.

NOTE ON PHOSPHORUS PILLS.

BY MESSRS. ALLEN AND HANBURYS.

Whatever the merits or demerits of the pil. phosphori, B.P., it is certain that it has failed to obtain the approval of any large number of prescribers and is not likely ever to be generally used.

In the absence of any published formula of a thoroughly satisfactory nature we suggest the following which, to avoid confusion with an advertised nostrum for which we believe it to be an efficient substitute, we propose to call *Pil. phosphori cum sapone*:—

℞ Phosphori . . . . gr. ij.
Carbon. Bisulphid. . . . . ♏x vel q. s.
Solve.
Pulv. Saponis dur.
„ Guaiaci Resin. āā . . . gr. xxxv.
Glycerin. . . . . gtt. xij.
Pulv. rad. Glycyrrh. . . . . gr. xij. vel q. s.

ut fiat massa gr. c. To be divided into pills of the strength required, and varnished or "coated" in the ordinary way.

The mass thus formed is of good consistence, easily manipulated, readily miscible with other remedies, and what is most important, readily soluble. It is hardly necessary to add that the very volatile bisulphide soon evaporates.

Plough Court, E.C.
May, 1876.

THE ANNUAL DINNER.

On Wednesday last, the Fifth Annual Dinner of the Members of the Pharmaceutical Society of Great Britain and their friends was held at the London Tavern, Bishopsgate Street. The chair was taken at half-past six by Mr. THOMAS HYDE HILLS, President of the Pharmaceutical Society.

After dinner was ended and the grace had been sung,—

The CHAIRMAN said: The first toast I have the honour to propose is, "The Queen." Her Majesty is the best and most constitutional monarch that ever lived. Long may she live and long may she reign over us. The toast is "Her Majesty the Queen," with three times three.

The toast having been duly honoured,

The CHAIRMAN said: The next toast I have the honour to give is "His Royal Highness The Prince of Wales, The Princess of Wales, and the other Members of the Royal Family." At our last Annual Dinner I spoke of His Royal Highness's intention to visit India; at that time there were many conjectures as to the result, which are now solved. His Royal Highness has visited our Indian Empire, and has been well received by the native princes, and the inhabitants. The courteous and genial nature of the Prince made him popular wherever he went, and won him the good opinion of all. The visit to India, from the day His Royal Highness left the shores of Great Britain to the day of his return, when he was received right royally by the people, was a great success, and cannot fail to be of the greatest importance.

Mr. ALEXANDER BOTTLE proposed the next toast; that of "The Medical Profession." He said: Gentlemen,—In rising to propose to you the next toast, permit me to express to you the gratification which I have at seeing so many of my brother pharmacists around our worthy President at the end of another pharmaceutical year. I think, gentlemen, that the company which we have here to night speaks well for the progress of pharmacy, and the interest we take in the Pharmaceutical Society. But, gentlemen, it is not my province to propose the health of our President; it is to ask you to drink another toast, that toast being the health of the medical profession. The medical profession have high claims upon all classes of society. We number among our earliest friends a member of the medical profession, and most of us have through life among the members of the medical profession our dearest and best friends. Not only do we apply to them for professional advice and skill, but we also have in the members of the medical profession friends on whom we call to consult upon other than professional matters. We esteem it a very high privilege to be associated with members of the medical profession in their endeavour to alleviate the pain and suffering of humanity. We esteem it a high privilege in our convivial meetings like this to have amongst us members of the medical profession. At all times we welcome them. We desire to emulate them in their attempt to alleviate human suffering, and to render such assistance as may be in our power and within our province. Gentlemen, I will not detain you, but I will ask you to drink, with every honour, the health of the medical profession, and I will couple with that toast the name of Mr. William Adams, the president of the Medical Society of London.

Mr. WILLIAM ADAMS: Mr. President and Gentlemen, the honour of responding to a toast so wide and comprehensive in its meaning as that of the medical profession should, I feel convinced, have fallen upon some more distinguished representative of the profession than myself. However, I cannot but recognize in the selection which you have been pleased to make a compliment made to the Medical Society of London, which, it so happens, during the present year, I have the honour to represent here as its president. In the name rather of the Medical Society of London do I acknowledge the compliment which you have been pleased to pay; and, as a member of the Medical Society of London, I must say that I cannot but congratulate you most heartily upon this very numerous, cordial, and festive gathering as a Pharmaceutical Society, on the present occasion. If any testimony were wanting, it would be that on such occasions as this the Pharmaceutical Society should assemble in such large numbers, and with such cordiality of feeling as is exhibited on the present occasion. If there is any one fact recognized generally in the various departments of medicine into which the science of the medical profession is subdivided, it is the mutual dependence and interdependence of each branch, depending, as they do mutually one upon the other,—I mean medicine, surgery, and pharmaceutical knowledge,—we recognize that they all rest upon one common basis, and of that basis—the scientific basis—of the profession there is no more important element than pharmaceutical knowledge—a knowledge which we know helps the best of us, helps surgeons, helps physicians, and helps every one. We know how many of the great men of the past, like Sir Benjamin Brodie, Mr. Travers, and Mr. Green, were distinguished not only as surgeons by the use of the knife, but for their knowledge of drugs—for the use of drugs, for their knowledge of pharmacy, and for their knowledge of medicine; whilst, on the other hand, we have had a few examples of men of a certain school who were celebrated only as surgeons for the use of the knife. It is said of a great man who lived a few years ago in London,—a most distinguished supporter of the Scotch school,—that he seldom or never prescribed for his patients, and that, indeed, when he once tried to write for salts and senna he did not know how to spell the prescription. That may be said occasionally, perhaps, of some few exceptions of the surgical class. Physicians, we know, are all good pharmaceutists. Then, gentlemen, one cannot but feel that in the advance of medicine generally a large share has been taken by the influence which has been exerted by the Pharmaceutical Society in establishing a solid and scientific basis, and also in diffusing a knowledge of pharmacy in the country; and for establishing that scientific basis, and diffusing the knowledge, I am quite sure that the obligations of the profession are deeply due to the Society which we have the honour of dining with this evening. In the name of the Medical Society of London, and acknowledging as I do the great claims which the public, the government, and the country ought to acknowledge towards the Pharmaceutical Society, I beg to return thanks for the toast you have given.

Mr. **Ernest Hart**: Gentlemen, the agreeable duty has been imposed upon me of proposing the toast which stands next upon the list; and it might well seem that to propose such a toast is almost a needless task. I have to propose "The Prosperity of the Pharmaceutical Society of Great Britain." And, surely, if any society be prosperous, then it may be emphatically said of the Pharmaceutical Society of Great Britain that it enjoys great prosperity, large influence, and universal confidence. That which you all wish, and in that wish I heartily concur, is that that prosperity may grow, that that confidence may be consolidated and that that influence may increase. And such a wish as that has it seems to me more in it than appears upon the surface, and yet in all that it really has in it we may all heartily concur. The Pharmaceutical Society of Great Britain has complex and various functions, and it is entrusted with duties so various that some of them may well seem conflicting. It has not only the task of educating students, but it has also the task of guaranteeing their fitness to practise that in which they have been educated. It has not only the task of protecting the interests which it represents, but it has also the duty, on behalf of the State, of regulating the exercise of those privileges, and of limiting those interests, should they in any case appear to conflict with the public interest. Now, so far as I know, no such various and complex duties have ever before been entrusted to any society, or to any corporation, and if we look to the past history of this Society I think it is a matter for no small congratulation that it has been able to reconcile those various interests, and to promote them all, without sacrificing any one of them. I do not suppose that it can be said of the Pharmaceutical Society in its past, more than of any other great society, that there has been no flaw in its conduct; and I am not here to say but that I am one of those who can point to some things which I think might have been otherwise, although, perhaps, then they might not have been better, but I say that having a fairly complete knowledge of what has been done by the Pharmaceutical Society, and having also many opportunities of knowing what are the opinions and what are the feelings of the great body of medical practitioners who watch with interest the proceedings of the Pharmaceutical Society, I believe I may say that the Society has completely succeeded in winning the confidence and respect of the medical profession, and in convincing that profession and the public at large that it is a fit guardian of the great interests which it exists to guide and to protect. And I believe that it has succeeded so in the past, because those who have guided it—its founders and its presidents—have, throughout, been moved by a high spirit of equity and by a large sense of public duty, and if they looked chiefly to the improvement of the education of the pharmacist, and to the elevation of his status, they have succeeded in that; and the Pharmaceutical Society has deserved well of pharmacy as it has deserved well of the medical profession. And so now, I think, we may look with the happiest hopes to the future, and hope that those same principles may still prevail, and that that same cordiality of feeling may still unite the two professions in dealing with those questions of the future, which may almost be described as questions of the present, and which lie in the borderland, in which some medical men or doctors dispense and in which pharmacists prescribe, or come near to prescribing. I see nothing in principle which can divide the pharmaceutical from the medical profession; and I see no reason why the continuous application of those high principles of equity and public right, which have guided this Society in the past, shall not do so in the future also, and, in settling off all such questions, lead it into places and into fields in which the medical profession and the Pharmaceutical Society may be entirely agreed. Pharmacy and medicine are both under the guidance of leaders in whom we may trust; and, following them, I believe that we shall always find that the questions of this sort may be satisfactorily settled to the equal advantage of both. And this leads me to the last words that I have to say, and those are to ask you to drink the health of the present leader and President of the Society. It affords me particular pleasure to do this, inasmuch as it affords me also the opportunity of drinking to a very old friend, and because I know that in the present President of the Society you have one who is altogether worthy of that long unbroken list of names of honour which have reflected credit on the Society. There are some past presidents here—Mr. Peter Squire by my side, who, I know, is one of the most respected of pharmacists among his brethren and throughout our profession; there are others who hold an equally high position, doubtless, whom I do not know; but throughout the long list which begins with Jacob Bell, and ends with the present President, there is no name, I believe, which you will more delight to honour than that of Thomas Hyde Hills. I can only say that Mr. Hills is known by my own profession, as well as in this, as a man of great singleness of purpose, of singular liberality, and as largely imbued with the love of the department of life which he represents. He has always protected its interests, and he regards the pharmaceutical profession to which he belongs as a calling highly to be honoured. I believe that in honouring it he has honoured himself as he has endeared himself to you. I beg to propose to you the prosperity of the Pharmaceutical Society, coupled with the name of Mr. Hills.

The **President**: Mr. Hart and Gentlemen, I feel very much pleasure and honour in having my name connected with the Pharmaceutical Society. There are many more worthy men who have done much more service to the Society than I have, and who could reply better; but, notwithstanding, as I am the President at the present moment, and you have done me the honour to couple my name with the Society, I shall not shrink from acknowledging that Society. It is the Society which I, and which every member is proud of. If it were not so we should not have the number of gentlemen round these tables. Gentlemen come here not to support the President, but to support the Pharmaceutical Society, and they are determined to do so. The founders of the Pharmaceutical Society set out with the object, if possible, to improve their condition and status. Not only that, but also the important business to which they belong, and with the desire that the public should have better medicine than they used to have; and I believe they have succeeded. Everything is better and more pure, and it will be still more so if possible. They were determined: they were honest in what they were about. They had made up their minds; they did not look either right or left. They said, "We will have a society which will improve the condition and the position of the pharmaceutists and the medicines in which they deal." And I am glad to say—and I can say it fearlessly and faithfully—that they have succeeded, Everything is going on well. Now and then little clouds appear, but we are true to our cause. I thank you very much for the honour you have done me in connecting my name with the Pharmaceutical Society. I thank Mr. Hart for the kind and warm manner in which he spoke of the Society, and also for his kindness in speaking of me in the way he has. It is a great delight to see the members of the medical profession here, and I have no doubt that we should have seen a great many more, but they were, many of them, engaged. The fact is, it is rather a long distance to come into the city; otherwise, I have no doubt we should have been honoured with several more gentlemen. Nevertheless, gentlemen, the kindness of those who have honoured us we appreciate, and I thank them for their company here this evening. And I also thank every one for rallying round the Pharmaceutical Society, and for the manner in which the toast had been drunk.

Mr. **Atkins**: Mr. Chairman and Gentlemen, a toast of much interest, and of not less importance to us as pharmacists, has been allotted to me this evening to propose. I rise with very much pleasure to propose it, but with a pleasure somewhat slightly dashed by the recollection that this toast has been proposed by very eminent men. My recollection goes back, at least, for two years, I, therefore, naturally felt a reluctance in succeeding them, but, being pressed to the duty, I at once, with that slight degree of hesitation, responded. Now, that will be quite enough in the form of apology, which is never very acceptable. Most of the gentlemen here present will remember the birth of this bantling boy some dozen years ago in the bracing air of Newcastle; but I suppose there were scarcely any of us who were then prepared to realize that after the lapse of some twelve years the lad of rapid growth and of manly muscle, with all the possibilities of a future vigorous and sustained manhood which was before him, would be seen in the Pharmaceutical Conference of to-day. Yet, such are the facts of the case. Well, now, Mr. President, if I am asked in one or two words to define what it is that the Pharmaceutical Conference has done, I have no difficulty whatever. My only difficulty consists in selecting from the abundance of the material. What has this British Pharmaceutical Conference accomplished? I only wonder if ever the question be put at all in the form of doubt rather than inquiry. Why, first of all, regarding the social aspect merely, and that will not be forgotten at a festive gathering, we have helped to collect the scattered, disintegrated fragments of pharmacy. We have helped to form a nucleus for their crystallization. We have helped to evoke a kindly, genial effusive, and most cultured form of hospitality wherever we have gone. And having gone to most of its conferences I am delighted, as one who has received, to attest, in the presence of so many who have dispensed, that we have been received in the most cordial and cultured manner. If it be true that it is more blessed to give than to receive then, if I had been so happy who have received, how much more happy must they be who have given? But, Mr. Chairman and gentlemen, if even in a festive gathering I were to limit the exposition of this toast at all to the mere festive idea, I should be altogether false to the merits of the toast, and false to my own convictions with regard to it. What has been done with regard to pharmacy? What has been done with regard to scientific investigation? I maintain that much—very much—has been done, and a broad basis for further labour has been laid, and precious seed has been scattered to the ground which will bear fruit a hundredfold through the exertions of our children. What has been done? Why, we have had, first of all, a series of very splendid, and I use the term advisedly, splendid inaugural addresses. We have had addresses from the Presidents in the chair, suggestive, exhaustive, sometimes eloquent, sometimes profound. And I just wish to say with regard to those addresses that I desire that they should be published some day in a separate form. I should very much like to see those inaugural addresses at our annual meetings published for the benefit of our students as a kind of volume of pharmaceutical ethics; and I believe they would constitute not simply interesting but very productive reading for our young men. We have also a 'Year-Book of Pharmacy' now, of which, year by year, a volume is added to our library—a volume which is replete with information, popular in its structure, and valuable as a work of reference. We have also had pharmaceutical and scientific investigations promoted. We have had donations given for original research, and if they have not been so zealously sought for in the past, I trust they will be more abundantly used in the future. And then we have been meeting year after year under the shadow of the wing of our elder and more aristocratic sister, the British Association, and I am sure that many of us must have caught some degree of the enthusiasm of the nobler institution in our meetings. I have spoken with regard to the history of the past. I will detain you with one word, and only one word, with reference to the future. What that future will be will depend largely, as I have intimated, upon those who are to be our successors, as well as, of course, upon the younger men who are now engaged in the ranks of pharmacy. But we have a vast untrodden path before us. We have mines of undiscovered and undeveloped wealth. I think it is Buffon who says that the leaf of one plant, or the wing even of a moth, is enough to engage the naturalist's attention, or the botanist's skill, for years. Well, we have in these scientific investigations abundant material to engage our attention for the future, and I trust that we and our children who are now entering upon pharmacy will be true to its vocation. If we enter upon it with diligence, with reverence, by connecting the great works and the great worker — the revelation and the revealer; if we are true and modest and real in the prosecution of our studies, we shall employ our powers in the very noblest department in which it is possible for us to employ them. And now I come to the last phase of this toast. I am reminded that I must couple this toast with a name; and if the Pharmaceutical Conference has been happy in many respects, it has been happy not the least in this; it has been well presided over. We have had a series of able presidents; but though we have had able men in the past—I say it with all respect to those who have gone before—we have a reserve force quite equal to the occasion. The possibilities of the future—the reserve forces, with regard to ability as to moderators in the chair, on which we may draw, are, practically, unlimited. I am happy to-night to be enabled to couple this toast with a most honoured name—a name universally respected—a name of the widest culture, and I think I might say of the truest and realest research. I couple this toast of the Pharmaceutical Conference with the name of Professor Redwood. Gentlemen, I will not detain you, or keep you from Professor Redwood one moment further except to say this—that I am delighted to think that the toast to-night, and the possibilities of the immediate future of our Pharmaceutical Conference are left in such able hands as those of Professor Redwood.

Professor **Redwood**: Mr. President and Gentlemen, the manner in which this toast has been received abundantly testifies to the fact that the Pharmaceutical Conference has lost nothing of the popularity which has hitherto prevailed among the pharmaceutists of this country; and I think we are entitled to consider that this is very creditable to both parties. It proves on the one hand, that the Pharmaceutical Conference has not sunk into a state of inactivity or been directing its activity in any other than the right direction. It proves, on the other hand, that the pharmaceutists of this country have fully appreciated and continue to appreciate the objects which the Conference has been endeavouring to carry out. Now, gentlemen, we have met here as members and friends of the Pharmaceutical Society, and this toast originates from that Society and is intended to convey the feeling of the Society towards the kindred association that has sprung from itself and includes and comprises much of the young blood of the most advanced and energetic of the members of that Society. I have but one remark to make further in reference to the toast which has been so ably, and I may say so eloquently proposed to you, and it is to this effect, that as long as the Pharmaceutical Society and the Pharmaceutical Conference continue to act in harmony, the Society endeavouring by all legitimate means to promote and advance education, and to qualify or to raise men to the highest and to a sufficient state of qualification to enable them to perform efficiently their respective duties; and on the other hand, as long as the Pharmaceutical Conference shall provide and mark out for such qualified men work of a suitable description—for these I conceive to be among the most important duties which devolve upon these two sections of our body, so long as these duties are carried out in that way I feel that we have every right to expect that both these sections of our body may continue to rise in each other's estimation, and to rise at the same time in the estimation of the medical profession, and of the general public.

Mr. William Scott Brown (Manchester) proposed the next toast, "The Visitors." He said: Mr. President and Gentlemen, when I entered this room to night I had not the slightest expectation of being called upon to propose any toast. It has pleased the powers that be to allot to me the proposal of what I am sure you will be happy to hear is the last toast on our programme. The first objection which I felt to the task being imposed upon me of proposing this toast was (to my discredit be it spoken) that I felt that I was almost a stranger myself, because of the members of the Council, I have attained the very great distinction of having attended the fewest number of meetings altogether through the year. I felt that to propose this toast would be almost equivalent to proposing the toast of "our noble selves." But yielding, as I always do, and that not only from a sense of duty, but from a sense of love and regard, and affection, to the worthy President of the Pharmaceutical Society, I have undertaken the duty, and I hope you will bear with me if it should be inefficiently performed. This toast of the visitors is so much associated with the toast which preceded it at an earlier part of the evening—that of the medical profession—that it is somewhat difficult to avoid mixing them up. But I am happy to find that though we appreciate—and very highly appreciate—the attendance of our friends of the medical profession at these our annual gatherings, we are favoured with the attendance, as visitors, of numbers of other gentleman who, though not engaged in any profession, are willing and desirous to lend the countenance and aid of their presence at these dinners of the Pharmaceutical Society of Great Britain. It has struck me once or twice that this toast of the visitors ought to be altered, and that instead of that, we ought to drink the toast of the "Fourth Estate of the Realm," namely the press. It has come to pass that we have really a pharmaceutical press of which we may be proud. We have not only succeeded in establishing a weekly journal which contains matter interesting to ourselves, and is largely devoted to taking notice of what is going on around us in the scientific world, but we also possess a monthly journal in which the chemists and druggists of this country are represented. This journal is important to the whole body of the trade, as well as to its promoters. I am sure that, as regards the medical press there is no jealousy whatever on the part of the pharmaceutical press, but they assist and aid each other and they both occupy a place which is advantageous and honourable to each and to all. But it has not been included in the programme that I should have the pleasure of proposing the toast of the press, and I therefore address myself to that which is my immediate duty, that is the toast of the visitors. I have attended these annual gatherings from the commencement with the exception of the one which took place last year. I assisted in their inauguration and I was delighted to do so for I am a strong believer in the good old English custom of hospitality; and I do not see why we should continue to justify the description which Shakespeare bestowed upon us when he spoke of the lean and starved apothecary. At any rate, we have at least abolished him; and I believe that if we go on as we have gone on he will become a creature of tradition—an extinct animal, lost in the ages of the past. Formerly it was the chemist's duty, and to many of us it seemed to be the privilege which we contended for, to repair the errors of excess at the table. We knew that at that time we might not have any part or lot in acquiring the disease which we were called upon to treat. But I believe that after a few more years' experience such as this we shall become qualified in the most remarkable manner to ourselves to accomplish in a most satisfactory manner the remedy which those who come under similar circumstances require at our hands. Well, gentlemen, it is a good old custom that speeches should be allowed; and I am sorry to say that I have occasionally had to attend public dinners at which speeches were not allowed. The speeches at public dinners are, very often, a great deal better than the dinners. Do not think that either mine, or anybody else's, is to be included in that category to-night, because I am quite satisfied with my dinner; and therefore I feel the more confidence in proposing the toast of the visitors, and assuring them that they are most welcome. We are favoured with the attendance this evening not only of members of the medical profession, but of many other gentlemen connected with the arts and sciences and collateral branches of business. We are pleased to see them all. We hope that they will attend on our next anniversary in increasing numbers, and I trust that the enjoyment they have had will induce them to come again, and to say in the words of the hymn—

"I have been there, and still would go."

I have no intention of pursuing the quotation any further. It would be extremely improper on my part, and even under the presidency of so distinguished and good hearted an individual as our worthy President, I shall not dare to finish the quotation. The first line will be realized in the experience of every gentleman who has attended here this evening and who has attended on previous occasions. I have to couple with this toast the name of Dr. Arthur Leared, and I cannot refrain from saying that I have very pleasant recollections of that gentleman. He is not only one who is an honour to the profession which he has chosen, but he has also proved himself a distinguished, earnest, consistent, and continuous friend of pharmacy and of the Pharmaceutical Society. I remember that about three years ago when I had the honour of proposing the toast of the medical profession, I then called upon the same gentleman to respond to the toast. He responded that time in a most eloquent speech, and I am sure to-night we may truly call Dr. Leared a visitor, because, as I understand, since the time that I met him three years ago he has almost circumnavigated the globe. At all events he has travelled over a large space of earth and water. I can only say that we are pleased to see him back amongst us. We welcome him among us most cordially, and we also welcome those visitors who have honoured us with their presence this evening, and I also propose their very best health.

Dr. Leared in reply said: Mr. President and Gentlemen, fortunately for me the duty which you have imposed upon me is as agreeable as it is easy. I may say that Mr. Brown has said a great deal too much as to myself personally, but I take it more as a compliment to the profession to which I have the honour to belong, than as being due to myself individually. If I might be allowed to say one word, sir, in regard to this dinner, it would be that, having been honoured with invitations on several occasions, I had come to the conclusion that it increases, not only in magnitude, but in interest and in every social way in which it is desirable that such a reunion should increase. And, sir, if I should say a word with regard not only to myself, but to my brother visitors, it would be that we thank you—and I say this not irreverently—not only from our lips but from our hearts, for the kindly feeling you have shown in inviting us here, and for the true pleasure and satisfaction you have afforded us. I thank you, gentlemen, again.

The toasts were interspersed by songs, rendered by a company under the direction of Mr. Winn. Mr. Harradine officiated as toast master.

The Pharmaceutical Journal.

SATURDAY, MAY 20, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE EVIL OF INDIFFERENCE.

ALTHOUGH the annual general meeting of the Pharmaceutical Society was this year characterized by extreme brevity, and the proceedings were almost entirely limited to the adoption of the Council's report, both the mover and the seconder of this measure took advantage of the occasion to refer to several subjects which may well furnish food for reflection.

Foremost among these subjects, as regards general importance, was the reference made by Mr. ATKINS to the feeling of dissatisfaction prevailing within the pharmaceutical body at what is assumed to be an unfavourable consequence of the legislation by which the condition of pharmacy in this country has been to some extent influenced within the last few years. We believe it is not going too far to say that, in the minds of many members of the trade there is a belief that their position is less satisfactory than it was before the passing of the Pharmacy Act, and in fact the expression of this view may be found from time to time in several of our correspondents' letters. Very often the complaint urged is very vague, and sometimes it obviously originates from the "Constitutional Grumbler;" in other instances, however, we have inclined to the opinion, that these expressions of dissatisfaction were the almost inevitable result of that transitional state through which the drug trade and the practice of pharmacy are undoubtedly passing. But the fact which is so unaccountable in connection with this state of public feeling amongst a large section of the trade, is the profound indifference manifested towards the Pharmaceutical Society. Whatever may be the primary cause to which this indifference is to be ascribed, there can be, we think, little question that its existence is in itself to a very great extent the reason why the action of the Pharmaceutical Society is attended with a less general protective influence than it is thought should be exercised.

To take as an illustration the case of illegal trading in drugs. We have repeatedly endeavoured to make it apparent that the repression of this evil is very much obstructed by the want of adequate support and assistance from the trade at large. Some years ago complaints were constantly being made in reference to this matter; in many instances they came from persons entirely unconnected with the Society, otherwise than in being on the Register of Chemists and Druggists, and though they seemed to entertain the opinion that the Pharmaceutical Society could be of service in removing the evil they complained of, they did not apparently appreciate the fact that the small support accorded to the Society by the trade constituted a necessary limitation of its efforts in that direction.

Already considerable expense has been incurred by prosecuting offenders under the Pharmacy Act of 1868, and inasmuch as the prosecutions undertaken have generally been successful, the trade at large has benefited by the action of the Society in this respect, and that portion which does not subscribe to it is further indebted to that smaller fraction of their brethren comprised among the members and associates of the Society. It would be obviously unfair to the members and associates if the funds of the Society were more largely drawn upon for purposes of this kind when there are so many demands upon them for the promotion of education which can only be in part responded to.

Moreover, apart from the mere monetary requirements of a more general protective action of the Society, such as many with much justice contend was one of the original objects of its founders, and one of the avowed purposes mentioned in its charter, it is almost, we should imagine, superfluous to point out that such action cannot well be carried out except by the co-operation of those likely to be beneficially interested in it. So long as the greater portion of the trade stands aloof from the Society, taking no interest in its proceedings, lending no aid to its deliberations and no strength to its finances, so long will the "protection of those who carry on the business of chemists and druggists" remain a desideratum only in some small degree less remote than it was at the time when the founders of the Pharmaceutical Society, feeling the need of this among other reforms, associated themselves together for the purpose of promoting "so laudable and benevolent a design" as that of uniting the pharmaceutical community of this country in one harmonious body and promoting its interests by mutual sympathy, co-operation, and support. That we are still far from even the moderate realization of this desirable end is, however, a fact no less lamentable than it is undeniable; we are glad therefore, that Mr. ATKINS's pointed allusion to some of the circumstances upon which it depends has served to draw attention to it, and we trust that his remarks may not be without due effect in bringing about a more wholesome state of things.

THE CONVERSAZIONE.

THE Annual Conversazione of the Pharmaceutical Society was held on Thursday evening last in the South Kensington Museum, and was attended by about 2660 visitors. The gathering was a very pleasant one, and the Society is much indebted to the officials of the Museum, and especially to Mr. CUNLIFFE OWEN, for the efficient manner in which they assisted in carrying out the arrangements.

THE BALHAM CASE.

THE mysterious death of Mr. BRAVO, at Balham, which we recorded in an extract from the *Medical Examiner* in our Journal last week, still remains unexplained, although great efforts are being made to investigate the matter. Appended to a notice of the case in the *Times* of Monday is a letter from "A Barrister," calling on the chemists of London to help the police in this matter. The appeal is grounded on the fact that every chemist selling antimony (emetic tartar) is bound, under the special provisions of the Sale of Poisons Act, to keep a record of his sales.

We feel assured that this reminder of a public duty will not be unheeded, but that it will cause chemists generally to look through their registers.

CO-OPERATIVE LIQUIDATION.

WE learn from a notice published in the *Standard* of the 17th inst., that a petition for the winding-up of the Yorkshire Civil Service Supply Association (Limited) was filed on the previous day by ROBERT ALEXANDER ROONEY of London, a creditor and shareholder of the said company. The petition is to be heard before the Master of the Rolls on Saturday, the 27th of May. This fact will, doubtless, be of interest to some at least of our readers, inasmuch as the Association referred to recently sent out, from its establishment in Boar Lane, Leeds, a circular addressed to medical men, announcing that it had a "dispensing department," etc. It would appear from the present result, that though this association may have endeavoured to do some harm to legitimate dispensers, it has not succeeded in doing much good for itself, and this may, we hope, be a ground for removing some of the apprehension with which the proceedings of such enterprises are regarded by chemists and druggists.

THE EBERT PRIZE.

THE Committee entrusted with the awarding of the EBERT prize for the present year appears to have met with some difficulty in discovering a suitable recipient. In a report just issued the Committee states that it considers that although the majority of the papers presented at the last meeting of the Amercian Pharmaceutical Association were valuable and instructive they did not "come within the cope intended as competing for the award." After a critical examination, three papers on Phosphoric Acid, by Professor MARKOE, Mr. DOHME, and Professor REMMINGTON, and one on Pancreatin, by Professor SCHEFFER, were selected for further consideration. But even respecting these the Committee came to the conclusion that the results attained by the authors had been foreshadowed by the investigations of previous writers to such an extent that they do not fairly come within the provisions prescribed by Mr. EBERT, in founding the "EBERT Prize."

ADULTERATION IN AMERICA.

MR. R. V. MATTISON reports in the *American Journal of Pharmacy* that the result of an examination of a sample of "balsam of Tolu," which excited suspicion by its rather softer consistence, was the discovery that it contained 63 per cent. of "a balsam prepared from the bark of *Liquid ambar orientale*" and nearly 11 per cent. of bark and charred ligneous matter. The fact that balsam of Tolu was just then nearly four dollars a pound in the market is a probable through unsatisfactory explanation of the phenomenon. Another statement in the *Druggists' Circular* that unaccountably low quotations for oxalic acid in Boston were synchronous with the presence of 22½ per cent. of Epsom salt in a sample examined would appear to indicate that the United States adulterators do not restrict their operations to high priced articles.

THE POTASH INDUSTRY.

TWENTY years ago wood ashes were exclusively employed in the manufacture of potash, but this can no longer be said of more than half the total production, and it is already predicted that the time is not distant when wood ashes will have entirely disappeared from the market. The discovery that the immense salt mines at Stassfurt could be profitably worked for the production of potash has of course been one of the main causes of this great change and has given a new importance to saline deposits wherever they may occur. Another not unimportant factor, however, is the very large quantity of potash now obtained as a by-product in the manufacture of beetroot sugar.

According to some statistics quoted on the authority of Dr. GRÜNEBERG in the *Scientific American* the quantity of ash exported from Russia has decreased from about 11,000 tons in 1864 to 5500 tons in 1873, or about half. With respect to American ash a still greater falling off is noticeable. The quantity exported from New York in 1865 was about 2600 tons; in 1873 it was below 400 tons.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A MEETING of the above Association will be held at 17, Bloomsbury Square, on Thursday evening, May 25th, at eight o'clock, when a paper on "Absorption Spectra" will be read by Mr. CHARLES J. BOORNE.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Thursday, May 18, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Present—Messrs. Atherton, Betty, Brown, Cracknell, Frazer, Greenish, Hampson, Hanbury, Owen, Rimmington, Robbins, Sandford, Savage, Schacht, Shaw and Sutton.

Several individuals were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Resignation of a Member of the Council.

The Secretary read a letter from Mr. Baynes, of Hull, adhering to his resignation.

The President expressed the regret of the Council that Mr. Baynes was unable to withdraw his resignation.

It was moved by Mr. Scott Brown and seconded by Mr. Atherton—

> "That the election of a member to fill the vacancy caused by the resignation of Mr. Baynes, of Hull, be postponed to the meeting of the Council in June.

Mr. Scott Brown in support of the motion said that he did not think, according to his reading of the bye-law, that the Council was compelled to fill up the vacancy that day. The bye-law said that it should nominate, but did not say that it should elect. Considering that this was an exceptional meeting of the Council held *pro formâ* for the purpose of arranging the business of the Annual Meeting, he thought that it was desirable to wait till the result of the election was ascertained and at the first meeting of the new Council fill up the vacancy which would be caused by Mr. Baynes' resignation.

Addendum.—In the Journal for May 6th, page 891, list of diplomas granted to pharmaceutical chemists, add the name of

Husband, John Cecil,

THE THIRTY-FIFTH ANNUAL GENERAL MEETING OF THE PHARMACEUTICAL SOCIETY.

Thursday, May 18, 1876.

MR. THOMAS HYDE HILLS, PRESIDENT, IN THE CHAIR.

The Thirty-fifth Annual General Meeting of the Members of the Pharmaceutical Society of Great Britain was held at 17, Bloomsbury Square, on Thursday morning last, May 18th, at twelve o'clock.

The Secretary having read the notice convening the Meeting,—

The President spoke as follows :—

Gentlemen, before commencing the business of the day, with your permission, I will make a few remarks. The first subject that suggests itself is the Evening Meetings of the Pharmaceutical Society, here as well at Edinburgh. These meetings throughout the country, I am glad to say, have increased in number and have been better attended, and the papers and lectures have been more interesting and important. Meetings, both social and scientific, are always productive of good, for besides eliciting much useful information, the members themselves become better acquainted with each other, and difficulties, often imaginary, are removed by friendly intercourse. The subject of the earlier closing of shops, and the good produced thereby, cannot be over-estimated; the shorter hours of business allowing to both master and assistant more time for recreation and study, thus inducing a healthier feeling both in mind and body. Having been connected with the Board of Examiners in my official capacity, and having had some little experience with assistants, I venture to throw out a suggestion to those gentlemen who take apprentices; that the pupils should be sixteen if not seventeen years of age; that they should have previously passed their Preliminary examination, and should serve an apprenticeship of not less than four years. I would also recommend to the students a course of study of six or twelve months, at the School of Pharmacy, Bloomsbury Square, or some other good school, previous to presenting themselves for examination. Before concluding I must speak of the proposed memorial to the late Daniel Hanbury, which I trust will meet with the support of every one connected with pharmacy and science in general. Mr. Hanbury was an honour to his calling, and his researches, recorded in the 'Pharmacographia' and elsewhere, are highly appreciated throughout Europe. As you are aware, a Committee has been formed with the object to do honour to his memory, and I shall be glad to add the names of any gentlemen who have not already joined in promoting the object. I have also great pleasure in informing you that Mr. Hanbury's 'Science Papers,' together with a record of his life, will be ready for publication by the end of this month.

It was agreed that the Report of the Council, copies of which had been previously printed and circulated among the members, should be taken as read.

REPORT OF THE COUNCIL.

In the Financial Statement of 1874 the Council had the satisfaction of reporting an increase in the total amount of subscriptions to the funds of the Society. In 1875, of which the report is now presented, an increase almost similar in amount will be noted. Whilst, however, this leading fact stood in 1874, as it does in 1875, as a matter for congratulation, certain misgivings were forced on the mind by a consideration of the sources whence the subscriptions had arisen. The fact of a diminution in the number of members of the Society holding the rank of "Pharmaceutical Chemist" was, and is still, to be deplored. It was, however, less in the latter than the former year, and the Council venture to hope that a different condition of things may soon prevail. Naturally the decrease in the higher grade is made more conspicuous by the increase in the lower—*i.e.*, "Associates in Business," who, although contributing equally with "Pharmaceutical Chemists" to the funds, are ineligible to do the work of the Society at the Council table or on the Board of Examiners.

Various reasons to encourage this hope may be adduced. First the natural and proper ambition of men to attain the highest rank among their fellows; secondly, the better early education necessitated by the Preliminary Examination of those who enter the business; thirdly, the growing tendency among young men to avail themselves of means of study offered beyond the ordinary routine of apprenticeship; and lastly, as some may think with more justification as it is borne out by statistics, a reference to the examinations of 1875. In 1874, 378 persons passed the Minor Examination and 53 the Major; a proportion as nearly as may be of 1 to 7; whereas in 1875, 141 passed the Minor and 54, or more than one-third of that number, the Major.

If we look beyond the number of successful candidates, we find that in 1874 only 71 presented themselves for the Major; in 1875 the number reached 82; while for the Minor, the candidates were in the two years, respectively 1160 and 285.

To those who consider the circumstances this is not at all surprising. Hitherto there has been an influ[illegible] of young men who entered the trade when no qualification was enforced, and it was with them a matter of absolute necessity to obtain a legal status. This cannot much longer continue.

The Council feel bound to direct attention to this diminished number of candidates, having deemed it necessary in consequence thereof to lessen the frequency of the meetings of the Board of Examiners, as well to economize the funds of the Society as to avoid needless trespass on the time of the Examiners. It may be quite right that the examination fees should not be a source of large revenue to the Society, but at least they must be sufficient to cover the expenses of carrying out the examinations.

Hitherto an unsuccessful candidate has had the fee deposited by him on entering, returned minus one guinea, but as the same trouble and expense are involved in the rejected as in the successful candidate, this sum by no means reimburses the Society.

Furthermore, this system has encouraged young men to present themselves entirely unprepared, indeed some have even avowed that they came rather to make as it were a "trial trip," than with the expectation of passing. To remedy these evils a new arrangement has been resolved on by the Council, to come into operation on the 1st of January, 1877. After that date no portion of the deposited fee will be returned, but instead thereof an unsuccessful candidate will be allowed to present himself again, within twelve months of his failure, on payment of a reduced fee of two guineas. The Council consider this both just and politic.

The number of candidates for the Preliminary Examination has fallen considerably short of that of former years, yet the Council think it is not fair to assume that the number of youths entering the trade must necessarily be reduced in the same ratio. In this, as in the higher examinations, many who had been through their apprenticeship helped to swell the number of candidates because they could take no further step to secure their rights under the Pharmacy Act until this first bar had been passed. It is hoped that the new arrangement, whereby the examination has been transferred to the College of Preceptors, will tend very much to induce youths to submit themselves to the ordeal at the termination of their schooldays. The notion of examinations by this and other similar Boards is becoming more and more familiar, and now many, whether intending or not to apply themselves to some calling in life where a certificate of examination is required, make it a point of honourable ambition to obtain one. The papers set by the College are answered as before at various centres, under superintendents appointed by this Council, but as at some of these centres very few candidates have appeared the policy of further reducing the number of centres may hereafter become a question for consideration.

Prizes.

At the distribution of prizes in October last, neither the Pereira Medal nor the Prize of Books was awarded; nor had the "Hills" Prize been given during the examination session of 1874-5.

Up to that time the pass lists had been divided into two parts; candidates whose marks exceeded a certain number being placed at the top of the lists, "in honours" as it was termed. At the end of the session, in July of each year, those classed in honours after the "Major Examination" (being also connected with the Society) were privileged to compete for the "Pereira Medal," and in like manner those passing the "Minor" for the "Prize of Books." Similarly, the best candidate of the "Minor Examination" in each month had, if the examiners thought fit to award it, the "Hills Prize of Books."

In practice the Board of Examiners became dissatisfied with this system. They felt that it was their duty, under the powers imposed on them by the Pharmacy Act, to certify only as to a man's qualification to be placed on the Register in the particular grade for which he had been examined; that, in fact, they were exceeding their duty by classifying the candidates, and thereby giving "A" an advantage over "B" in the eyes of the public, when both had fairly earned the rank to which they aspired and were by law entitled.

The two Boards, therefore, in London and Edinburgh, after conferring on the subject, suggested to the Council that in future the pass-lists should simply be handed to the Registrar in alphabetical order.

That the distribution of prizes should be taken more completely into the hands of the Council.

That prizes should be given only to candidates who had passed the "Major Examination," and that all who had so passed, being connected with the Society, should be eligible to compete for such prizes.

These suggestions were adopted by the Council after full consideration, and the regulations framed to carry them out may be seen in the Calendar for the present year.

As Mr. Hills was the donor of the entire fund provided for the various prizes of books, it was of course deemed right to obtain his sanction for that which seemed to be a deviation from his original intention.

That sanction having been accorded, the following scheme was agreed on:—

That there should be three prizes open to competition, one examination serving for the award of the three.

The first candidate to have the "Pereira Medal," in silver, with books of the value of £5.

The second, the "Pharmaceutical Society's Medal," in silver, with books of the value of £3.

The third, the "Pharmaceutical Society's Medal," in bronze, with books of the value of £2.

The balance, £5, still remaining from the interest on the invested Fund, after providing the books above named, is to be given in books to the holders of the "Jacob Bell Memorial" scholarships.

Library.

The Library has received many additions by presentation, and great care has been exercised in the selection of books purchased by the Council. It was determined to devote the legacy bequeathed by Mr. Daniel Hanbury (for the purpose of extending the Library) to the purchase of standard works and books of exceptional value, which might ever remain a memorial of one so much esteemed by the Pharmaceutical Society. Several such works have already been secured, and others will be added in due course.

That the opening of the Library in the evening continues to be appreciated is evinced by the attendance.

The circulation of books among members residing in the country has likewise increased.

Museum.

Considerable attention has been paid to the Museum and the Curator is preparing a descriptive catalogue which will be of great service to students. The materia medica portion is already in type.

Evening Meetings.

The evening meetings have been well attended, and the papers read have been followed by interesting and well sustained discussions. The Council feel that it is fair to attribute the improved attendance at these meetings to the fact that shortening the hours of business is becoming more general with chemists.

School of Pharmacy.

The Society's School of Pharmacy has been well attended. The lecturers have had large and attentive classes, and the laboratory has been so full that the Council have found it necessary twice during the session to erect extra benches for the accommodation of students who were waiting until there should be vacancies for them.

North British Branch.

Until 1875 the Pharmaceutical Society had no paid secretary at its North British Branch. For thirty years Mr. Mackay had most efficiently performed the secretarial duties of the Society in Scotland, and the Council cannot too strongly express the thanks which are due to him for the vast amount of labour he has expended in the cause. The work of the Society has, however, so much increased in Edinburgh, owing to the additional duties imposed by the examinations since the passing of the Act of 1868, and to the increased accommodation given to members at the Society's rooms, that it would have been unreasonable longer to trespass on the valuable time of Mr. Mackay.

An assistant-secretary has therefore been appointed for the North British Branch, but it is satisfactory to know that Mr. Mackay's vigilant attention is still no less directed to the interests of the Society.

The Society's Library in Edinburgh has received many additions during the past year, and at present contains nearly 700 volumes, a catalogue of which is nearly ready for issue.

The Museum has been systematically re-arranged and many specimens have been renewed, especially in the students' cases of materia medica, which have been made as complete as possible. For the practical portion of the examinations in chemistry, good accommodation has been provided in the Society's premises.

The Scotch Board of Examiners continue to carry on their work in complete harmony with the Board for England and Wales, while every effort is made to assimilate the work done by the two Boards. It is with much regret that the Council have to notice the recent death of Mr Tait of Edinburgh, who had for several years taken an active part in conducting the business of the Society in Scotland. He was Chairman of the Board of Examiners for Scotland at the time of his death, and his sudden and unexpected removal is not only deeply felt but much deplored by all as a loss to the Society.

Benevolent Fund.

The annual contributions to the Benevolent Fund advanced from £915 3*s.* 0*d.* in 1874 to £968 6*s.* 7*d.* in 1875. The number of subscribers to the Fund is, however, less than 1700, whilst the number of registered persons directly interested in the Fund by their eligibility to receive relief therefrom is nearly 14,000. There are, therefore, still about 12,000 chemists and druggists who are non-subscribers. The Council with a view of extending as widely as possible the interest in the Fund and its distribution resolved that every subscriber of half-a-crown a year should have a vote in the election of Annuitants.

The Council trust that by this means a large number of additional subscriptions will be obtained, and appeal with confidence to the members of the Society to assist in furthering this desirable object. The amount payable to the twenty Annuitants now on the list (£600 a year) exceeds the interest on invested capital by £150, and the Council are quite dependent on annual subscriptions for this balance and for the amounts required monthly for the relief of the distressed persons applying for assistance.

Parliamentary.

In the last Report of the Council it was stated that no action had up to the date of issue been taken upon the Report of the Select Committee on the "Apothecaries' Licences Bill," but shortly afterwards a Pharmacy Bill (Ireland) was introduced by the Chief Secretary for Ireland, which contained a provision that persons who passed the examinations to be conducted under the auspices of a Pharmaceutical Society to be called into existence in Ireland, should be admitted to the register in Great Britain, and *vice versâ*—such examinations to be conducted in Ireland without supervision by this Society, and, therefore, without guarantee that the examinations in Great Britain and in Ireland should be of equal stringency. Further, although the Bill contained a provision enabling the Society to establish two examinations (making two grades, as in England) it only compelled the institution of one, the passing of which was to confer the title of "Pharmaceutical Chemist." A deputation waited on the Chief Secretary for Ireland, and represented to him the mischief and confusion that in their judgment were likely to arise from different laws prevailing on this subject in the same kingdom, but without satisfactory result. The Government remained determined to pass the Bill, but the Council eventually secured the withdrawal of the "reciprocity" clause. The Bill, so altered, passed through both Houses of Parliament, its provisions applying exclusively to Ireland.

The Sale of Food and Drugs Bill which was before Parliament at the time of the issue of the last Annual Report has since become law, and your Council have the satisfaction of seeing that most of the suggestions submitted by them to the Government were adopted and the Act rendered thereby much more definite and less objectionable than its predecessor.

A Bill was brought into Parliament last year proposing to make penal the administration of poisonous drugs and compounds, which it was alleged were given to horses by grooms and others to improve their appearance.

A prohibition as to administering such drugs might possibly be necessary, but the Bill went much further, fettering with unreasonable restrictions the sale of many articles in common use, and virtually altering the schedules of Poisons in the Pharmacy Act.

The Council made strong representations to the Government on the subject, and ultimately the Bill was withdrawn.

Another Bill on the same subject has been introduced this Session, but it is free from the objectionable provisions above alluded to.

An important alteration has been made in the amount payable for the patent medicine licence, which is now uniformly five shillings throughout the country. No allusion or reference having been made to the proposed change either in the Budget or in any discussion in Parliament, the Council were surprised to find this provision in the Inland Revenue Act when it appeared.

FINANCIAL STATEMENT FROM JANUARY 1ST TO DECEMBER 31ST, 1875.

Receipts.

	£	s.	d.	£	s.	d.
Balance in Treasurer's hands, January 1st, 1875				455	13	7
Balance in Secretary's hands, January 1st, 1875				70	13	9
Balance in Mr. Mackay's hands, January 1st, 1875				23	9	6
Life Members' Fund :—						
Fees	42	0	0			
Interest	89	5	0			
				131	5	0
Government Securities—Interest				446	5	0
Subscriptions :—						
1822 Members, Pharmaceutical Chemists	1913	2	0			
835 ,, Chemists and Druggists	876	15	0			
577 Associates in Business	605	17	0			
884 Associates not in Business	464	2	0			
852 Apprentices	447	6	0			
50 Entrance Fees	105	0	0			
	4412	2	0			
Fines upon restoration to the Society	39	2	6			
				4451	4	6
Registration Fees :—						
54 Pharmaceutical Chemists, Major Examination	283	10	0			
141 Chemists and Druggists, Minor Examination	444	3	0			
33 Chemists and Druggists, Modified Examination	34	13	0			
450 Apprentices, Preliminary Examination	945	0	0			
604 Examination Fees	634	4	0			
29 Registration Fees as Chemists and Druggists	152	5	0			
16 Fees for Restoration to the Register	16	16	0			
3 Jury Certificates	0	3	0			
				2510	14	0
Legacy—Daniel Hanbury	100	0	0			
Less Legacy Duty	10	0	0			
				90	0	0
Interest on Deposit Account				4	13	4
				£8183	18	8

Expenditure.

	£	s.	d.	£	s.	d.
Advertisements				7	0	0
Apparatus				24	3	0
Annuity—Dr. Redwood				100	0	0
Carriage of Books to or from the Library, and other parcels				14	2	6
Certificates of Death				26	12	5
Conversazione	163	18	6			
Pharmaceutical Meetings	24	10	9			
				188	9	3

Examiners, Boards of—

	England and Wales. £	s.	d.	Scotland. £	s.	d.	£	s.	d.
Fees to Examiners	604	5	6	164	6	6			
Fees to Superintendents—Preliminary Examination	190	1	0	24	3	0			
Hire of rooms for conducting Preliminary Examination	51	3	6	3	17	6			
Travelling Expenses	100	8	0	4	0	0			
Refreshments for Examiners	46	14	8	2	14	4			
Apparatus, Drugs, Chemicals, etc., for Examinations, and sundry charges in connection therewith	32	6	7	34	2	0			
				233	3	4			
				1024	19	3			
							1258	2	7

	£	s.	d.	£	s.	d.
Fixtures and Fittings				94	19	11
Furniture				19	0	6
House Expenses				255	0	7
Journal—Balance of account				840	2	0
Laboratory :—						
Professor of Practical Chemistry—Endowment of Chair	100	0	0			
Prize Medals, etc.	4	14	11			
				104	14	11
Law and Professional Charges				385	12	3
Lectures :—						
Professor of Chemistry and Pharmacy—Endowment of Chair	100	0	0			
Professor of Botany and Materia Medica—Endowment of Chair	100	0	0			
Subscription to Royal Botanic Gardens	21	0	0			
Prize Medals, etc.	8	16	9			
				229	16	9
Local Secretaries' Expenses				2	1	10
Library—Purchase of Books, etc.				80	13	8
Museum :—						
Curator's Salary	150	0	0			
Specimens and Sundries	66	8	6			
				216	8	6
Branch of the Society in Scotland :—						
Furnishing Account	113	9	2			
Current Expenses	153	3	9			
				266	12	11
Postage				223	13	8
Provincial Education—Grant to the Leeds Chemists' Association				25	0	0
Register—Balance of Account				22	15	6
Repairs and Alterations				259	15	2
Rent, Taxes, and Insurance				640	1	2
Returned Subscriptions to Associates				16	16	0
Stationery, Engraving, Printing, and Office Expenses				267	14	0
Salaries :—						
Secretary and Registrar	450	0	0			
Assistant Secretary	250	0	0			
Clerks and Servants	940	11	0			
				1640	11	0
Cost of Materials supplied to the Bell Scholars—session 1875-6				10	0	0
Diploma Cases				13	16	0
Sundries				23	1	5
Travelling Expenses—Country Members of Council				281	5	10
Refreshments for Council				45	0	3
Balance in Treasurer's hands, December 31st, 1875				476	7	2
Balance in Secretary's hands, December 31st, 1875				84	13	10
Balance in Mr. Mackay's hands, December 31st, 1875				39	14	1
				£8183	18	8

BENEVOLENT FUND, 1875.

Dr.

	£	s.	d.	£	s.	d.
Sixteen Annuitants, each receiving £30	480	0	0			
Two quarters' annuity to Midsummer (Annuitant now deceased)	15	0	0			
Two months' annuity to Christmas to Four Annuitants elected in October	20	0	0			
				515	0	0
Widow of a Member at Devizes	15	0	0			
A Registered Chemist and Druggist at King Stanley	5	0	0			
A Registered Chemist and Druggist at Stone	10	0	0			
Widow of a Member, London	15	0	0			
Ditto (second grant)	10	0	0			
Widow of a former Member at Plaistow. Applicant is a Candidate for an Annuity	10	0	0			
Widow of a former Member, London. A grant was made to the Husband in 1874	10	0	0			
A Registered Chemist and Druggist at Wells, Norfolk (second grant)	10	0	0			
Ditto (third grant)	10	0	0			
A Registered Chemist and Druggist at Lower Norwood, now an Annuitant (second grant)	10	0	0			
Widow of a Registered Chemist and Druggist at Birmingham	10	0	0			
Widow of a Registered Chemist and Druggist, London	10	0	0			
Ditto (second grant)	10	0	0			
A former Member at Dulwich (second grant)	10	0	0			
Orphan Daughter of a late Member at Southampton (eighth grant)	10	0	0			
Widow of a Member at Manchester	10	0	0			
Widow of a Member, London	10	0	0			
Widow of a Registered Chemist and Druggist at Hull	15	0	0			
A former Member at Norwich	10	0	0			
Ditto (second grant)	5	0	0			
Widow of a Member at Gosport (third grant)	5	0	0			
Ditto (fourth grant)	20	0	0			
A Registered Chemist and Druggist at Dover, formerly a Member, now an Annuitant (second grant)	10	0	0			
Widow of a Registered Chemist and Druggist at Batley Carr, now an Annuitant (second grant)	10	0	0			
A former Member, London	8	10	0			
A Member at Guernsey. Applicant is a Candidate for an Annuity	15	0	0			
Widow of a Registered Chemist and Druggist at Wigan (second grant)	10	0	0			
A Member at Bristol (fifth grant)	15	0	0			
A Registered Chemist and Druggist at Ashbourne	15	0	0			
The five Orphan Children of a late Member at Portsea	20	0	0			
A Registered Chemist and Druggist at Boston (second grant)	15	0	0			
Widow of a Registered Chemist and Druggist at Wensley	5	0	0			
Widow of a Member, London	10	0	0			
Widow of a Registered Chemist and Druggist at Birmingham (second grant)	5	0	0			
Widow of a former Member at Liverpool	5	0	0			
Widow of a Registered Chemist and Druggist, formerly a Member at Halifax. Two grants were made to the Husband, who died during his Candidature for an Annuity	15	0	0			
A Registered Chemist and Druggist at Liverpool. Applicant is a Candidate for an Annuity (third grant)	10	0	0			
Widow of a Member, London	15	0	0			
Widow of a Registered Chemist and Druggist, London (third grant)	10	0	0			
				423	10	0
Purchase of £600 Consols				565	2	6
Printing and Stationery	22	14	9			
Postage	14	12	9			
				37	7	6
Balance in Treasurer's hands (Dec. 31st, 1875)				183	15	6
Balance in Secretary's hands (Dec. 31st, 1875)				0	7	9
				£1725	3	3

Cr.

	£	s.	d.	£	s.	d.
Balance in Treasurer's hands, Jan. 1st, 1875				97	12	0
Dividends on Invested Capital				431	16	10
Donations	177	7	4			
Subscriptions	968	7	1			
				1145	14	5
Legacy—Barrington Garnham, Brighton				50	0	0
				£1725	3	3

We, the undersigned Auditors, have examined the accounts of the Pharmaceutical Society, as presented in the Financial Statement and Benevolent Fund Account, and find them correct; and that there was standing to the account of the Society at the Bank of England, on the 31st December, 1875:—

		£	s.	d.	£	s.	d.
General Fund	New 3 per Cents.	15,000	0	0			
Life Members' Fund		3,000	0	0			
					18,000	0	0
Benevolent Fund	Consols	15,000	0	0			
Pereira Memorial Fund		100	0	0			
Bell Memorial Fund		2,050	0	0			
					17,150	0	0
Secretary's Casual Relief Fund	do.				105	0	0
Hills Prize Fund—Russian Bonds					300	0	0

FREDERICK BARRON,
WILLIAM HODGKINSON,
WILLIAM SQUIRE,
EDWARD HORNER,
Auditors.

March 16, 1876.

The following Registers were placed before the Meeting by the Registrar in compliance with the provisions of the Pharmacy Acts, 1852 and 1868.

Register of Members, Associates and Apprentices of the Society.
Register of Pharmaceutical Chemists.
Register of Assistants.
Register of Apprentices and Students under the Pharmacy Act, 1852.
Register of Chemists and Druggists under the Pharmacy Act, 1868.

Mr. S. R. Atkins (Salisbury) moved—

> "That the Report of the Council now read be received, and printed in the Society's Journal and Transactions."

He said—Mr. President and Gentlemen, The Secretary has just passed me a paper, asking me to move the adoption of the report. The exact form of the resolution put into my hand is this:—"That the report of the Council now read be received and adopted, and printed in the Journal and Transactions of the Society." I rise with pleasure, sir, to discharge this simple duty this morning, although it is not an enviable task to rise at an early stage of a business meeting, because one has scarcely caught its spirit, or caught the indication of the nature of its proceedings. But the report is so simple and business-like in its character, and it appears to me from the brief study that I have given to it, to be so satisfactory, that I ought not to hesitate for a moment, and I do not hesitate, in very cordially moving its adoption. If it be true that that nation is blessed that has no history, I suppose that, judging by the report, we ought to consider ourselves extremely blessed, for there is not very much history in the report. At least, it is a history of figures—of statistics rather than anything else. But in regard to the report, there are just two points on which I would briefly offer a remark. The first is the paragraph in regard to the Preliminary examination. It is known to the members of the Pharmaceutical Society that I have taken some little interest in this matter, and I am extremely glad to be enabled to report that so far at least as I can judge in the centre over which I have the superintendence, a very marked improvement has taken place in the character of the young men who come up to pass. With regard to the point indicated here, and the reason assigned or the explanation given as to the reduced number of young men who present themselves, I really am not in a position to form an opinion and I have not sufficient data for judging as to the correct cause; but I am disposed to think that the reason given here in the report is the correct one. I suppose that I ought now to be perfectly content with the position that the Preliminary examination has attained. Well, I am content so far as the matter has at present progressed, and it would be extremely unwise, ungracious, and indeed, unphilosophical altogether, to attempt to disturb an arrangement which I have just admitted is, as I believe, working well. I think the present mode of conducting the examination ought to have a lengthened and a fair trial, and I trust it will have one. But inasmuch as it has been said that I have secured all that I once contended for, I wish, not in the spirit of criticism or hostility, at once to put it on record that at present the Preliminary examination is not conducted as I desire, though I may be wrong in my desire. My contention has been this. It is now some years ago since I first offered it. My contention is a twofold one. First, that the examination ought to be a strictly preliminary one, to be passed on entering our business. That, I think, is a most important consideration to the guardian and the trainer. That, however, is a point which we cannot, I suppose, have legislation upon. We are gradually getting that cured, by the practice within our own body. But the other point upon which I have always felt strongly is this, that this examination being a strictly preliminary one, being one equivalent to the tests of the universities and of the College of Preceptors, it ought to be conducted by a body outside our own Society. Now, I may be met by the reply that this is already the case. Well, with all due respect, I submit that it is not. Practically, a student who comes up remains in precisely the same condition as for years he would have been, save that we do not examine in our own houses. We go to some public room or hall, where we are free from all possibility of collusion, and there conduct the examination. But so far as the youth is concerned, he comes to the local chemist; he comes to the pharmacist, the superintendent in the neighbourhood controlling the centre, and he submits to examination. The papers are sent up to London, and, for aught he knows, they may come here or go anywhere else. They actually go to the College of Preceptors to be examined. What I desire to see—not immediately—let me guard against any misunderstanding—what I desire to see ultimately the law is this—that a youth coming to be an apprentice shall present a guarantee of the education through which he has passed, that that shall be registered here at the Pharmaceutical Society as the introductory or initiatory act. And, I submit that, financially, if you regard it in that point of view, it would be no loss—possibly a gain to the Society; because if one guinea be paid to the College of Preceptors for its share of the work, the other guinea would come to the Pharmaceutical Society. I imagine that except the mere office cost of the act of registration here, there would be no cost whatever in conducting examinations in the centres throughout the country. I hope it will be understood by the members of the pharmaceutical body here that I do not raise this point for discussion, but simply once again to put on the record of the proceedings that while I am thankful for the progress that we have made, we have not got quite to the end of the journey. The other matter is the last clause in the report, and that is the reduction of the patent medicine licences. Well, being a provincial, the reduction or assimilation or equalization throughout the country does not please me. If I were a metropolitan instead of a provincial, I dare say I should rejoice in the reduction from two guineas to five shillings. But being a provincial chemist, I do not rejoice in the reduction; it has opened up an increased amount of competition; it has produced a number of raids upon our small territory for which we are by no means grateful. With regard to patent medicines, I am almost reluctant to offer one word when I know that I have before me my old and esteemed friend the late president of the Pharmaceutical Conference, who gave us so fierce a tirade against patent medicines. The man who ventures to cross a lance with him must be a brave if not a wise man. However I am disposed to differ from him, and I am not disposed to go with my friend, Mr. Groves, in his desire to utterly destroy the patent medicine trade. I do not know what would become of us. Our occupation would be gone. We should have to seek an interest in the colonies, or some other part of the world; pharmacy, in Great Britain especially, and its profits would be very largely gone if we did not engage in that trade. We cannot be parties to a section of the patent medicine trade which we know to be utterly wrong, and—I was going to say immoral—with that we have nothing to do. But there are patent medicines and patent medicines, and whilst we desire to eliminate from the trade that which is wrong and unphilosophical, we cannot agree at all to an attempt to destroy what, in the provinces, is regarded as a very important part of our business; we cannot attempt this; it has never been mooted here and, therefore, I do not imagine that it will be raised. And now I have one or two more words to offer. I said at the outset that we should indeed be happy if we had no history. But if it should be imagined by members coming here today who may be blest with eclectic pharmacies—who may have *recherché* schools of training—who know naught but first class business—who have nothing but dispensing with the very highest class of family trade—if they supposed that there are no questions for dissatisfaction within the body politic, they would be altogether wrong. I am not a focus for their collection or their dissemination. If there is one man I abominate more than another, it is the constitutional grumbler. Little good does he do to himself or to anybody else. But at the same time, it is our duty to take note of those expressions of dissatisfaction which may exist in pharmacy, for aught I know, as long as the world lasts. At any rate, there are the feelings of to-day existing. There is one thing I cannot understand with regard to the great body of chemists in this country. A large section of them are indifferent to the Pharmaceutical Society of Great Britain. I cannot fathom that at all. I suppose it is true in morals as in matter that for every result there must be a proportionate and adequate cause. That cause does exist, but I do not know how to explain it at all. I do not speak of those men who are opposed to the Society. Occasionally you meet with a disappointed man who has got a craze, and does not like the Society, and who, in anything but an elegant manner, would send us to the limbo to which we do not desire to go. I do not refer to such a man or such men as that; I speak rather of that greater difficulty which we have to contend with—the *vis inertiæ* of indifference—the men who do not come to our meetings—the men who scarcely read our literature—the men who complain of us, and yet do not examine what we do, or ask what we try to do—who complain of what is being done, but do not put their shoulders to the wheel and try to do it better. It is rather these men that I complain of, and I think it is quite time that they should be distinctly told that if there is a fault in our administration or a difficulty in the complex arrangements which we seek to carry out, they, at least, ought to give us the benefit of their counsel and come to our meetings, and show us their interest in these questions. Well, now, as I understand, one of the complaints of such men—and I would seek to express it fairly—is this: they say, "You put us through a costly training—at least, our sons and students—and what do you give us for it? You do not give us a professional result, for that you cannot guarantee, and that we do not ask for." I wish to express this thought, if I can, and put it into words. It comes to me occasionally in this way: I do what I can in my own sphere as other men do. I ask men to share with me in our work and to come to our meetings—to come to our dinners and to our conversaziones, and to take part in our proceedings, and I am met with this most difficult thing—this inertia of indifference. It assumes this expression sometimes—"You demand from us a costly training. You cannot give us a professional result and a professional status, and we are feeling increasingly the disadvantage of getting a non-remunerative result, because we have increased competition; we have increased raids." Now, there are patent medicine licences, and that other question, that civil service matter, which I hope, will not lead to any discussion here to-day. I trust not. But, at any rate, these are points which are argued to be the inadequate and inefficient returns which are secured for the more difficult training, and the more costly introduction to the ranks of pharmacy. There is one other matter which I wish to refer to, and that is our position towards the medical profession, or in relation to the medical profession. Now, I tread here on extremely delicate ground, and I will be as careful as I can in uttering what I have to say. I believe the correct line to be drawn between ourselves as pharmacists and the medical profession is this, that whilst the medical profession ought not to dispense, we ought not to prescribe. If we are to put it into a single sentence, we might, possibly, express it in that form. But, sir, any legislation attempting to enact a law of that kind would be practically impossible. There must be a line of honourable recognition and of honourable distinction which shall realize that object as a goal which we shall steadily work to, and in the attainment of which there must be mutual forbearance and mutual respect. It is extremely pleasant, when one meets at the hospitable board at which so many of us were present last evening, to observe distinguished professional men, and to listen to the genial and kindly sentiments expressed by men of eminence like Mr. Ernest Hart. But I wish to say here, in the presence of pharmacists this morning—and I would rather have said it if those medical gentlemen had been present—on occasionally reading, as I do, the medical press, I feel grieved at times that we, as pharmacists do not receive that full accord of generous sympathy which, I think, we ought to have. I do not think that there is a recognition always of the earnest attempts which men are making throughout the country to disseminate information on this point, and in the conduct of their own business to avoid trespassing upon ground which is not legitimately their own. I trust, sir, that when I remember the great advance that has taken place in the accuracy of our preparations, the greater care which is taken in the dispensing of medicines, notwithstanding what Sheffield and Manchester may say on that point; when I remember that in a very large number of surgeries throughout this country the dispensers are only errand boys who have been trained, and who gradually acquire knowledge by an *experimentum in corpore vili* mode of which I should myself object to be the subject or the object; when I remember that we are taking great care to improve the condition of our business, and we do not always see the same accuracy or the same care in the professional domain, I think that at least the lesson we ought to learn is one of mutual respect, mutual confidence, and of the need for very great delicacy in criticizing our mutual relations. I now, sir, have said as much as I ought to say, and a great deal more, and I close by cordially moving the adoption of this report.

Mr. HUMPAGE: Gentlemen, I have been asked to second the adoption of this report, and I do so with a great deal of pleasure; but if our friend who has just proposed the adoption had any trepidation when he commenced to speak, the task which I have to perform is enough to make me all in a quake. What can I say after the very eloquent, lucid, nice, gentlemanly, kindly-spoken manner in which his sentiments have been expressed? I shall merely take up your time for a few minutes in making a remark or two in reference to the parliamentary section of the report. It will be in the memory of most of us that at the time at which, as the report now states, there was in contemplation a Bill called "The Apothecaries' Licensing Bill," we knew very little as to what it would be. And I think that I shall be expressing the feelings of the meeting when I say that when it did make its appearance, we were greatly vexed. It proposed to give a title to a body of individuals without, shall I say, any work on their part, placing at a disadvantage those gentlemen who, at a great expense and by great application, had attained their position; for, at any rate, the last generation did not consist of students. It was the pestle and mortar, and all the ordinary wear and tear of trade. But those who were fortunately born later, and felt that they must undergo an examination, have had, many of them, very great difficulty and considerable expense to enable them to obtain that title. When, therefore, it was contemplated to bring together as friends and fellow workers, under the same name, two classes of individuals who had obtained that title with far different qualifications, I certainly do consider that the pharmacists of this country had good grounds for complaint. And I moreover think that the case was so clear that it really required only a little effort on the part of the pharmacists of this country to prevent it. I am fully aware—and there is no man who has attended these meetings more than myself—I am fully aware, that the gentlemen who do us the honour to be elected as our

Council have a very large amount of work; and when we bear in mind that they, some of the best men in the trade, give us their services, we ought all, individually, to feel grateful to them. At the same time occasions do occur—and I cannot help thinking that that was one of those occasions—when if we had had a body of gentlemen whose business it was to protect that which we have a right to call our own, it would be well for us. I am happy, therefore, to see that the pulse, at all events, of the trade is to be felt as to what its view is as to having—I will not call it a protection society, but I will call it the election of gentlemen who will make it their business to see that that which is our own shall not be unfairly taken from us. Individually, at my age, of course, it is not of much importance. But when I bear in mind that this Society is educating a body of gentlemen who must live; when I see that on the right hand and on the left their business is being clipped in this way and clipped in that—the medical gentlemen allowed to go on or choosing to go on dispensing their medicines—I ask, with some anxiety, What is there for the dispensing chemist to do? I am fully aware that in London the reply is easily made. Look at the body of physicians—general practitioners of good standing, who are continually writing their prescriptions. I admit it. Go into a country place. There is a medical practitioner who, fifty or sixty years ago, was the apothecary, and by the consent of the profession he was allowed to take a higher station. Now, you go into the country towns, and there are the M.D.s; but whilst they take that title of M.D., they take many other titles. They take, in fact, all they can take. They dispense their own medicines. They take their fee where they can get it, and where they cannot get it, they are willing to go upon far different terms. But as for the chemist, if a physician comes into the neighbourhood to consult, does the chemist dispense that prescription? No, he does not. Is that not somewhat unfair? The medical practitioner was allowed to take a higher position—a position whereby he can charge for his attendance, and he does that; but he also does the other. The statement is sometimes made that the chemist has no right to prescribe, and the question is sometimes asked whether he has such a right. I, in reply to that, say, What do you call prescribing? If an individual—one of our visitors last night at our dinner, for instance—felt this morning a little squeamish, I suppose he would go to the first chemist he could meet at the west end, and say, "I feel I want a little sort of pick-me-up." Would the chemist say, "You must go and consult Dr. So-and-so." No, I do not think he would say so. I think he would mix him a little draught. Or the customer would say, "I am subject to this sort of indigestion. My teeth are not very good, and I really feel generally somewhat uncomfortable, but to-day unusually so." Well, I think the chemist's assistant would be doing no more than his duty to his employer if he said, "Well, there is this pepsine wine. If you like, I will give you a little draught now; and I would recommend a little of this pepsine wine." Or it may be that in another district he would say, "I will give you a little draught now, and here is a bottle of this fluid magnesia." Is that prescribing, Mr. President, or is it not? I hold that it is prescribing; and I hold, further, that we have a right thus to prescribe—a right fully and completely. I denounce as much as any man any person who attemps to sail under the medical flag, and pretends to be what he is not, calling his place the "Medical Hall," or saying that he was assistant for so many years to Dr. Jones Curem, round the corner. I do not hold with that, and I think, as pharmaceutical chemists, that is not our work. But I think we have a right to treat such cases as I have described, if I may use the word "cases" in connection with them, and that we have a right to go as far as I have stated. But I need not tell you that that is denied. Then what are we to do? I think we are to hold our own if an attempt is made against us. Bear in mind what prescribing is as conducted in Whitechapel, where you cannot get 2*s.* 9*d.* for this bottle of put-up-mixture, or 4*s.* 6*d.* for a bottle of sarsaparilla to purify the blood. You can get that at west-end establishments, and legitimately, too, but you are unable to get it in certain neighbourhoods. And then, is it fair that a chemist, with a wife and six or seven children upstairs, is to say, "You must go to a doctor, I cannot do anything of that kind?" No; I say that, as a body we ought to set our faces as steel against that which is unjust interference with the medical profession; but we are seeking to hold our rights and to defend them. I go further. I should not be sorry to see, at our next annual meeting—should there be occasion to stand up to defend such interests as I have been speaking of—a portion of money voted for that purpose. Understand that I mean no antagonism. Any friends who choose to co-operate with the Pharmaceutical Society, let them do so. They ought, I think, to have our sanction; but anything like an adverse influence, anything like a going counter to, or reflecting for one moment upon, the proceedings of the Council, ought to be completely deprecated. But the Society to which I refer, or committee, or what you may choose to call it, is simply to be called upon to do work which the Council of the Pharmaceutical Society has no time to do. The Council has certain duties, educational and so forth, but it has not time to look for evidence. I say we have fought and won our rights, and I think it is our duty, if not for ourselves, for those who come after us, to see that they are not interfered with. I have much pleasure in seconding the adoption of the report.

Mr. Mee, Highbury: There is one question in the report which I cannot understand, and I should be very glad to have it cleared up. My attention was first called to it by the resolution of the Council to remit examination fees without altering the bye-law. It is absolutely necessary that the subscriptions of our members should not be used to assist and endow those persons who do not intend to join us. Still, we should be very careful to take fees in a lawful manner, and therefore I desire to put this question to the Council:—I see in the financial statement that the sum of £634 has been received as examination fees. I wish to ask from whom those fees were taken, whether from persons desiring admittance into the Pharmaceutical Society in accordance with Charter, 1843, and Act of Parliament, 1852, or from persons desiring to enter the business of a chemist and druggist, who are obliged to comply with the compulsory clauses of the Pharmacy Act, 1868, viz., to be placed on the Register under that Act. If the latter, under what clause of that Act or what bye-law is the registrar empowered to demand the registration fee before examination and in the event of the failure of the candidate to pass examination to retain one guinea, and if he has this power, why he requires a receipt for the whole of the registration fee on returning the balance?

The President: Mr. Mee had sent this question to Mr. Bremridge, and we thought it better to have our solicitor here. That gentlemen is here, and he will give you an answer in the legal form.

The Solicitor (Mr. Flux): The written question sent in by Mr. Mee appears to have been based upon an error. He has in that question assumed that clause 7 of the Pharmacy Act, 1868, does not contain the word "examination." It does, in fact, contain these words "Upon every such examination and registration as aforesaid such fees shall be payable as shall from time to time be fixed and determined by any bye-law, to be made in accordance with the Pharmacy Act." Well, then, looking to the bye-laws I find that they are sufficient to sustain the Council—that is, they are sufficient according to my opinion to sustain the Council in requiring the payment of the fees which they insist upon. Then, again, with regard to the receipt required on the return of the fees, I find that Mr. Mee is also in error, because the receipt required is not a receipt for more than is actually returned; and with regard to the returning, it does seem to me that, so far from the candidate having any grievance because he gets two guineas returned, having paid three, he is a recipient of an act of grace for which he ought to be thankful, inasmuch as having paid three guineas for the privilege of being examined he has two guineas returned in recognition of his misfortune in not having passed the examination.

Mr. MEE: I cannot understand your answer. The only clause I can find in the Pharmacy Act of 1868 is that on "every such examination and registration as aforesaid, fees shall be payable from time to time." If you were interpreting the old law of high treason, that a man should be hanged, drawn and quartered, you surely would not desire that you should quarter him first, and then draw him, and then hang him. There are no fees payable under this Act but registration fees. "Upon such examination and registration as aforesaid, such fees shall be payable as shall from time to time be fixed and determined by any bye-law to be made in accordance with the Pharmacy Act." That is all that it says about it. It is my firm impression, notwithstanding your answer, that we are not entitled to demand any fee whatever.

The SOLICITOR: It is hardly convenient that this meeting should proceed to discuss the legal question whether these words do import it. The words in the Act of Parliament are "upon every such examination and registration as aforesaid," such fees shall be required. But then they are not all the words which are to be found bearing upon the question of examinations. There was a prior Act of Parliament, and there was prior to that, a charter, and there was a long course of dealing by this Society which placed a construction upon its prior instruments. And, again, it is decidedly a practice in examining bodies, and it is a convenient and well recognized practice, that the fees should be payable upon examination, and I am prepared to defend the right of this body to require fees upon these examinations.

Mr. KENT: Mr. Chairman and Gentlemen, I take the opportunity of making a remark or two, and I wish to draw the attention of the meeting to the question of the Benevolent Fund. I think all, with that exception, is very satisfactory. I find that out of a body of 14,000 there are less than 1700 who subscribe to that honourable object. I regret exceedingly to have occasion to draw the attention of this meeting to a matter of such importance. The moment that the Pharmaceutical Society established a Benevolent Fund in connection with its operations, I considered that it stood on very honourable ground, and it appears to me a very sad reflection upon the body of chemists that they are so unsympathizing with their unfortunate brethren. It is to be borne in mind as a well established fact that chemists as a body spring from good families. When they become reduced to poverty the poverty is to them a distress, which, perhaps, is unknown to persons who are born poor, and who never a family depending upon him, and with heavy expenses, to be gradually reduced year by year, and at last to come to want is a different matter, and he might well think it knew anything else but poverty. For a chemist with exceedingly hard if the body of chemists cannot sympathize with him in so distressing a case. I have read a good deal in the Journal respecting persons who have written in a manner which made it appear as though they boasted that they did not subscribe to such a worthy fund. Now if the 14,000 members of the Society subscribed ten shillings per annum each—it would cost them only a trifle over twopence a week,—and would place £7000 in the hands of the Council, which then could deal with poverty in a tangible manner if it should attack a poor brother chemist. I do not think that £30 is an adequate sum to dole out to a poor brother chemist who may require it. But we might give fifty or sixty or one hundred pounds per annum in such a case, and that would be such a relief as would make him feel grateful. Almost all other trades have various modes in which they manage in the most comfortable manner to support their poor decayed fellow tradesmen. The other day I was passing along way towards Epping Forest, and I saw some beautiful almshouses established by bakers. Why cannot chemists establish something of the same benevolent kind? If I can by my few words induce persons to subscribe to our fund I shall feel exceedingly pleased. I have nothing further to add, except this, all honour to the few who do subscribe to such a worthy object.

The PRESIDENT: Before putting this resolution I would just make a remark or two, more particularly about what Mr. Atkins has said on the subject of the Preliminary examination. I believe that it was Mr. Atkins who brought forward in this room the proposition that the Preliminary examination should be conducted by the College of Preceptors. That has been now in force for about four months. There have been two examinations, and I am very glad that Mr. Atkins does not want to change immediately, and that he is going to give it a chance for a little time. But there are several examiners in the room, and I have no doubt that they will take notice of what Mr. Atkins has said, and think it over. With respect to what Mr. Humpage has said about the Council not taking action as it ought, I can say that the Council does all that it possibly can do; but the fact is that it does not do to take up every case, for upon inquiring into many it is found that they do not belong to us, that is not the chemist or the druggist, but the apothecary, that is carrying on the business under the name of a chemist and druggist. If Mr. Humpage knew all, he would see that the Council could not act more than it does; or, otherwise it would be everlastingly fighting everybody, and there would be no time to do anything else. If Mr. Humpage has read his *Chemist and Druggist* for the last week, he has found two cases. Have you seen them, Mr. Humpage?

Mr. HUMPAGE: I have.

The PRESIDENT: Well, they were not really chemists and druggists. We have really not neglected our duty. I will say that on behalf of the Council, and I will tell you this, that those who are elected do not intend to neglect their duty. With respect to an association, or anything of that sort, that is a private affair. It is another matter altogether; but the Council will do all it can to protect anybody belonging to the class to which it belongs.

Mr. HUMPAGE: I may say that I should be sorry if any remark which I made was accepted as finding any fault with what has been done. I would throw my hat round three times heartily upon any occasion to thank the members of the Council—and thank them from the bottom of my heart—for all that they have done. But a camel can hold only so much water; and if there is more work than the Council can do, or, I was going to say, rather dirty work, which it does not like to do—and I admire its taste—why, then, as I have before remarked, it must not be supposed that I am dissatisfied with its conduct.

The PRESIDENT: I quite understand; but we have gone into all this. We consider this, but we do not think it necessary, really, to publish it to the world.

The resolution for the adoption of the report was then carried.

The list of nominations for election as members of Council was then read by the Secretary. Scrutineers were appointed to examine the voting papers, and it was agreed that the meeting should be adjourned until five o'clock on the following day, that the result of the election might then be made known.

Mr. ANDREWS (London): There is one thing remaining —a vote of thanks to the President and the Council.

Mr. RANDALL (Southampton): I have very great pleasure in seconding that vote of thanks. We owe very much, I think, to the President and the Council. They take a very great deal of pains and spend a great deal of time in our service.

The motion was carried unanimously.

The Vice-President (Mr. Bottle): Gentlemen, our President has asked me to thank you for the compliment you have paid to him, to myself, and to the other members of the Council. We have taken at all times, and will continue to take an interest in carrying on the business of the Society, so long as we have your confidence; and longer than that I think I may say for him and for the rest of us we shall take no interest. We could not work without the confidence of the Society at large. Gentlemen, we thank you for this kindly expression of your feeling, and we hope that the Pharmaceutical Society may continue to grow and prosper when my friend and myself and those who have been working for the Society for thirty years are all passed away.

The meeting was then adjourned until 5 o'clock on the following day.

ADJOURNED MEETING.

Friday, May, 19, 1876.

MR. THOMAS HYDE HILLS IN THE CHAIR.

The Scrutineers brought up their report as follows:—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the Thirty-fifth Annual General Meeting of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us and report the following:—

Voting Papers received		1073
Disallowed from informality		3
Votes Registered		1070
Received by post too late	46	59
Sent under cover to the Secretary	4	
Unsigned by Voters on envelopes	9	

Hills	1022	Frazer	902
Schacht	1009	Williams	895
Bottle	1003	Cracknell	875
Sandford	994	Atkins	718
Greenish	992	Owen	712
Mackay	988	———	
Savage	964	Baildon	669
Atherton	954	Roach	539
Shaw	920		

E. N. Butt, *Chairman.*
William R. Bluett.
Richard Noakes.
Maurice Howell.
Thomas Jull.
William Fletcher Gadd.
Charles Croyden.
William Martindale.
Frederick Andrews.
Walter Hills.
A. C. Wootton.
Walter Breton.

May 19*th*, 1876.

Council.

The Chairman then declared that the following were elected members of the Council for the ensuing twelve months:—

Atherton, John Henry, Long Row, Nottingham.
Atkins, Samuel Ralph, Market Place, Salisbury.
Bottle, Alexander, 37, Townwall Street, Dover.
Cracknell, Charles, 217, Edgware Road, London, W.
Frazer, Daniel, 113, Buchanan Street, Glasgow.
Greenish, Thomas, 20, New Street, Dorset Square, London, N.W.
Hills, Thomas Hyde, 338, Oxford Street, London, W.
Mackay, John, 119, George Street, Edinburgh.
Owen, John, 51, Holloway Road, London, N.
Sandford George Webb, 47, Piccadilly, London, W.
Savage, William Dawson, 4, Park Road East, Brighton.
Schacht, George Frederick, 7, Regent Street, Clifton, Bristol
Shaw, John, 24, Great George Place, Liverpool.
Williams, John, 16, Cross Street, Hatton Garden, London, E.C.

Auditors.

There being only the requisite number of candidates (five) for the office of Auditors, the Chairman declared the following duly elected for the ensuing twelve months:—

Barron, Frederick, 2, Bush Lane, London, E.C.
Hodgkinson, William, 127, Aldersgate Street, London, E.C.
Horner, Edward, 20, Bucklersbury, London, E.C.
Squire, William, 5, Coleman Street, London, E.C.
Stacey, Samuel Lloyd, 300, Holborn, London, W.C.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSOCIATION.

The annual general meeting of this Association was held in the West Hall, Anderson's University, 204, George Street, on Wednesday evening, the 10th inst., at nine o'clock precisely. Mr. William Greig, President, in the chair. There was a large attendance.

The minutes of the last meeting having been read and approved of, the Secretary was called upon to read the—

Annual Report.

"The session was entered upon in May last amidst not a little excitement in connection with the memorial which had been sent up to the Council of the Pharmaceutical Society from this city, and which had originated at meetings in connection with this Association; a good deal of misunderstanding prevailed regarding the precise objects of the memorial, which was greatly fostered by several anonymous letters which appeared in the *Pharmaceutical Journal*, and which no doubt prevented it obtaining that calm consideration it might otherwise have received. While directly little apparent good has resulted from the memorial, there is reason to believe that indirectly some good has come of it; at all events our excellent representative at the Council Board, Mr. Frazer, deserves great credit for the courage, energy, and enthusiasm with which he took up the cause of the memorialists, not only at the meetings of the Council, but through the columns of the *Pharmaceutical Journal*, and publishing at his own expense a pamphlet defending the objects of the memorial, as well as the consistency of his own conduct throughout the discussions on the question. The thanks of this Association and the trade generally are greatly due to Mr. Frazer for his valued services as a member of the London Council and otherwise. Your council at the outset had their attention called to the state of the finances of the Association; through the illness of the treasurer and other causes the library fund and those of the society had got disarranged, so that it was discovered that, while a handsome balance appeared in last year's financial statement, the council were actually indebted to the library fund. A five guinea subscription from our worthy President, Mr. Greig, together with other private subscriptions by the members of the council, at once put this state of matters right, and at the opening meeting of the winter session, in October last, other twelve pounds' worth of books were added to the library, and also a handsome book case, which has happily not been of much use to us as yet, our books being so largely taken advantage of by the members that we have had nothing but an array of empty shelves to show in it yet.

"The opening address by the President referred to the progress we had made as a business during the past fifty years, a progress which he proved to be as marked as it was satisfactory. The same evening, Mr. W Emmerson McIver, F.C.S., now of Melbourne, Australia, read a very thoughtful paper on 'The Growth of Plants,' which he treated from a chemical point of view. The best wishes of the Society have no doubt followed Mr. McIver in his new venture as a professor of chemistry at the antipodes.

"The second lecture of the session was delivered by Mr. William Gilmour, of Edinburgh, President of the North British Branch of the Pharmaceutical Society, his subject being 'Some Features in the Development of a Modern Science.' The more recent researches on light and optics were very graphically described by Mr. Gilmour, and his lecture was rendered all the more interesting by the great number of very beautiful experiments with which it was illustrated. Mr. Gilmour deserves our most hearty thanks for his great trouble in coming such a distance, both to instruct and entertain us.

"The third scientific meeting was taken up by Dr. Machattie, his subject being 'Antiseptics and Disinfectants.' Most of the older members of the Society were more than pleased to see Dr. Machattie once more in our midst, and glad also to see that his twelve years' sojourn in a foreign land had not made him lose any of his former fluency as a lecturer or ability as an experimentalist. The subject was treated in an exhaustive manner, and well merited the hearty applause it received from those present. Probably the most interesting of the session's meetings was that at which two of your own members came forward. Mr. R. S. Nilson created quite a sensation with his splendid collection of chemical and electrical apparatus, which he exhibited by the kind permission of his employers, Messrs. G. Mason and Co.; while Mr. J. C. Hunter's paper on 'The Deposit obtained from the Tincture of the Perchloride of Iron' was quite in keeping with some of his former original investigations. We hope other members will follow the example of these gentlemen.

"The lecture on 'Glauber: His Life and Labours,' by Professor Ferguson, of the University, was most interesting and instructive. It was expected that this lecture would have appeared in the *Pharmaceutical Journal* before this, but unfortunately the Professor has been so busy with his other engagements that he has not been able to get it put into a fit state for publishing. We sincerely trust we shall soon again be favoured with another such able lecture from Mr. Ferguson. Dr. J. S. Nairne, who on a former occasion favoured the Society with an admirable lecture, again came forward with a paper, showing extensive research, on 'Ancient Physicians and Ancient Pharmacy.' It is hoped that Dr. Nairne will be able next session to return to the subject, and give us what he was, for want of time, unable to overtake on this occasion—viz., an outline of his investigations on 'Ancient Pharmacy.'

"The last, though most certainty not the least, of the last session's scientific meetings was that at which Mr. W. L. Howie, F.C.S., of Edinburgh, came forward with his very exhaustive and elaborate paper on 'Phosphate Syrups.' The fact that this paper has been published in full both in the *Pharmaceutical Journal* and *Chemist and Druggist*, and that quotations have already been made by other journals, and by large makers of these syrups, shows somewhat of the interest that has been attached to the subject, and it seems significant that as yet none of Mr. Howie's facts have been gainsaid.

"The Assistants' Section have had a series of interesting papers read at their meetings during the session, meeting alternately with the Association, but the secretary will present a report of their operations which will no doubt meet with your approval.

"The Annual Festival was to some extent a failure this year, though from no fault of your committee or the chairman; the general feeling is now in favour of some more intelligent entertainment than *soirées*, which have now become to a large extent stale and unprofitable.

"*Our Classes.*

"At the opening of the session your council had the pleasant duty to perform of presenting nine of the students who were connected with the classes last year with the prizes that were offered, a notice of which appeared at the time in the *Pharmaceutical Journal*; and encouraged with the success of the class scheme generally, although some of these classes were a financial loss to the Association, the council determined to continue them as far as possible; consequently arrangements were entered into with Dr. Machattie to conduct a practical chemistry class, but owing to the small number of students coming forward it was with much regret abandoned. It is very difficult to see why in a city like Glasgow a class of twenty or thirty cannot be got up, more especially as the advantages offered this year were superior in many respects than those of former years. Dr. Machattie was most anxious to have renewed his connection with the Association in this capacity, and would have given up other engagements in our interest, but the limited number that came forward to enrol themselves did not justify the council in asking Dr. Machattie to make the sacrifice.

"The Tutorial class, while not a failure in the same respect as the Chemistry class, has not quite fulfilled the expectations of your council this session. Twenty-three members were enrolled for it, and the teacher, Mr. Fyfe, as well as those members of council who from time to time have visited the class, report very favourably regarding the progress made by the students. An examination in each of the three departments was held last month and so soon as the results are known the prizes offered by the council, through the liberality of Mr. Frazer, will be distributed to the successful competitors. The small number that came forward to this class compared with last year, however, and the charges for teacher and class-room being the same, this class has turned out a loss of several pounds to your Association.

"The Botany class under Professor Kiddir, of the Free Church College, has begun under the same favourable auspices that it did last year; twenty-one members being enrolled. At the close of this class next month an examination will also be held, when prizes will be given to the most successful of the students.

"It may be noted that out of the three classes held last year, a fair proportion have already passed their respective examinations, and some are preparing to enter business on their own account, and most of them have acknowledged that but for their attendance on the classes they would not yet have got through their examinations.

"A matter of great importance to us as an Association is the forthcoming visit of the British Pharmaceutical Conference, which will no doubt be a marked era in the history of your society. Much good it is hoped will result from this visit. We will not only come face to face with those members of our profession whose names are so well known to us all, giving a stimulus to each of us to strive and take a more personal and a deeper interest in the scientific department of our business, but we will also be able to show to those leaders in our trade who may honour our city with their presence, some of the difficulties we Scotch pharmacists have to contend against. It it is hoped at all events that some original papers will be read by local men. The Secretaries of the Conference are most anxious for this, and we will do our best to show a good front on the occasion.

"With regard to the entertainment of the visitors during the sittings of the Conference, the ordinary funds of the Association are not sufficient for this, and it will be necessary a special voluntary subscription be made for the purpose, and no doubt when the members of the trade are solicited they will respond in a handsome manner and thus enable your council to show to their English brethren that genial and hearty hospitality for which Scotchmen are generally famed.

"A subject which has less or more been a puzzle to the leading members of our trade ever since the passing of the Pharmacy Act in 1868, namely, the wholesale way in which co-operative stores and unqualified persons manage to evade the provisions of the Act of Parliament, has come very prominently to the front of late, but it would seem as though the various successful prosecutions that have taken place only pointed out the ease with which the proverbial coach and four may be driven through our law. It seems desirable that some stronger measures than prosecution should be adopted. A proposal is at present before the trade for the formation of a 'Defence Association.' It will be remembered how energetically the defence associations wrought during the agitation on the Poisons Bill, and there appears a fair field at present for action, if the Act of Parliament is not to become a complete sham; when co-operative stores and other illegitimate traders are stepping in, and are not only selling those patent medicines and proprietary articles, most of which ought to be under the regulation of the Poisons Act, just as vermin killers are, at nearly cost price, but in many instances are dispensing prescriptions on the same ruinous principle, it is high time we were up and doing. But these are comparatively small matters when we consider our own position in Glasgow, with surgeons on right of us, doctors on left of us, 'medical botanists' here, and 'doctors of philosophy' there, all swallowing up our trade, and cutting down the profits of what is left, the question comes home to us more pertinently than to any others,—What is to be done? Let us see to it that we are not behind in the march of progress, for it is on ourselves we must mainly depend.

"The question of earlier closing has not been talked of much this session, but the young men for their own sake should not lose sight of the question, until reasonable hours are procured for their necessary study and relaxation. Overlooking for the moment, however, those clouds which ever and anon shall darken our horizon, and taking our society as a whole, this session has been the most prosperous and successful of any year in its existance, the membership (163) is larger than in any former year, and as will be shown by the treasurer's financial statement, more money has passed through his hands. The average attendance of members has been good, and while no 'burning' question has been agitated, the interest has been deep, and let us hope abiding, for surely this measure of prosperity is not to be wasted on the desert air; there is noble work before us, we have a select and useful library,—May it not be made more extensive and more useful? May we not add a small museum, and then get a larger? Is the project of a school of pharmacy with a suite of rooms of our own to be lost sight of amidst the shouts of a toy dealer selling our patents at wholesale prices? or are we to permit a number of unprincipled physicians and unqualified persons to crush us out of existence? Surely not!

"'Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labour, and to wait!'"

Mr. William McKenzie, the treasurer, then read the financial statement, which was considered very satisfactory. The secretary of the Assistant's Section, Mr. R. A. Taylor, also read his report.

Mr. Kinninmont in moving the adoption of the reports made reference to the new phase of the patent medicine question, viz., a general warehouseman in the city who is advertising 1*s.* 1½*d.* goods at 10½*d.*, etc., also to the recent prosecution in Glasgow. He gave fair warning to any who thought they were clear of the law, that they might prepare themselves; and he should certainly insist that the full penalty of fifty pounds should be claimed, so that in future it would not be such a small matter to be taken up on a charge of an infringement of the Act.

As Local Secretary to the Pharmaceutical Conference Mr. Kinninmont also urged the members of the Association to become members of the Conference. After a few remarks by Messrs. Davison, Brodie, Fenwick, Foster, and others, the reports were unanimously adopted.

The President then delivered his valedictory address, alluding chiefly to the affairs of the Association, and touching upon the various points in the secretary's and treasurer's reports.

Several motions were then considered of which due notice had been given, first remitting it to the council to make the necessary arrangements for the reception and entertainment of the members of the Pharmaceutical Conference during the approaching visit in September next, which was unanimously agreed to; it being intimated that accommodation had been procured in the Royal Hotel, George Square, one of the most commodious and central, where the meetings would be held, and friends from a distance accommodated all under one roof.

The second resolution which was intended to empower the council to limit the membership of the Association was lost, the previous question being carried, and the third resolution to petition the Council of the Pharmaceutical Society with regard to the examinations, did not meet with a seconder, and accordingly fell to the ground.

The election of officers and council resulted as follows:—

President, Mr. Daniel Frazer; Vice-President, Mr. Kinninmont; Treasurer, Mr. W. McKenzie; Secretary, Mr. J. M. Fairlie; Council, Messrs. John Currie, Senr., James MacDonald, William Greig, John Macmillan, Thomas Davison, John Jaap, William Whyte, R. Brodie, R. C. Rait, J. M. G. Murdoch, J. A. Clarke, and A. Paul; Auditors, Messrs. A. Paterson and John Foster. A hearty vote of thanks to the retiring President, Mr. Greig brought the meeting to a close.

Review.

ANALYSE CHIMIQUE DE QUELQUES DROGUES ACTIVES ET DE LEURS PRÉPARATIONS PHARMACEUTIQUES. Par LE DR. G. DRAGENDORFF. Traduit par LE DR. JUL. MOREL. Gand, F. CLEMM: Paris, F. SAVY; Leipzic, F. CLEMM. 1876.

CHEMICAL ANALYSIS OF CERTAIN ACTIVE DRUGS AND THEIR PHARMACEUTICAL PREPARATIONS. By DR. G. DRAGENDORFF. Translated by DR. JUL. MOREL. Ghent, F. CLEMM: Paris, F. SAVY; Leipzic, F. CLEMM. 1876.

This work, which is a translation into French of the author's, 'Die chemische Werthbestimmung einiger starkwirkender Droguen,' is a most valuable contribution to pharmaceutical and chemical literature, inasmuch as it not only includes directions for the qualitative and quantitative analysis of a large number of the most energetic and useful drugs (*e.g.* preparations of aconitine, belladonna, ipecacuanha, aloes, etc.), but discusses the comparative values of various processes, obtained in most instances by *direct experiment* upon substances of known compositions; some of these processes being due to the author himself, and others to other chemists. Thus, in the case of the preparations of the alkaloids of *aconite*, *belladonna*, and *hyoscyamus*, the method recommended is the volumetric process of Mayer, viz., precipitation of the alkaloid by a standard solution of mercuric iodide in potassium iodide; the reagent is added until no further precipitation of iodo-mercuride of the base take place, and the volume of the solution used represents with considerable accuracy the relative amount of alkaloid present, when certain minutely detailed precautions are taken. By this means it has been shown by Zinoffsky, that the amount of alkaloid contained in different parts of *Aconitum stoerkeanum*, *Acon. napellus*, and *Acon. variegatum*, varies considerably, the flower invariably containing much more than the stem or leaf. On the other hand, gravimetric methods are applicable in several instances; for the most part these consist of the ordinary alkaloid-extraction processes perfected in various ways. Thus Günther has carefully examined the leaves, stalks, roots, fruit, and seeds of *Atropa belladonna*, both by the gravimetric process and by Mayer's volumetric method, with the result of finding very close accordance between the numbers obtained by the two processes; the leaves and fruit containing nearly the same quantities of alkaloid per 100 parts of dry substances (from 0·8 to 0·9 per cent. in each case), whilst the stalk and roots contain much less (0·15 to 0·2 per cent.), and the seeds an intermediate quantity (0·4 per cent.). With *Hyoscyamus albus* and *H. niger*, on the other hand, the maximum amount of active principle is contained in the leaves and seeds (0·1 to 0·5 per cent.), the stalks and roots containing invariably a much lesser quantity.

The examination of *opium* and the medicaments containing this drug or its educts is discussed at some length; the author's experiments lead him to the following general conclusions. When the analysis of a sample of opium is required speedily, the method of Hager* is preferable; but in order to obtain the most exact results, that of Schacht† is rather to be selected, especially with certain modifications, chiefly consisting in the use of Mayer's mercuric iodide titration process, and the treatment of the ammoniacal filtrate from the morphine precipitate with amylic alcohol, whereby traces of morphine not precipitated are recovered along with small quantities of codeine, papaverine, narceine, etc., from which this small quantity of morphine is separated and recovered by means of ammonia after evaporation of the amylic liquor.

In the case of *conine* preparations, hemlock extracts, etc., the titration process of Mayer does not give good results, owing to the solubility of conine iodo-mercuride in water; whilst *tobaccos* may be readily valued (as to the percentage of nicotine contained) by this method. *Colchicum* may be examined by this titration process, when certain precautions are attended to, but the results even then do not seem very trustworthy; the determination of the active principle gravimetrically by extraction with chloroform is preferable. On the other hand, *St. Ignatius' bean, false Angostura bark, nux vomica*, and preparations of *strychnine* generally may be readily valued by this process, as also may *ipecacuanha*.

In the examination of *aloes* the author gives the following rules:—" Any aloes sold as Cape or Socotrine aloes, which yields to ether more than 6—6·5 per cent. of soluble matter, is to be suspected." As also should " any aloes, which, after treatment with alcohol at 95 per cent. or at 50 per cent. Tr., yields more than 20 per cent. of insoluble matter,"or " which is more soluble in weak than in concentrated alcohol; or of which the aqueous extract precipitates when treated with about four times its bulk of alcohol;" or which leaves more than 4·5 per cent. of residue after treatment with boiling water, or which after treatment with a mixture of 3 vols. 95 per cent. alcohol and 1 vol. ether leaves a residue amounting to more than 5 per cent." Further, "Any *aloes lucida* containing more than 3·0–3·6, and any *aloes socotrina* leaving more than 4·25 per cent. of ash, is to be suspected."

Mayer's reagent may be used for the valuation of *Sanguinaria Canadensis*, but whether the precipitate consists of the iodo-mercuride of chelidonine or of chelerythrine or of both, or of something else is unknown. For the examination of *cantharides* and its preparations, the author recommends a process consisting essentially of removal of fatty matter by rectified petroleum spirit, moistening the residue with soda, or with magnesia and water, treatment with hydrochloric acid and chloroform, and finally with ether, and weighing the cantharidin left after evaporation, and washing with alcohol of the residue, a correction being made for the solubility of cantharidin in alcohol. *Guarana, tea, coffee, maté, Paraguay tea, Cape tea, coffee extract*, and other substances containing caffeine may be examined for that alkaloid, by simply evaporating the aqueous extract to dryness along with some magnesia and pounded glass, and repeatedly treating the residue with ether, whereby almost pure caffeine is dissolved out.

In conclusion we most cordially recommend this work to the attention of pharmacists and public analysts, and all others engaged in the examination and valuation, by chemical means, of drugs.

BOOKS PAMPHLETS, ETC., RECEIVED.

British Manufacturing Industries. Edited by G. Phillips Bevan, F.G.S.—Acids, Alkalies, Soda, Ammonia and Soap. By Professor Church, M.A., F.C.S.—Oils and Candles. By W. Matthew Williams, F.C.S., F.R.A.S.—Gas and Lighting. By R. H. Patterson, F.S.S. London: Edward Stanford. 1876. (From the Publisher).

The Induction of Sleep and Insensibility to Pain by the Safe Self-Administration of Anæsthetics. By John M. Crombie, M.A., M.D. Second Edition. London: J. and A. Churchill. 1876.

Domestic Medicines, their Uses and Doses in the Absence of Professional Assistance, etc. By A. F. Haselden. Seventh Edition. London: Hardwicke. 1876. From the Author.

Notes and Queries.

[510].—COUGH ELIXIR.—The answer to " Ribe's " inquiry respecting a recipe for black currant cough elixir, I find the following answer very well:—Make an infusion of horehound (1 oz. of the herb to 80 ozs. of water), and while hot add ℥viii good black currant preserve, strain, allow to cool, and add the following:—

Chlorodyne	℥i
Oxymel	℥ii

Ft. Mist.

C. L. Ridea, *St. Helen's*.

ANTISTERNUTATORY POWDER (FERRIER).—Dr. Ferrier recommends (*Lancet*, April 8, p. 525) for the cure of cold in the head, the use of a snuff composed of the following ingredients:—

Hydrochlorate of Morphia	2 grains.
Acacia Powder	2 drachms.
Trisnitrate of Bismuth	6 „

Of this quantity one-quarter to one-half may be taken as snuff in the course of twenty-four hours. Dr. Ferrier says that the inhalations should be commenced as soon as the symptoms of coryza begin to show themselves, and should be frequent at first so as to keep the interior of the nostrils constantly well coated. Each time the nostrils are cleared another pinch should be taken. Mr. Spencer Watson (*Lancet*, April 22, p. 625) says in "confirmation of the principle" of Dr. Ferrier's plan, that tobacco-snuff taken freely so as to form a coating on the mucous membrane that should be left undisturbed for some hours, will give relief. He also says that he has found " Hagner's

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* The aqueous extract is boiled with lime for ten minutes; the filtrate is acidified with hydrochloric acid, evaporated to a small bulk and precipitated with ammonia; the precipitated morphine is washed with ether or chloroform to remove adherent narcotine, codeine, etc. The weight of the unwashed precipitate, however, more nearly represents the actual morphine present, as about 9 per cent. of morphine is not thrown down by the ammonia, whilst the crude morphine precipitate contains about 10 per cent. of foreign matters.

† The aqueous extract is treated with animal charcoal, evaporated to a small bulk, and precipitated with ammonia; the precipitate consists of calcium meconate, narcotine, and morphine, and should represent about 14 per cent. of the opium. The narcotine is removed from the dried precipitate by means of absolute ether, and the morphine is dissolved out from the residue by absolute alcohol.

Olfactory" answer admirably in cases of simple catarrh of the nasal passages, although too irritant for catarrh of the air passages. For this preparation he gives the following formula:—

Crystallized Carbolic Acid . . .	5 grains.
Rectified Spirit	20 minims.
Liquor Ammoniæ	5 „
Distilled Water	10 „

A few drops of this solution are placed inside a cone of blotting-paper and the open end of the cone applied to the nostril for inhalation.

Obituary.

Notice has been received of the death of the under-mentioned:—

On the 7th of April, 1876, Mr. George Charles Cumpsty, Chemist and Druggist, of Islington, Liverpool. Aged 42 years.

On the 14th of April, 1876, Mr. Henry Herbert Smithard, Chemist and Druggist, of Peckham Grove.

On the 17th of April, 1876, Mr. George Robert Anderson, Chemist and Druggist, of Belgrave Street, Stepney. Aged 70 years.

On the 17th of April, 1876, Mr. George Mason Smith, Chemist and Druggist, of Gravesend. Aged 30 years.

On the 26th of April, 1876, Mr. Richard Kemp, Pharmaceutical Chemist, of Upper Street, Islington. Aged 73 years. Mr. Kemp was one of the Founders of the Pharmaceutical Society.

On the 27th of April, 1876, Mr. Lawrence Vodder Bond, Pharmaceutical Chemist, of Tiverton. Aged 52 years. Mr. Bond had been a Member of the Pharmaceutical Society since 1853.

On the 27th of April, 1876, Mr. Thomas Cockburn, Chemist and Druggist, of Dalkeith. Aged 35 years.

On the 5th of May, 1876, Mr. James Wilkinson, Chemist and Druggist, of Wigan. Aged 43 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF MILK OF SULPHUR.

Sir,—About two years ago I entirely discontinued the sale of "Milk of Sulphur" (*Lac Sulphuris*), being determined to educate my customers to the use of the so-called genuine article, Sulphur Præcipitatum. As I expected I had explanations to give and prejudices to overcome, but I have succeeded in silencing if not convincing most of my customers, for I find that my sale has declined to about one-sixth of its former quantity; of course I have the satisfaction of believing that if I have lost my trade I have obeyed the law. When asked for Milk of Sulphur I give Sulph. Præcip. and label it Milk of Sulphur.

Your leader on "Pragmatical Analysts," which is not a whit too strong, set me thinking and thinking and produced a very uncomfortable impression that in selling Precipitated Sulphur as Milk of Sulphur I am subjecting myself to a penalty of £20 under the 6th section of the Sale of Food and Drugs Act for "selling a drug which is not of the nature, substance and quality of the article demanded by such purchaser," knowing full well that the purchaser desires to be supplied with the old article.

Can you, Mr. Editor, help me in my dilemma or should the momentous question be remitted to the Society of Public Analysts?

JACOBUS.

*** To our apprehension the terms of the Act are so unmistakable as to justify your "uncomfortable impression."—ED. PHARM. JOURN.

THE EXAMINATION PASS LISTS.

Sir,—Mr. Proctor deserves the thanks of that body of men which might appropriately be termed the "promise and potency" of the Pharmaceutical Society to be. The new method of arranging the names of successful candidates alphabetically instead of in order of merit is, I think, fraught with consequences which will not tend to raise the standard of pharmaceutical attainment. It takes away, as Mr. Proctor says, a most excellent incentive to diligent study and does not bestow that reward on merit which it rightly deserves. It removes or prevents that desire to excel which is universally recognized as a powerful stimulus to earnest study, and comparatively few will be found willing to make themselves thoroughly proficient merely for their own satisfaction, and without any prospect of special recognition. Unless the Board has had good reasons for making the change, I think it ought to reconsider the matter, since it is felt to be a hardship by those who are working hard in order to stand high on the examination list.

"AGGRIEVED."

Belfast, May 9th, 1876.

F. L. Phillips.—As "all poisonous vegetable alkaloids and their salts" are included in Part 1 of Schedule A of the Pharmacy Act, it is decidedly necessary that sales of the preparation mentioned should be registered.

G. C. Druce.—*Rosa mollis* (probably) and *Juncus compressus.*

"*Anthos.*"— (1) Some exotic species of *Lonicera.* We cannot undertake to name foreign plants. (2) *Ranunculus floribundus.* (3) *Daphne Laureola.*

G.—(1) *Diplotaxis muralis.* (2) *Sisymbrium officinale.* (3) *Carex stricta.* (All sedges should be sent in fruit). (4) *Alopecurus pratensis.* (5) *Festuca ovina.* (6) *Anthoxanthum odoratum.* (7) *Eriophoron polystachion.* (8) *Carex glauca.* (9) *Scirpus cæspitosus.* (10) *Carex præcox.* (11) Send a better specimen in fruit. (12) *Viola lutea.* (13) *Stellaria Holostea.* (14) *Myrica Gale.* (15) *Ranunculus acris.*

G. E. Jones.—(1) *Carex riparia.* (2) *Sinapis arvensis.* (2) *Luzula multiflora.* (4) *Trifolium filiforme.* (5) *Arenaria leptoclados.* (6) *Vicia sepium.* (7) *Orchis Morio.* (8), (9) Send a better specimen. (10) *Ruppia maritima*, probably; it should be gathered in August, when it will be found in fruit. (11) Send a better specimen in fruit.

We must request our correspondents to limit the number of plants sent for identification at one time to six.

W. Pattinson.—The book was published by Mr. Hardwicke, of Piccadilly.

"*Franziskus*" is referred to the rule respecting anonymous communications.

G. E. G.—An article on the preparations of *Prunus Virginiana* will be found in vol. iv. of the present series, p. 44.

H. Machon.—Chemists and druggists are not exempt from the legal regulations respecting transactions in rectified spirit.

J. E.—Most of the terms may be found in any good French dictionary. We know of no dictionary specially devoted to the subject.

"*Ignoramus.*"—Your questions would be more fitly addressed to the editor of a dental journal.

"*Knaresborough.*"—We cannot imagine that such a practice would be construed as a breach of the Sale of Food and Drugs Act.

A. Strachan.—*Liq. Piper. Methystici.*—According to the *British Medical Journal* (April 29, p. 545) a solution is prepared by scraping 4 or 5 grams of the kava-kava root (*Piper methysticum*) and macerating it in a quart of water for five minutes, and filtering.

In consequence of the length to which the reports of the annual meetings extend we are compelled to defer the publication of several communications until next week.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. J. C. Thresh, Mr. Thompson, Mr. F. G. Barrett, Mr. A. H. Allen, Mr. B. S. Procter, Mr. G. Delves, Mr. Nuthall, Mr. W. Davison, Mr. Brodie, "Aggrieved," "Suum Cuique," "Fair Profit," "Enitar," J. H. B.

CAPSICINE; AN ALKALOID SAID TO BE CONTAINED IN CAPSICUM FRUIT. DOES IT EXIST?

BY J. C. THRESH, F.C.S.

In the list of alkaloids whose existence is doubtful, published by the British Pharmaceutical Conference, is found "Capsicine," and concerning it reference is given to an analysis by Braconnot.[*] In Watts' 'Dictionary' it is stated that capsicine is an "alkaloid obtained from Spanish pepper, the fruit of *Capsicum annuum*,"[†] and that "the same name is applied in America to an oleo-resinous extract from cayenne pepper." *En passant*, I may remark that this name is given here to an alcoholic extract of the fruit.

Again, Attfield in his 'Chemistry,' page 444, gives capsicine, or capsicia, in his list of alkaloids, and adds that "it is crystalline, and forms crystalline salts with acids."

In none of the above quoted works do we find it stated that it is the source of the intensely pungent properties of the drug; but that it is supposed to be such is proved by the papers to which we are referred. Thus Braconnot, in his analysis published in 1817, refers to this principle as an "huile tres-âcre" in the following words:—

> "Cette huile âcre a le caractère des huiles fixes; mais elle semble se rapprocher des huiles volatiles par sa solubilité dans l'eau: en effet, après avoir été lavée un grand nombre de fois avec ce liquide, il contracte une saveur brûlante, et la matière huileuse disparaît."

After the discovery that so many powerful drugs owed their activity to the presence of alkaloids, it was reasonable to suspect that the peculiar substance above described might prove to be one, and consequently we find first Witting and afterwards Landerer engaged in the investigation. The latter, in 1854, published a paper ('Vierteljahress. Pract. Pharm.') in which he expresses his belief in the active principle being an alkaloid, but the value of the proof he adduces in support of his belief may be best judged from his own words:—

> . . . "Durch Digestion dieser Substanz (that part of the spirituous extract soluble in ether) mit Essigsaüre und andern verdünnten Saüren bildeten sich Losüngen, in denen das Capsicin enhalten zu seyn schien; und auf Zusatz von Alkalien zu diesen Lösungen schieden sich gelb-braune Flocken ab, welche nach sorgfältigem Aussüssen zwar keine alkalische Reaction zeigten, jedoch der Träger des scharfen stoffes sind, und das Capsicin seyn dürften."

He then relates his failure to obtain any crystalline compounds of the alkaloid with acids.

This is all the evidence I can obtain in support of this alkaloid's existence, and it must be admitted that it is very weak. Obviously the best method of disproving it would be to prove what the acrid principle really is, but as my investigations[‡] are far from being completed, I cannot at present undertake to do this. By other investigators the acrid principle has been variously described. Flückiger and Hanbury, in their 'Pharmacographia,' page 408, simply remark that "Bucholz, in 1816, and Braconnot about the same time, traced the acridity of capsicum to a substance called capsicin," and add, "It is evidently a mixed substance, consisting of resinous and fatty matters." In Royle and Headland's 'Materia Medica,' page 589, it is stated that Forschammer has obtained "a neutral, resinous, active principle, capsicine, white, brilliant, pearly, and very acrid." Unfortunately I cannot trace the original paper, but Professor Flückiger informs me that it was published before 1838, and that from the unsatisfactory state of organic chemistry at that time there is absolutely nothing to be learnt from it. I should nevertheless be glad if any reader can kindly inform me when and where his paper appeared. Since then, however, no other investigator has isolated such a substance, and its existence is consequently not proven.

In Husemann's 'Pflanzenstoffe,' 1871, page 1136, is published a short account of a substance called capsicol, which was afterwards prepared and examined by Buchheim.[*] This substance is an oily liquid, possessing in an eminent degree the rubefacient virtues of the drug. Whilst not affirming that this capsicol is a pure organic principle, I think the experiments which I now proceed to relate prove most conclusively that the acrid principle is not an alkaloid, and that the so-called "capsicine" does not exist.

My experiments were performed with the fruits now found in commerce (*Capsicum fastigiatum*). Upon removing the pericarp from the seeds, thoroughly washing and drying the latter, I found that, contrary to what is universally believed, the seeds are entirely devoid of acridity or pungency. In taste they are similar to dried beans. I took 100 grammes of pericarp, and after powdering it packed it in a percolator, and passed benzine through it until nothing further was dissolved, and the residue was no longer pungent. The benzine solution upon evaporation yielded 20 grammes of a red, fatty substance of intense pungency. This I dissolved in ether, and shook with successive portions of dilute sulphuric acid (1-20). The acid fluid had an acrid taste, and precipitated with solutions of iodine and phosphomolybdic acid, but not with alkalies. I partially neutralized the acid with barium carbonate, filtered and evaporated to a small bulk. A considerable quantity of a red fat separated out and was removed. This fat contained the acrid principle, for upon now adding excess of alkali and shaking with ether, evaporating the ethereal solution, a slight brown oily residue was obtained, smelling somewhat like conium, and which partially dissolved in acids and gave precipitates with iodine, iodide of potassium and cadmium, Nessler's reagent, and metatungstic acid, and had a taste mawkish and very persistent, but not at all acrid. This alkaloid is undoubtedly the one whose presence was first indicated by Felletár, in 1868,[†] though obtained in a different manner, and since confirmed by Dragendorff, and also by Flückiger. Thus, although the fatty substance contains an alkaloid, it is not the active principle of the drug, as upon concentration of the acid liquid containing it it becomes less acrid by separation of an oily acrid substance, and yet with reagents gives more certain indications of the presence of an alkaloid.

These experiments do not account for the precipitate which Landerer states he obtained by adding an alkali to the acid solution, I therefore repeated my experiment, using about 1 kilo of pepper instead of 100 grammes. By concentrating the acid solution to a small bulk I found that on adding an alkali a precipitate was obtained, but it proved to be the alkaloid previously mentioned.

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[*] *Ann. Chem. Phys.* [2], vi., 1.

[†] Braconnot, *Ann. Chem. Phys.* [2], vi., 1; Witting, *Buchner, Repert.*, xxxvi., 15; Landerer, 'Vierteljahress. Pr. Pharm.,' iii., 34.

[‡] Since writing this I have succeeded in isolating the active principle, particulars of which I hope shortly to communicate.

[*] *Archiv der Heilkunde*, vol. xiv., 1872.

[†] Wiggers and Husemann, 'Jahresbericht,' 1868, p. 70.

In conclusion I may state that this conium like alkaloid appears to exist in capsicum fruits in very minute proportions. From this kilo of pepper, however, I obtained crystals of both hydrochlorate (cubes and tetrahedrons) and sulphate (prismatic), and hope by employing larger quantities of material soon to obtain it in sufficient amount to admit of its being further examined.

Buxton, May 14, 1876.

PHOSPHORUS PILLS.

BY T. HAFFENDEN.

These are very often in request now, and seeing Messrs. Allen and Hanbury's note in last week's Journal I venture my own experience. I have been very successful with a formula of Dr. Corfe's, and he tells me he is quite satisfied with them, and finds unmistakable evidence of free phosphorus in their therapeutical effect. They are composed of—

Mucilage,
Powd. Sugar,
Reduced Iron,
Quinine,
Phosphorus.

By means of a water-bath an emulsion is made of the phosphorus and mucilage, the powders mixed in while still warm, and then worked up in a mortar in the usual way; they require to be quickly coated, and then I find they keep for a long time—some in stock now have been made six months, and are quite soft now and the phosphorus fumes still rising, quite perceptible to the nose and the naked eye, though there is only $\frac{1}{40}$th grain in each pill. I have also had to dispense phosphorus in mixtures, and have found the emulsion in the mucilage of gum arabic of the Pharmacopœia to answer quite satisfactorily.

Brighton.

GLYCEROLE OF SUBACETATE OF LEAD.

BY C. D. PARRY.

I beg to submit a much easier method of making the glycerole of subacetate of lead invented by Mr. Squire.

Mix equal portions of liq. plumbi and glycerine in an open dish, and evaporate by gentle heat until the water is driven off.

When the glycerine is reduced to its original bulk it may be poured into a bottle, filtering not being necessary.

Should the strength be objected to, I think it may be increased two or three times if necessary.

Borough High Street.

ACTIVE PRINCIPLE OF ERGOT OF RYE.

The liquid extract of ergota, as it is prepared according to the British and other pharmacopœias by the action of ether and diluted spirit, would appear to be a rather doubtful preparation regarding the uniformity and value of its effects; since according to chemical researches made in Germany by Salkowski and Buchheim, which have been confirmed by Dr. Zweifel of Strassburg, the active principle of ergot is not soluble at all in alcohol. Salkowski found that powdered ergot which had been deprived of its oils by ether and digested with strong alcohol contained this principle unimpaired. He and a pupil of his, Dr. Wernich, at present a teacher in the medical school of Japan, contend that the active principle of ergot is of the character of an acid, while Buchheim has contradicted this in a treatise on the subject published in the *Archiv für experim. Pathologie und Pharmacie*, vol. iii. This very careful pharmacologist describes a procedure by which a solid, dark brown, amorphous and highly hygroscopic substance is obtained, which after drying over sulphuric acid, may be powdered, and which, besides a certain amount of leucin, contains the active principle to which he gives the often rather mystically applied name of ergotin. Salkowski confirms Buchheim regarding the preparation and effects of this substance on the arteries, but he differs with him in respect to its chemical nature which he thinks not, as Buchheim does, allied to animal glue and derived from the gluten of the rye grain. Salkowski tried but failed to produce out of it a crystalline body with specific properties. In the fourth volume of the periodical cited, however, Dr. Zweifel publishes a process by which he has succeeded in obtaining from a watery extract, the amorphous active principle in a somewhat more pure state with less admixture of leucin and other undefined substances. This agent is of acid reaction, easily dissolved in water, and when tried in its solution by direct application and subcutaneous injection on frogs caused within 15 to 30 minutes partial, within an hour total paralysis, first in the posterior, then in anterior extremities, and as Zweifel contends, simply in consequence of irritation of the sensitive nerves in the skin and its following reflex action. The pulsations of the heart, meantime, are not affected. Salkowski confirms these observations in the *Klin. Wochenschrift*, and points to Zweifel's promised further investigations as important for demonstrating the identity of the paralysing and the uterus exciting substance.

MEZQUITE GUM.*

BY A. W. MILLER, M.D, PH.D.

It is said that large quantities can be obtained. Can it not be used advantageously in pharmacy? To the simple inquiry proposed as above, I would answer in the affirmative. I have applied it to most of the uses of gum arabic in pharmacy, and have found it to fulfil the same purposes. Emulsions can be made of balsam copaiba, of fixed and essential oils quite as readily with it, and having fully as much permanence as when gum arabic is used. There seems to be no appreciable difference in the requisite proportions. The adhesive power of mezquite is very considerable, perhaps even greater than that of gum arabic. The mucilages and powders of both gums are equally serviceable in forming pill masses. The colour of mezquite, and of the mucilage prepared from it, is rather darker than that of the best grades of selected gum arabic, and this disadvantage may prove to be an obstacle to its introduction into elegant pharmacy. A very handsome white powder can, however, be readily obtained from it.

On account of the diversity of opinions which are frequently entertained by different members of the profession in regard to the utility and advantages of new drugs, I endeavoured to obtain the views of a number of pharmaceutical friends, to whom I distributed samples of the gum. The results of these trials agree in the main entirely with my own as above stated. While no one of these gentlemen observed any special merit or advantage in mezquite over and above that possessed by gum arabic, they are unanimous in considering the behaviour and effects of the two gums as almost identical. A suggestion of the late Professor Procter, published in the twenty-seventh volume of the *American Journal of Pharmacy*, has a direct bearing on this point. On account of the compatibility of mezquite and subacetate of lead, he advises its employment whenever it is desirable to make use of the emollient and protective influence of a mucilage in conjunction with the astringent and sedative action of a lead salt. He regards the association of mezquite mucilage and subacetate of lead, with sufficient glycerin to prevent it from drying too rapidly, as a good substitute for many other less elegant and less efficient dressings.

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* From the 'Proceedings of the American Pharmaceutical Association,' vol. xxiii.

Mr. F. Kalteyer, of San Antonio, Texas, from whom I obtained my supply of mezquite, informs me that he is constantly using it pharmaceutically in place of gum arabic, and that it is preferred to the latter by brewers for the purpose of thickening and clarifying beer. He regards mezquite as being slightly astringent, and therefore recommends it in the treatment of bowel complaints, particularly when occurring among children, in which cases he is in the habit of exhibiting it as a mucilaginous drink.

I have ascertained incidentally that over a thousand pounds of mezquite have been already consumed in Philadelphia and Baltimore as a substitute for gum arabic in the manufacture of confectionery and medicated lozenges. My information is to the effect that it was found to be quite equal, but not in any way superior to the lower grades of gum arabic, particulary that variety commercially known as Jiddah or Gedda gum. One of the gentlemen applied to stated that with him it was a mere question of price, as he was unable to observe any difference in their intrinsic value. Another confectioner, who consumes large amounts of gum arabic in the preparation of gum-drops and similar bon-bons, declares mezquite to be unfit to take the place of the second, or even the third pick gum, which he is in the habit of using for the finer qualities of his goods. The extremely low rates of all the different varieties of gum arabic, which prevail at the present time, of course exclude mezquite from all of the more important applications in the arts. It is, however, worthy of being put on record that the United States can furnish so valuable a substitute in case the supply of gum arabic should, at some future time, either fail entirely or become so diminished as to advance its price unduly.

Mezquite gum was prominently brought to notice in 1854 by Dr. George G. Shumard, the surgeon and geologist of Captain R. B. Marcy's Expedition to the Brazos and Wichita Rivers. He stated at that time that the tree furnishing it is very abundant on the plains of Upper Texas and New Mexico, covering thousands of miles of surface, so that mezquite can be obtained in inexhaustible quantities. The gum exudes in a semifluid state, and hardens into rounded lumps within a few hours. By exposure to the sun it is bleached to a certain extent, though very light-coloured pieces are comparatively rare. A tree will yield from an ounce to three pounds, the quantity being greatly increased by incisions made into the bark. The gum can be collected in July, August, and September, the most favourable period being the latter part of August. Dr. Shumard employed the gum medicinally in several instances, and found it to answer the purpose of the best gum arabic.

At an even earlier date than the above, the *Prosopis dulcis* of Mexico is stated in Redwood's Gray's Supplement to yield a gum which is used in place of gum arabic, and is known by the Spanish name *goma mezquitina*.

Mr. John E. Murphy, a druggist residing in Santa Fé, New Mexico, advises me that the mezquite tree is not found within two hundred miles of this city, as it does not thrive well north of the thirty-second parallel of latitude. He has seen it growing luxuriantly on the lower Gila River in Southern Arizona, and also scattered here and there on the plains of Texas. On the Rio Grande, where it is met with only as a low, scrubby bush, the roots are frequently dug up and used for fire-wood; on account of their great hardness they make a better fire than either hickory or oak. The gum can only be collected from the larger size trees in remunerative quantities. Mr. Murphy gives it as his opinion that the transportation charges will amount to more than can be realized for the gum in the Eastern markets. He estimates the expense of bringing it to the railroad termini at fully five cents per pound, and about that much more from Las Animas or Grenada, Col., to the East. Mr. Murphy regretted having none of the gum on hand, but very kindly offered to send the Apaches on a special excursion after it.

Dr. O. Loew, of Washington, D. C., who was connected with one of the government expeditions, informs me that the mezquite tree is a handsome acacia, requiring but very little moisture. The pods are exceedingly sweet, and they are used by the Indians as food, as well as for the preparation of an alcoholic beverage. The wood is rich in tannic acid; being very tough, it is well adapted to the manufacture of cabinet work. Charcoal made from it is exceedingly hard and dense, so that it is well suited for smelting operations. Dr. Loew regards mezquite as identical with gum arabic, but believes it usually to contain a little tannic acid.

Mr. F. Kalteyer, who was before alluded to, has also published a note on mezquite in the Report of the Commissioner of Agriculture for 1872. He states that during the previous year it became an article of export from Texas, some 12,000 pounds having been gathered in Bexar County, and as much more between that and the coast. The gum is, however, hardly known east of the Brazos. According to this authority, it is yielded by several species of Mimosæ found in Texas, New Mexico, and Arizona. The species most common in Bexar County attains a height of from twenty to forty feet, with a diameter of about eighteen inches. It is often met with in localities where no other tree will live. Very handsome furniture has been made from the wood, as the grain is very fine. The gum can be gathered only during dry seasons; it is dissolved during wet weather, when it falls to the ground and is lost.

Mr. Frank T. Maynard, of Petaluma, Cal., writes that the mezquite tree is very abundant about Hermosila, Mexico, where cattle feed and fatten on the bean it bears.

Mr. McMurtrie, of Washington, in 1873, published some remarks on substitutes for the astringent barks at present employed in the manufacture of leather. The heart-wood of mezquite is there stated to contain 6·21 per cent. of tannic acid; while the alburnum and bark contain only 0·5 per cent.

A specimen of mezquite, sent by Dr. Shumard to the President of the Philadelphia College of Pharmacy, was carefully examined by the late Professor Procter, whose researches were published in the *American Journal of Pharmacy* of 1855. Dr. Campbell Morfit, of Baltimore, also obtained some of the same gum, and published an article on it in *Silliman's Journal*, for July 1855. He gives the following as current synonyms for mezquite: muckeet, mezqueet, and musquit. According to a proximate analysis performed in the laboratory of Dr. Morfit by Mr. Frederick W. Alexander, mezquite consists of 11·64 per cent. of water, ·236 per cent. of foreign matter, ·206 per cent. of bassorin, 84·967 per cent. of arabin, and 3 per cent. of ash. Professor Procter found only 2·1 per cent of ash; while gum arabic is stated to vary from 2·7 to 4 per cent.

It may seem somewhat strange that a sophistication of a drug of such very recent introduction should be already met with, though in this instance the substitution was probably due to ignorance rather than to fraudulent intentions. Not being previously acquainted with the physical characteristics of true mezquite, the recognition of the false gum was entirely due to the very marked difference in the chemical reactions of one of my specimens from those given by Professor Procter, which agree in the main with those I obtained from Mr. Kalteyer's sample. The gum in question had been obtained for me from the interior of California, the purpose being stated for which it was wanted. Being very much puzzled in attempting to account for its peculiar behaviour, I made very searching inquiries concerning its origin, and, after considerable delay, I was advised that it had been procured through a wholesale house in San Francisco. No one about this establishment could tell definitely whence it was derived or where it came from, but they *thought* that it came from Australia. The substance is, therefore, most probably the Australian or wattle gum, as it seems to agree with Flückiger and Hanbury's description of this article.

In order to present the various reactions in as concise and definite a manner as possible, I have arranged them in a tabular form, so that they can be compared at a glance. I have included, also, the experiments as far as given by Professor Procter, and finally the parallel behaviour of true gum arabic.

	True Mezquite.	Professor Procter's Mezquite.	Gum Arabic.	False Mezquite.	Selected dark pieces of False Mezquite.
Concentrated solution of borax.	No effect.	Not altered.	Gelatinized.	Somewhat thickened.	No effect.
Neutral acetate of lead.	" "	" "	No effect.	Slight cloudiness.	" "
Subacetate of lead.	" "	" "	Gelatinous precipitate	Gelatinous precipitate	" "
Ammonia after acetate of lead.	Gelatinous precipitate	Bulky, gelatinous precipitate.	No effect.	No further change.	" "
Ammonia after subacetate of lead.	Thick, gelatinous precipitate.	No precipitate.	Dense, gelatinous precipitate	Thickens it still more.	Copious gelatinous precipitate.
Acetate of lead after ammonia.	Abundant precipitate.	....	Gelatinous precipitate	Thick, gelatinous precipitate.	Gelatinous precipitate
Concentrated solution of ferric sulphate.	Gelatinizes.	....	Gelatinizes.	Gelatinizes.	Gelatinizes.
Dilute solution of ferric sulphate.	Colour darkened.	No precipitate.	Orange colour.	Olive-green colour.	Dark-green colour.
Sodic silicate.	Causes thickening.	....	Causes thickening.	Gelatinizes at once.	No change.
Ammonic oxalate.	White precipitate.	White cloud.	White precipitate.	White precipitate.	Dark precipitate.
Argentic nitrate.	No reaction.	....	No reaction.	No reaction.	No reaction.
Ammonic chloride.	" "	....	" "	" "	" "
Glycerin.	No change.	....	No change.	No change.	No change.
Alkaline sol. of copper.	No reaction.	No reduction.	No reaction.	No reaction.	Reduction to suboxide
Iodine.	" "	No change.	" "	" "	No reaction.
Ninety-five per cent. alcohol	Coagulates.	Precipitates white flocks.	Curdy precipitate.	Coagulates.	Coagulates.
Seventy-five " "	Curdy precipitate.	....	" "	Curdy precipitate.	No effect.
Specific gravity.	1·452.	1·311.	1·487.	1·316.	1·528.
Specific gravity of solution, 1 part gum to 2 of water.	1·128.	....	1·149.	1·136.	....
Reaction.	Acid.	Acid.	Acid.	Acid.	Acid.

It will be observed, that Professor Procter obtained no precipitate by ammonia added after subacetate of lead. This is most probably due to his solutions having been dilute, when no reaction occurs, while from the mixture of concentrated mucilage and strong solution of subacetate of lead, a very thick gelatinous precipitate is thrown down by ammonia. For all the experiments recorded in the above table, excepting Professor Procter's, mucilages were used, made from one part gum to two of water.

Mezquite gum occurs in roundish pieces of various sizes, sometimes reaching an inch in diameter. A few of the smaller fragments are almost as light in colour as the best variety of gum arabic, but by far the greater proportion is of every shade of orange and garnet down to dark amber. Like true gum arabic the tears exhibit numerous fissures, and when broken, they are prone to break into a multitude of fragments. A very handsome white powder can be procured from mezquite. The gum is entirely and freely soluble in water, yielding a clear transparent mucilage.

The above false mezquite averages a much darker, reddish-brown colour, some of the pieces being almost the shade of Socotrine aloes. They are all clear and not fissured. Notwithstanding their dark colour, they yield a tolerably white powder.

Dr. Edward Palmer, in a lengthy essay on Indian Foods, published in the Report of the Commissioner of Agriculture for 1870, shows the mezquite tree and its products to be of very great importance to many tribes of our western Indians. He states that the buff-coloured pods, attaining a length of from seven to nine inches, ripen in June, when they are chewed by both whites and Indians on their journeys. In taste they resemble the early harvest apple, having an agreeable blending of acidity and sweetness. They are not only nutritious, but are also found to be a preventive of thirst. The Indians are in the habit of bruising the ripe pods in a stone or wooden mortar, and mixing them with water in a rude earthen dish. After standing a few hours, a kind of cold porridge or mush is obtained. All present then seat themselves on the ground around the newly prepared mess, and, using their hands as scoops, dip in without further ceremony, presenting a grotesque sight, such as is seldom witnessed outside of an Indian camp. The almost naked bodies of these Indians of every rank, age, and sex soon become smeared from head to foot. The shaggy appearance of their hair is anything but suggestive of cleanliness, though it does not interfere with the development of a peculiar complaisant look on their dusky countenances. Their tumid abdomens soon begin to give proof of the quantity consumed.

When the fruit or bean-like pod is quite ripe, it is thoroughly dried and then stored away for winter use. The Apaches, Primas, Maricopahs, Yumas, Yavapais, Mohaves, Hualipais, Cocopahs, and Moquis, of Arizona, besides many tribes in New Mexico, Utah, Nevada, and Southern California, regard them as great luxuries. The Indian women pound the dry pods until reduced to a fine powder; this is mixed with a little water, pressed into large thick cakes weighing several pounds, and dried in the sun. When stored away in a coarsely pulverized or entire state the pods soon become a living mass, as an insect of the species *Bruchus* issues from each seed. The Indians, however, do not scruple at this, but permit the larvæ to form a portion of their bread. When reduced to flour, a homogeneous mass of animal and vegetable substance is thus obtained. The flour is very sweet, so that a palatable gruel can be made from it, or an agreeable and refreshing drink when merely mixed with water. By boiling it in water and then allowing it to ferment a pleasant and nutritious beverage is obtained, which is much esteemed by the Indians. There is said to be great suffering among the above-named tribes when the crop of mezquite beans fails. Excellent vinegar can also be prepared from the pods. The Indians of Arizona mix the gummy exudation of the tree with mud, and then smear it on their heads, for the double purpose of destroying insects and colouring their hair. Horses and cattle soon grow fat when fed on the pods. The women use mezquite bark to make shirts; they also twist the same material into rope or twine, and even weave it into baskets.

The flour is also used by the Pueblo Indians as an ingredient of their favourite dish, which they call *pinole*. Their women prepare this by parching wheat, pulverizing it with a flat stone in a very slightly concave mortar, termed a *metate*, and then mixing it with the flour of the mezquite beans.

NEW INDUSTRIAL APPLICATIONS OF SALICYLIC ACID.*

BY M. R. WAGNER.

As the result of numerous experiments with salicylic acid, it appears that this product, which has hitherto been applied only to medicinal and pharmaceutical uses, may be usefully employed in numerous other departments of industry which have not hitherto been noted.

The author gives the results of his experiments in this direction, which we translate from *Le Technologiste*:

I.—*The Preservation of Alimentary Products.*—Instead, as Kolbe directs, of sprinkling fresh meat with salicylic acid, in dry powder, Wagner employs a saturated aqueous solution, with which the meat is watered, and afterwards preserved in hermetically sealed vessels.

Meat which had been thus treated on the 28th of April, 1875, and deposited in a cellar, was found, on the 20th of June, to have undergone no trace of decomposition, and gave no odour.

It is worthy of notice that a solution of salicylic acid causes raw meat after a time to assume the greyish appearance of meat which has been cooked.

Salicylic acid is a most valuable addition to salt brines used for the preservation of various articles of food, such as salted meats, pickles, etc.

Carbolic acid has been employed to some extent in the preparation of smoked meats as a substitute for the usual smoking, but it appears that salicylic acid answers the same purpose without the dangerous results which have sometimes resulted from this practice.

Fresh butter kneaded with 1 or 2 parts in a thousand of salicylic acid in powder, or, better, covered with a diluted solution, is preserved, even in warm weather, from two to eight times as long as ordinary butter prepared in the usual manner.

II.—*Preservation of Wines and Vinegar.*—Wagner adopts the ideas of Neubauer with regard to the employment of salicylic acid in œnology, and adds that the property of salicylic acid of preventing fermentation may become of great importance in the manufacture of wines and vinegar. A very slight addition of salicylic acid to a cask of wine retards fermentation to a very notable extent, so that delicate product can be fully preserved even in the warmest season.

III.—*Manufacture of Glue and Gelatine.*—Salicylic acid may be advantageously employed in the vats used for the maceration of the crude materials from which glue and gelatine are prepared. It is also valuable as an addition to the materials during the boiling, as it appears to facilitate the conversion of the tissues into gelatine. Aqueous solutions of gum arabic and gelatine are preserved for a long time by the addition of minute quantities of salicylic acid, without losing in any degree their adhesive properties.

The sizing used by weavers, as well as the paste employed by bookbinders, paper-box makers, etc., is prevented from decomposition by the addition of salicylic acid. The albumen of blood or of eggs may be preserved indefinitely in the same manner.

IV.—*Tanning.*—The introduction of salicylic acid seems to promise a new future to this important industry as soon as this product is furnished at a sufficiently low price. By the use of a small portion of this acid, the operation of swelling (*gonflement*) may be much facilitated. The use of the sour bath made of refuse malt and bran, gives rise by fermentation to putrid exhalations, especially when thick hides, like those destined for sole leather, are being prepared, when the operation may be prolonged for three or four weeks. In such cases, the addition of a small percentage of salicylic acid not only prevents the disagreeable odour, but gives to the hide a desirable reddish colour. The employment of this acid is also advantageous in the manufacture of kid-skins intended for gloves, as well as in the preparation of parchment, vellum, gold-beaters' skin, strings for musical instruments, etc.

It is highly probable that salicylic acid may facilitate the ordinary action of the tanning materials, not only in its action upon the gelatine, but in preventing the souring of the bark liquors by fermentation, producing gallic acid, which, as is well known, possesses no tanning action.

V.—*The Production of Dye Colours and Writing Ink.*—Salicylic acid may prove useful to dyers for the production of violet shades.

The sensibility of this acid for the persalts of iron is, according to Dolfuss, greater even than that of sulphocyanide of potassium; for while the latter, diluted with 64,000 times its weight of water, scarcely gives a reaction, salicylic acid gives a violet reflection even with a dilution of 572,000.

A violet-black ink may be prepared by the use of salicylic acid which possesses some advantages over the ordinary gallic inks. The production of a cheap writing fluid by its use is only a question af time.

VI.—*Perfumery.*—Salicylic acid promises to be of service to the perfumer; for, in addition to its combination with methyl—in methyl salicylic acid ether (oil of gaultheria) which may now be easily produced artificially—its combinations with other radicals to produce fragrant ethers may be of service.

The salicylate of potassium prepared by the neutralization of salicylic acid by carbonate of potassium if exposed to the air becomes yellow and gradually decomposes, producing an intense odour of roses.

When the mixture is distilled with water, there is obtained a product having the odour of oil of roses.

Oil of spirea also may be prepared artificially by the decomposition of salicylic acid.

MODIFICATION OF DUFLOS' METHOD FOR THE SEPARATION OF IODINE.*

BY C. RICE.

Among the processes in use for the separation of iodine from metallic iodides, the most reliable and trustworthy is that devised by Duflos, which depends upon the fact that ferric chloride in contact with metallic iodides or hydriodic acid liberates iodine and is itself reduced to ferrous chloride ($Fe_2Cl_6 + 2HI = 2FeCl_2 + 2HCl + 2I$.) If this decomposition be performed in a small distillatory apparatus, the whole of the iodine is carried over along with the vapour of water, and may be received in solution of potassium iodide, in which it may afterwards be estimated volumetrically by the usual methods. The apparatus in which this process is conducted generally consists of a small long-necked flask furnished with a glass tube bent at an angle of about 30° and passing downwards into a vessel containing iodide of potassium solution. It is not made to dip into the solution, but to terminate just above its surface, in order to prevent the return of the solution into the flask on ceasing to apply heat. The whole of the receiver is moreover generally immersed in a vessel of cold water, which ensures a low temperature of the solution of potassium iodide, and therefore prevents loss of iodine on detaching the receiver. Owing, however, to the somewhat sluggish manner in which the vapours of iodine descend the outer limb of the delivery-tube, especially that portion which is inside the receiver, it is desirable to apply some agent which prevents its accumulation either as vapour, or, what is more frequent, as finely divided crystalline sublimate. I have for some time been in the habit of using a stream of carbonic acid passed through the flask as a means of accomplishing this purpose. A long-necked flask of about 6 fluid ounces (177·2 cc.) capacity is fitted with a rubber stopper, previously entirely deprived of any accessible sulphur by repeated boiling in dilute potassa solution and thorough washing; two glass tubes are fitted into the stopper, one for the passage of carbonic acid, the other for the escape of the volatilized products. The first tube is of such a length inside the flask as not to touch the liquid contained therein while in a slanting position, but merely to carry the current of gas over the surface of the liquid while boiling. The other tube, which must be of a sufficiently large calibre to readily carry off the vapours, is curved outwards, and in its descending portion connected with a separate detachable glass tube by means of (purified) rubber, and long enough to dip into the receiving vessel, while the other end terminates inside of the flask (which is supported in an inclined position) just at the under surface of the stopper. The delivery-tube is fitted into the receiver by means of a (purified) rubber stopper, having an additional short tube for allowing the escape of air and carbonic acid. The receiving vessel containing solution of potassium iodide is surrounded by a current of very cold water. In using this apparatus the delivery-tube can be dipped below the surface of the solution of potassium iodide without the risk of any return of the liquid into the flask on withdrawing the heat, owing to the current of carbonic acid, which prevents the formation of a vacuum. Besides, the same current pushes along the vapours of iodine and carries them into the absorbent solution quite rapidly. When no more vapours of iodine are observed, it is advisable to withdraw the heat for a short time, keeping up, however, the current of carbonic acid, and to re-apply heat after a while; I have frequently obtained additional though small quantities of iodine vapour from the flask. When the operation is entirely finished the lower separate portion of the delivery-tube is disconnected, carefully rinsed into the receiver with solution of potassium iodide and the iodine now held by the latter in solution—representing the total of the iodine in the quantity of metallic iodide taken for analysis—is estimated volumetrically in the usual manner.

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* From the *Laboratory*.

* From *New Remedies* for April.

ANOTHER REPORT ON THE PROPERTIES OF THE COCA LEAF.

BY G. F. DOWDESWELL, B.A.

The author has recorded in the *Lancet* for May 6, some observations on the properties and actions of the leaf of the coca plant, made in the Physiological Laboratory of University College. The following extract will show that the conclusion at which he has arrived differs widely from that of Sir Robert Christison, as recorded in a recent number of this Journal.

"It was purposed, in the first place, to observe the effect of the drug on the pulse, on the temperature of the body, and particularly on the secretion of urea, which it had been asserted to diminish; these objective facts being regarded as far more reliable and conclusive in every way than statements as to mere subjective effects, which are always open to the objection that they exist only in imagination, and can neither be demonstrated nor disproved. Moreover, the assertion of its observed effects was so positive that no doubt was felt as to obtaining decisive results. A series of preliminary observations was therefore made to ascertain the normal state of the system, in the writer's own person, in the above named particulars. The temperature was observed by placing under the tongue, for three minutes or upwards, one of Casella's clinical thermometers. The pulse was taken always in the same position. Tracings of the arterial pressure were frequently obtained by a Marey's sphygmograph, of Mahomed's construction—an excellent instrument, kindly lent by Dr. Ringer for the purpose. The amount of exercise taken was recorded, as nearly as possible, daily. The amount of food ingested during the period, solid and liquid, was very similar in all respects. The whole of the urine passed during the twenty-four hours was collected from 9 A.M. till 9 A.M the following day, the whole being mixed together, and examined an hour or two afterwards. It was tested for albumen, and for sugar by Fehling's process, and the urea was estimated by the simple and convenient method of Dr. Russell. The reaction of the urine was acid throughout both series of observations; its physical characters were tolerably constant, the deposit of amorphous lithates obviously depending upon increased exercise.

"The next step was to procure a supply of the drug and obtain preparations of it. Several parcels were procured from different sources; these varied greatly in their characters and quality, the majority having lost their colour and the characteristic aroma of the leaf; consequently they were as inert as so much weather-beaten old hay would be. The experiments with them may therefore be omitted altogether. A parcel, however, was subsequently obtained, which was stated to have reached this country only a few weeks since, the characters of which were markedly different from the previous samples; the bouquet described by Dr. Weddell and other travellers in the country as characteristic of the leaves while fresh, being evident when they were crushed, and the taste when chewed with lime being peculiar and distinctly different from that of previous samples; this odour was aromatic, with a certain resemblance to that of fresh pepper. The flavour of the extract and infusion, too, differed from that of former samples, being agreeable and aromatic, with only a slight bitterness, that of the former parcels being only bitter, disagreeable, and almost identical with that of senna leaves, but milder. The greater portion of the experiments recorded were made with this sample, the leaf of which was small and delicate; but subsequently another parcel was met with of still different characters, and having another and much stronger aroma. The leaf of this was much longer and broader than the others, answering more to the character of *E. obtusum* before mentioned; the colour too was infinitely better preserved than any of the former, being not only a decided, but in some almost a bright green; they were moreover adherent together in compact masses, as they are said to be packed in the cestos, and so more likely to preserve their properties, instead of separate and loose as all others had been.*

"In these experiments the leaves were both swallowed in pills with lime, chewed with the same, taken as infusion, and as extract, all which were prepared by Mr. Gerrard of University College Hospital, who has taken much interest in the subject, and who has also very successfully obtained the alkaloid, and the volatile constituent of the leaf, and is still continuing an investigation of its pharmaceutical properties . . The extract was prepared by different methods, generally by macerating with milk of lime, and exhausting with alcohol, which was then entirely eliminated at a low temperature. The effect of the lime is probably to neutralize the coca-tannic acid, and by this method the volatile principle in which the peculiar aroma consists is preserved; and as all accounts agree in stating that when this aroma is lost, with it is lost its efficacy, it appears that the active principle, in part at least, resides in the volatile constituent. For this reason an extract prepared in the above manner was preferred to the mere alkaloid."

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* The market price of the drug is about eight shillings a pound; some chemists charge a shilling an ounce, while one advertising agency offers it at even a higher rate than this! A pound yields but a very few grains of the alkaloid. It has been stated to be procurable in Paris fresher and cheaper than in this country. It may possibly be imported into France direct from Lima, but there is reason to believe that a considerable quantity is reshipped from this to France, Italy, and other countries.

The results in the various trials are set out in tabular form in the original paper, and concerning them Mr. Dowdeswell remarks:—

"These results, as far as they go, are negative, as many most competent to judge concluded that they would be; but contrary to the expectations of the writer, formed from published statements. It has been taken in all forms, solid and liquid, hot and cold, at all hours from 7 o'clock in the morning till 1 or 2 o'clock at night, fasting and after eating. In the course of a month nearly one pound of the leaves altogether has been consumed, but without producing any decided effect; it has not affected the pupil nor the state of the skin; it has caused neither drowsiness nor sleeplessness; assuredly it has occasioned none of those subjective effects so fervidly described and ascribed to it by others—not the slightest excitement, nor even the feeling of buoyancy and exhilaration which is experienced from mountain air, or a draught of spring water. This examination was commenced in the expectation that the drug would prove important and interesting physiologically, and perhaps valuable as a therapeutical agent. This expectation has been disappointed. Without asserting that it is positively inert, it is concluded from these experiments that its action is so slight as to preclude the idea of its having any value either therapeutically or popularly; and it is the belief of the writer, from observation upon the effect on the pulse, etc., of tea, milk-and-water, and even plain water, hot, tepid, and cold, that such things may, at slightly different temperatures, produce a more decided effect than even large doses of coca if taken at about the temperature of the body. What its physiological action may be, particularly on the lower animals, in highly concentrated doses, as of the alkaloid or the distillate, is another question, as it is whether the subjective effects which have been asserted may not offer a question of curious nervous idiosyncrasies.

"That Dr. Weddell, with his ample opportunities of judging, was not without a shrewd suspicion that its reputed effect upon the Indians was partly due to imagination, association, and habit, is shown by the words with which he concludes his article (*op. cit.*, p. 533), as follows:—Je crois, enfin, que l'habitude est pour beaucoup dans la fidélité de l'Indien à l'usage de la coca, tout comme dans celle de certaines fumeurs à leur pipe. Et il est, je crois, essentiel de ne pas perdre de vue que, chez l'Indien la force d'habitude doit jouer un rôle d'autant plus grand, que l'habitude qui nous occupe est presque la seule qui lui soit restées des temps passés, et qu'aujourd'hui comme alors il attache à la feuille de coca des idées superstitieuses qui doivent tripler, au moins dans son imagination, la grandeur des bienfaits qu'il en retire; qu'il trouve, enfin, dans cette mastication, la seule et unique distraction qui rompe l'incomparable monotonie de son existence.'"

ANTOINE JEROME BALARD.

The following extract is from an address, published in the *Journal de Pharmacie*, that had been prepared by M. Wurtz to pronounce at the grave of M. Balard. It was not delivered, however, in deference to a wish that had been expressed by the deceased.

"Antoine Jérôme Balard was born at Montpellier, the 30th of September, 1802, of honourable but poor parents. They were vine-dressers, who cultivated their fields with their own hands. After his infancy, Balard was adopted and brought up by his godmother, and to this fact he owed his education and career. In his maternal heritage he found a gift more precious still, a quick intelligence, energy, and uprightness of character. After his studies at the College of Montpellier, he is met with at the age of seventeen as *préparateur* in the School of Pharmacy, and this school which he was so to honour granted him his diploma, July 5, 1826. He was then divided between chemistry and botany; later he cultivated and taught physics.

"About 1824, while botanizing one spring morning on the borders of a salt marsh, he noticed a deposit of sulphate of soda that the freshness of the night had caused to crystallize in a basin where the mother liquors from common salts were kept. The idea of working these mother liquors immediately seized his mind, and occupied it during the greater part of his life. In the course of his experiments he was struck by a peculiar coloration that certain reagents developed in these waters. He recognized the fact, and having pursued it with that tenacity which is the genius of inventors, he had the happy fortune of discovering bromine. This was a grand discovery. Balard had isolated a new simple body, and that not one of the rare or obscure metals hidden in some little known mineral; it was an important body which would rank between chlorine which we owe to Scheele, and iodine which we owe to Gay-Lussac. Thus the name of this young man of twenty-four was placed at the first onset by the side of these illustrious names; there it has become immortal!

"Attention was at once turned towards the new body. Its properties and principal combinations had been studied by Balard and described in a classical memoir. Gay-Lussac congratulated the young chemist and exhibited a specimen of bromine in his course at the École Polytechnique. The Royal Society of London awarded to him the highest reward at its disposal. At Montpellier his renown came to aid his poverty. He was called successively to the School of Pharmacy, the Royal College, and finally, in 1834, to the Faculty of Sciences. There he was in a situation that provided for him the resources for every day life and the means of labour. But the straits of early years left in his mind a lasting impression: habits of economy, with the legitimate desire of insuring the future; the taste of a modest life and moderate surroundings; with a marked avoidance of expensive habits and objects. The influence of this disposition is perceptible in his labours. He chose by preference simple methods, primitive apparatus, and reagents prepared by himself, and he liked to recall the great discoveries that issued from the poor officine of Scheele. He could not better choose his model; but is it not true, on the other hand, that if simplicity of method is an advantage and the economical use of things a gain, these conditions are not always compatible with the precision that should be sought before all in experiments? Those that we owe to Balard, however, have always had this character of precision. His discoveries have never been contested and are marked throughout by his powerful originality. Those of hypochlorous acid and oxamic acid filled up veritable gaps and opened up new paths.

"Balard was occupied in the study of the oil which separates during the distillation of brandy from the marc, and which is known as amylic alcohol, when he was called to Paris to fill the chair of Thenard at the Faculty of Sciences, Dumas occupying that of Gay-Lussac. He there took his seat after those great leaders, by the side of his inimitable colleague. His lively speech, his lucid and abundant exposition, and the slightly raised accents of his voice, combined to command the attention of a difficult audience. Later he carried the same qualities and distinction to the College of France, where he was called in 1850 to replace Pelouze.

"Balard lived in Paris thirty-eight years, and this long period, if not the most productive, was at least the most useful of his life. The Academy of Sciences opened its doors to him in 1844. Since then he has taken the most lively and sustained interest in scientific progress, seeking to develop his first discoveries and to make new ones. In 1840 he took out a patent for the extraction of potash salts from the mother liquors of salt marshes that had already deposited sulphate of soda, under the influence of cold. His laboratory researches had revealed to him the proportions of these salts and the conditions of their separation. For forty years he had pursued the application of these experiments to an industry, a rare example of perseverance at last crowned by success. But, as often happens, this success was not so complete in respect to material advantages as could have been hoped. Just at the moment his last difficulties had been overcome there were discovered, near Stassfurt, nearly inexhaustible beds of the salts that he worked upon, which had been deposited at an early geological age through the drying up of a primeval sea. Thus Nature had herself achieved, upon an immense scale, that which Balard had succeeded in accomplishing; he imitating, without knowing it, the natural processes. This coincidence may add to his glory; it added nothing to his fortune. In that which concerns the application of bromine, which to-day has become a very useful and wide spread agent in the photographic art, and under the form of bromide of potassium a very valuable medicine, Balard had the same kind of success: he had to content himself with the idea that his discovery had become a boon to mankind."

THE DISPENSING OF POISONOUS DRUGS.

The following correspondence upon this subject has appeared in the Birmingham *Daily Post*:—

"Sir,—One of your leading articles this morning refers to a projected conference of pharmaceutcal chemists, to be held here on the invitation of an eminent firm. Amongst the matters to be considered are the organization of a Trade Defence Association and the sale of poisons by unqualified persons.

"I suggest that the dispensing of poisons by qualified persons also requires regulation beyond that now in force. A physician or surgeon might to-day write a prescription containing a poisonous ingredient, in a dose so accurately calculated to the circumstances of the case as to be productive of the best results. The same prescription might be wholly unsuited to the same patient a few days hence. Yet the chemist who has once made up the prescription, or any other member of the trade, will, and often does, go on making up the same prescription for months or years, without any fresh authority from a qualified medical practitioner. Nay, more; it is customary to dispense such a prescription from a copy of the original document, though the writer of it may have been dead for years.

"I knew these facts from personal experience, but to ensure accuracy, after reading your article this morning, I have called on six of our leading chemists and have put to each, or his principal assistant, the following questions:—"If a person were to bring you a prescription of the late Dr. Evans (who has been dead about three years), or of the late Dr. Eccles (who has been dead about fifteen years), for pills, each containing 1-6th of a grain of morphia to be taken every six hours, should you dispense it?" The uniform answer was "Yes;" some adding "certainly," or "without a question." "If (I proceeded to inquire) the same prescription were brought to you, not in the original writing, but marked a copy, would you then dispense it?" The same affirmative answer was given in each case.

"This is a state of things which I think many well-informed persons will consider news of a character by no means harmless. The possible abuses of the practice are too obvious to call for development, into which, for prudent considerations, I do not enter. It would seem not unreasonable to enact that the prescription of a qualified medical practitioner, containing a poisonous ingredient, should never be dispensed from a copy unless countersigned at the particular date by the original prescriber, or by some other legally qualified person. In the case of the original prescription, some time should be stipulated beyond which it should not be dispensed, without the date and signature of the first prescriber or of some other qualified medical practitioner. The precise extent and form of the limitation could only be determined after inquiry, which can neither be too patient nor too exhaustive to ensure safety, without vexatious or unnecessary interference. Those are matters of detail; but that, in principle, the state of things to which I have referred is deserving of inquiry, will, I think, be generally conceded.

"SAMPSON GAMGEE, F.R.S. (Edin.),
"Surgeon to the Queen's Hospital."

"Sir,—We have read Mr. Gamgee's letter in to-day's *Post* with much interest, and in the event of the proposed conference of chemists being held in Birmingham, will endeavour to obtain an opportunity for the discussion of that and any other question that medical men may propose, as it is to the interest of the public as well as of the profession and of chemists, that there should be a perfect understanding on this and kindred subjects. We have no doubt but that this letter will receive the assent of those members of the trade whom want of time has prevented us from consulting.

"SOUTHALL BROS. AND BARCLAY.
"C. J. ARBLASTER,
"CHURCHILL AND SON,
"PALMER AND POWELL,
"BANKS AND CO."

HANBURY MEMORIAL FUND.

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	£	s.	d.
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The Pharmaceutical Journal.

SATURDAY, MAY 27, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

EXAMINATIONS AND ORDER OF MERIT.

VARIOUS exigencies connected with the annual meetings which have recently been held prevented our earlier reference to a matter, which has now on three successive occasions been brought before our readers, and has no doubt, likewise been dwelt upon still more frequently in a less conspicuous manner by many who imagine that some grievance has been inflicted upon them by the recent change in the regulations under which the Society's examinations are conducted. We refer especially to those alterations of the procedure of the Board of Examiners, consisting in the discontinuance of the system of publishing in two divisions the names of candidates who have passed any of the examinations, and of arranging the names of successful candidates alphabetically instead of in order of merit according to the general estimate formed by the examiners as to their relative qualifications.

Mr. PROCTOR of Newcastle was the first to raise an objection to this change, and the sentiment which led him to do so is one that we thoroughly sympathize with. We do not wonder that it should at once have received a cordial response, or that it should be this week followed up by the expression of wonder as to what may be the reasons that have actuated the Board of Examiners in recommending this change. The advantages of the system formerly adopted are so lucidly stated by Mr. PROCTOR that we cannot do better than adopt his own words where he says that on receiving answers to an advertisement for a qualified assistant it was always a satisfaction to him to be able to turn to the official lists, and thus from an unbiassed appraisement check the applicant's own estimate of his qualification upon the ground of having passed this or that examination.

We agree with Mr. PROCTOR that it is a pity employers should lose the advantage that classification would thus afford; it is equally a pity that the laborious student should not, by such classification, reap the advantage of standing in a pre-eminently creditable position among those who have passed through the ordeal of examination, and that future students should lose the incentive to exertion afforded by the possibility of standing foremost among a hundred competitors. But having from the sentimental point of view given our heartiest concurrence to all that has been said in favour of the abandoned system by Mr. PROCTOR and those who have followed him, we must descend to the more common-place region of fact. Remembering that Mr. PROCTOR set out with the confession that he did not know the grounds upon which the Board of Examiners decided to omit the classification of those who passed the examinations, and the suggestions since put forward that the matter should be re-considered, it will not be out of place to explain here what were the reasons for the change. We may do so most tersely by repeating the terms of the sixth section of the Pharmacy Act, 1868, which provides that all persons appointed to conduct examinations under the Pharmacy Act are empowered and required to examine all persons, etc., and that every person who shall have been examined and shall have obtained a *certificate of competency, skill, and knowledge,* shall be entitled to be registered etc., etc. The criterion of competent skill and knowledge does not comprise anything more than the legitimate dead level of passing or not passing. The function of the examiners under the Pharmacy Act resembles in this respect the physical measurement of millitary recruits, and consists merely in determining whether or not candidates come up to the legal standard. Anything further than this is not contemplated by the Act; a classification of the passed men indicating that while C, D and E had passed so as to satisfy the requirements of the law, A and B had manifested higher degrees of qualification would be not only something outside the scope of the Act, but likewise—so far as legal qualification is concerned —an injustice to those who merely display sufficient qualification to acquire the right to be registered. Therefore the introduction of such indications, however consistent with the spirit in which the Pharmaceutical Society has always sought to promote education, would be entirely *ultra vires* as regards the legalized functions of the examining Board.

It must be admitted that compliance with the requirements of the Act is not calculated, as our correspondent "AGGRIEVED" urges, to raise the standard of pharmaceutical attainment; but before we complain of injustice being done to candidates of superior merit we must remember the necessity of being thankful for small mercies, and the fact that though the Pharmacy Act does not give all that might have seemed desirable to the founders and supporters of the Pharmaceutical Society, the struggle between their views and the vested interests by which they were opposed has at least resulted in establishing in regard to pharmaceutical qualifications some recognition of the need of knowledge and of the insufficiency of ignorance. This result of compromise is a step in advance that we must not despise though it may fail to satisfy, and for further progress we must look forward to the time when the body of men alluded to as the "promise and potency" of the future Pharmaceutical Society shall constitute the majority of those engaged in pharmacy instead of being as now numerically an almost insignificant minority.

WHAT CONSTITUTES AN OVERDOSE OF STRYCHNIA?

Our contemporary, the *Canadian Pharmaceutical Journal*, records a fatal case of poisoning, which if it finds a correct explanation in the verdict of the coroner's jury may well attract the attention of the editors of the Pharmacopœia should they think of following Dr. Farquharson's advice and revise its posology.

A lady suffering from general debility was supplied by her "physician," with a mixture, dispensed by himself, and said to be composed of—citrate of iron and quinine, 80 grains; solution of strychnia, B.P., 40 minims; and water to 2 ounces. Of this the patient took one teaspoonful, and, having been cautioned that the medicine was a dangerous one, before taking it appealed to her servant as to whether she had measured too much. Immediately afterwards she complained of feeling as if she were "all puckered up," convulsions followed, and in spite of every endeavour she was dead within two and a half hours after taking the dose. At the inquest the liquid remaining in the medicine bottle was measured and found to be about three teaspoonfuls short of two ounces, but no explanation was given as to whether any had been spilt. Even if, notwithstanding the servant's evidence to the contrary, the whole of the three teaspoonfuls had been taken, it would have represented a quantity of solution of strychnia considerably below the maximum dose of the Pharmacopœia. But the jury returned a verdict that death had resulted from the lady inadvertently taking an overdose of medicine containing strychnia, in excess of the quantity prescribed by her physician.

Some comment has been made on the fact that no analysis was made either of the remainder of the mixture or of the Liquor Strychniæ from which it had been prepared.

THE MEDICAL COUNCIL.

The announcement was made in the *London Gazette* of the 19th inst., that her Majesty has been pleased to appoint John Simon, Esq., C.B., F.R.S., and Thomas Pridgin Teale, Esq., F.R.C.S., to be for five years Members of the Medical Council, in the places of Dr. Sharpey, resigned, and Dr. Parkes, deceased.

DEATH OF M. BUIGNET.

We regret to record the death on the 9th inst. of Dr. Henri Buignet, Professor of Physics in the Paris School of Pharmacy. Dr. Buignet was a member of many learned societies, and was one of the Editors of the *Journal de Pharmacie et de Chimie*. He was also the General Secretary of the Paris Society of Pharmacy.

CINCHONA CULTIVATION IN NEW CALEDONIA.

According to a recent letter in the *Temps* an attempt has been made to introduce cinchona cultivation into New Caledonia, but it has not been attended with success. Four years ago eighteen plants—of what species is not stated—six to ten inches high, were planted on the Mission peak, at an elevation of about 2000 feet, in moist argillaceous soil having a decided slope. They were surrounded by a barrier and then left without further attention. The result was that the wild boars destroyed the barrier and got at the plants, so that one year after there was but one plant left, which however was nearly 6½ feet high and measured about 4½ inches in circumference. Under these circumstances the experiment cannot be looked upon as decisive, and a desire has been expressed that it should be repeated with suitable precautions.

SPURIOUS SAFFRON.

According to the learned authors of 'Pharmacographia,' saffron, through its inevitable costliness, has been liable to sophistication from the earliest times. In the middle ages the authorities having failed to suppress the practice by burning the adulterated drug, took to burning the adulterators. What they would have done in the case of entire substitution is not quite clear. In Canada, however, the so-called "American Saffron," obtained from *Carthamus tinctorius*, appears to have so far replaced the stigmas of *Crocus sativa*, that at a pharmaceutical examination in Toronto some candidates having been shown "American Saffron" pronounced it to be the genuine article, and on being told that this was not the case, said that this was the only saffron with which they were acquainted, or had ever seen used!

PERSIAN OPIUM.

The Persian opium, it is said, is not much liked in China, owing to its having a peculiar flavour caused by the mixture of a large quantity of oil during the process of preparation, and owing also to its being sometimes found adulterated. Indeed, although the quality is good, it is said that adulteration is now so extensively practised as to bid fair to check the trade with China, which has in recent times assumed considerable proportions, unless the Persian authorities take measures to prevent fraud.

Persian opium, however, finds a somewhat better market in London, inasmuch as it contains, on an average, a large quantity of morphia. From London the greater part is sent to the Continent and to America. Prior to the opening of steam communication on the Persian Gulf some opium used to be sent from Persia by land to Constantinople, whence it found its way to the Continent. But that route has since been altogether given up.

About 100 cases of opium (in cakes) are brought annually to Persia from Herat. This is taken to the Yezd market. From Yezd also a quantity of opium prepared in the shape of small sticks or cylinders is sent for consumption in Herat. A small quantity of stick opium is consumed in Persia itself. No opium whatever is known to be imported into Persia from other places.

The Drugging of Animals Bill was read a third time and passed the House of Lords on Monday.

Transactions of the Pharmaceutical Society.

Erratum (p. 927).—The name of Mr. Williams was accidentally omitted from the list of members of Council present at the meeting on the 18th inst.

BENEVOLENT FUND.

Subscriptions Received during April, 1876.

	£	s.	d.
Anonymous	0	5	0
Ackrill, G., Mona Court, Kingstone, near Hereford	0	10	6
Aitken, R., 338, Oxford Street, W.	0	5	0
Aitken, William, 3, Pitt Street, Edinburgh	0	5	0
Alewood, E., Castle Square, Swansea	0	10	6
Allen, C. B., 338, Oxford Street, W.	0	5	0
Allen, G., Ampthill	1	1	0
Anness, S. R., 20, Westgate Street, Ipswich	0	10	6
Anthony, J. L., 48, High Street, Bedford	0	10	6
Applegate, E., 5, Hercules Terrace, Holloway	0	10	6
Armitage, E. H., Dartford, Kent	1	1	0
Ashford, E. C., 24, Gold Street, Northampton	0	5	0
Ashton, W., 77, Lord Street, Southport	0	10	6
Astrop, H., 730, Old Kent Road	1	1	0
Atherton, J. H., Long Row, Nottingham	0	10	6
Averill, H. A., Stafford	1	1	0
Averill, J., Stafford	1	1	0
Bagshaw, W., 37, Yorkshire Street, Oldham	0	10	6
Baildon, H. C., 73, Princes Street, Edinburgh	1	1	0
Baker, W. K., Sidcup	0	5	0
Balcomb, J., Cheltenham	0	5	0
Balkwill, A. P., Plymouth	0	10	6
Balkwill, J., Kingsbridge	0	10	6
Ball, J., Oxton Hill, Birkenhead	0	10	0
Bally, E. F., Baldock, Herts	0	5	0
Barber, G., 27, Botanic Road, Liverpool	0	10	6
Bard, H., 3, Exe Buildings, St. Thomas, Exeter	0	2	6
Barnard, J., 338, Oxford Street W.	1	1	0
Barnes, J. and Son, Fishergate, Preston	0	10	0
Barnitt, Hughes and Co., 15, Old Bond Street, Bath	0	10	6
Barnitt, J., 4, Upper Parade, Leamington	0	10	6
Barrett, H. L., 83, Brixton Road, S.W.	0	2	6
Barron, W., Cheltenham	0	5	0
Barry, T. S., Ealing	0	10	6
Barton, W. H., Gipsy Hill, S.E.	0	10	6
Bateson, T., 23, Stricklandgate, Kendal	1	1	0
Baxter, G., Worksop	0	5	0
Baxter, W., Central Public Laboratory, Kennington Cross	1	1	0
Beckett, W., Market Place, Heywood	0	10	6
Beech, J., 273, Icknield Street West, Birmingham	0	10	6
Beech, J., jun., 273, Icknield Street West, Birmingham	0	2	0
Beetham, M., 7, Promenade Villas, Cheltenham	0	10	6
Bell, W. H., 96, Albany Street, Regent's Park	0	10	6
Bendelack, C., Cheltenham	0	5	0
Bentley, J. N., Bridge Street, Heywood	0	5	0
Bently, W. J., High Road, Tottenham	0	10	6
Berry, W., 15, Albert Villas, Cotham, Bristol	0	10	6
Best G., Bondgate, Darlington	0	5	0
Best, J., 333, Holloway Road, N.	0	10	6
Betts and Son, Woodbridge	0	10	6
Betty, S. C., 6, Park Street, Camden Town	0	10	6
Bingley, J., 91, Bailiff Street, Northampton	0	10	6
Bird, R., 103, Holborn, W.C.	0	10	6
Bishop, T., 1, Wardour Villas, Arragon Rd., Twickenham	0	10	6
Blain, W., 25, Market Street, Bolton	0	10	6
Bogle, R., Market Street, Heywood	0	5	0
Bolton, C. A., Goosegate, Nottingham	0	10	6
Bolton, T., 83, Middleton Road, Dalston	0	5	0
Bond, Mrs. Jane, Portishead	0	1	0
Boor, F., Fallowfield, Manchester	0	5	0
Booth, G. W., Chesterfield	0	10	0
Booth, J., Castlemere, Rochdale	0	10	6
Braddock, G., 33, Queen's Road, Oldham	1	1	0
Bradley, F., per Mr. Hodsoll, 17, Cross Street, Hoxton	0	2	6
Brailey, C., Heavitree, Exeter	0	5	0
Branson, J., Masborough Bridge, Masborough	0	2	6
Bray, W., Buntingford	0	5	0
Brend, K. B., 40, High Street, Swansea	0	5	0
Brend, T., 40, High Street, Swansea	0	10	6
Bromley, R. M., 3, Beckenham Place, Denmark Hlil	0	10	6
Broomfield, C., 2, Northernhay, Exeter	0	5	0
Brown, J. F., 4, Market Square, Dover	1	1	0
Brown, W. B., Fishergate, Preston	0	5	0
Buchanan, J., 52, North Bridge, Edinburgh	1	1	0
Buck, R. C., 192. Breck Road, Liverpool	0	5	0
Buck, Thomas, 9, East Street, Middlesborough	0	5	0
Bull, C. C., 6, Leopold Street, Seacombe	0	5	0
Bulley, W. H., 26, High Street, Exeter	0	2	6
Burn, J., Flintham	0	5	0
Burton, J., 397, Cambridge Road	0	2	6
Busby, J., Harpenden	0	10	6
Butland, C., 65, St. Sidwell, Exeter	0	5	0
Butt, E. N., 13, Curzon Street, W.	2	2	0
Cameron, W., Well Street, Bedford	0	5	0
Campbell, E. K., 12, Montague Place, Hackney Wick	0	2	6
Candler, J. T., 39, High Street, Margate	0	10	6
Carter, W., Cheetham Hill, Manchester	0	10	6
Case, W., Cockthorpe, Wells	0	10	0
Catterns, H. P., 59, Church Street, Camberwell	0	10	6
Chapman, H., Cornhill, Ipswich	0	10	6
Cheetham, W. H., 83, Brixton Road, S.W.	0	10	6
Child, Thomas, 84, Wellington Road, Leeds	1	1	0
Clark, J. A., 11, Duncan Place, E.	0	10	6
Clarke, J., 20, George Street, Croydon	0	10	6
Clarke, R., Devizes	0	10	6
Clarke, T. M., 50, George Street, Richmond, S.W.	0	10	0
Clarke, W., 23, High Street, Ilfracombe	0	10	6
Clarke, W. R., Sheep Street, Northampton	0	5	0
Clifton, E., Cornhill, Ipswich	0	5	0
Cocking, F. J., 10, Wellington Street, Teignmouth	0	5	0
Cocks, J. W., Union Street, Torquay	0	5	0
Cocksedge, H B., 20, Bucklersbury, E.C.	0	10	6
Coke, R. S., 22, Albert Road, Morice Town	0	5	0
Cole, F., Congleton	0	5	0
Coles, F., 248, King's Road, Chelsea	0	10	6
Collett, C. B., 19, South Street, Exeter	0	5	0
Cooke, J., 126, Hoxton Street, N.	0	10	6
Cooper, A., 80, Gloucester Road, South Kensington	1	1	0
Cooper, G., 101, Fore Street, Exeter	0	10	6
Corfield, C., St. Day	0	10	6
Corfield, T. J. T., St. Day	0	10	6
Cornelius, J., Teignmouth	0	10	6
Cornell, W., Tavern Street, Ipswich	1	1	0
Cornforth, E., Birmingham	0	2	6
Cossey, J., St. John's Maddermarket, Norwich	0	5	0
Cottrill, G. J., High Street, Shepton Mallet	0	5	0
Crofts, H. C., 194, High Street, Chatham	0	10	6
Cruse, T. H., Palmerston Road, Southsea	1	1	0
Culverwell, J. S., Plough Court, Lombard Street	0	5	0
Curtis, F. G., 3, Celbridge Place, Westbourne Park	0	2	6
Cuthbert, J. M., 19, High Street, Bedford	0	10	6
Cutting, J., 33, Bath Street, Leamington	0	10	6
Dadford, T., 33, Gold Street, Northampton	0	10	6
Daggers, F., Preston	0	5	0
Dakin, J. P., Wantage	0	2	6
Darling, W., 126, Oxford Street, Manchester	1	1	0
D'Aubney, T., 82, Shepherdess Walk, N.	1	1	0
Davies, E., Bishop's Castle	0	10	6
Davies, J., 20, Moreton Street West, Belgrave Road, S.W.	0	5	0
Davies, W., 292, Gray's Inn Road, W.C.	0	5	0
Davis, B., Warwick Street, Leamington	0	5	0
Davis, F. P., 36, Northbrook Street, Newbury	0	10	0
Davis, H., 19, Warwick Street, Leamington	0	10	6
Davison, R., York	0	10	0
Davy, H., Bridgegate, Rotherham	0	5	0
Dawson, A., Woking	0	10	6
Day, T. S., High Street, Beckenham	0	10	6
Delves, G., 187, High Street, Exeter	0	10	6
Dennison, M., Dudley	0	5	0
Denston, J. T., Kettering	0	5	0
Dewar, M A., 154, Upper Whitecross Street, E.C.	0	10	6
Diggle, T. K., York Street, Heywood	0	5	0
Dixon, H., Union Street, Ryde	0	10	6
Dobson, G., Ealing	0	5	0
Dodman, R., Sussex Villa, Ranelagh Road, Ealing	0	2	6
Dowty, R., 175, Kentish Town Road	0	2	6
Dudden, R. M., Sutton Wick, Pensford	0	5	0
Duncan, Flockhart and Co., 139, Princes Street, Edinburgh	1	1	0
Duncan, W., Rothesay	0	5	0
Duncanson, W., Stirling	0	10	6
Dunkley, E., High Street, Tunbridge Wells	0	10	6
Dunn, R., 28, Brook Street, Bath	0	5	0
Dyson, W. B., 21, Gloucester Road, South Kensington	1	1	0
Eade, G., 72, Goswell Road, E.C.	1	1	0
Eade, J., 72, Goswell Road, E.C,	1	1	0
Eaton, J., Tamworth Street, Lichfield	0	5	0
Edwards, W., Denbigh	0	5	0
Ekins, J., 81, High Street, Bedford	0	5	0
Eliott, S., 7, Lockyer Street, Plymouth	0	5	0
Ellidge, J. W., 27, Union Street, Ryde	0	5	0
Elsey, T., Halkin Street West, S.W.	1	1	0
Emerson, C., 8, Church Street, West Hartlepool	0	10	6
Emson, W. N., Hospital for Diseases of Throat, Golden Sq.	0	5	0
Evans, Lescher and Evans, 60, Bartholomew Close, E.C.	1	1	0
Evans, E., 5, Union Street, Blue Town, Sheerness	0	2	6
Evans, H. Sugden, 60, Bartholomew Close, E.C.	1	1	0
Evans, I. H., Market Cross, Lymm	0	5	0
Evans, J. J. O., Teignmouth	0	5	0
Fairgrieve, T., 46, Clerk Street, Edinburgh	0	10	6
Farrow, C. H., 2, Upper Street, N.	0	10	6
Fell, W. E., Avenham Lane, Preston	0	5	0
Fergusson, J., 6, Strand Street, Liverpool	1	1	0
Field, W., 83, Brompton Road	1	1	0
Fincham, R., 57, Baker Street, W.	1	1	0
Fitzhugh, R., Long Row, Nottingham	0	10	6
Fletcher and Palmer, Cheltenham	1	1	0
Flower, T. S., Pier Street, Ryde	0	5	0
Ford, E. B., 3, George Street, Pontypool	0	5	
Fore, T., Market Street, Birkenhead	0	10	

	£	s.	d.
Foster, A. H., Birmingham	0	5	0
Foster, E., Friargate, Preston	0	5	0
Foster, J. A., Birmingham	0	5	0
Foulkes, W. J., Grange Mount, Birkenhead	1	1	0
Fowke, T. E., 18, Market Square, Stafford	1	1	0
Fowls, J., 45, Kensington Road, Southport	1	1	0
France, J., Church Street, Rotherham	0	5	0
Francis, G. B., 5, Coleman Street, E.C.	1	1	0
French, J., 293, High Street, Chatham	0	10	6
Froom, W. H., 70, Aldersgate Street, E.C.	1	1	0
Fryer, C., 12, St. Nicholas Street, Scarborough	0	10	6
Fryer, J., Batley Carr	0	10	6
Fuller, R. T. C., 233, Walworth Road	0	10	6
Gadd, Henry, 97, Fore Street, Exeter	0	10	6
Gale, Samuel, 338, Oxford Street	1	1	0
Galloway, G., and Son, 13, Castle Street, Inverness	0	10	6
Gardner and Ainslie, Edinburgh	1	1	0
Garner, J., 119, Kensington High Street, W.	0	10	6
Geldard, J., St. Austell	0	5	0
George, H., 68, Broad Street, Worcester	0	10	6
Gibbon, D., Cheltenham	0	5	0
Gibbs, W., Union Street, Ryde	0	10	6
Gibson, J. B., High Street, Grantham	0	10	6
Gibson, R., Erskine Street, Manchester	2	2	0
Gilmour, A., Burntisland	0	5	0
Gloyne, C. G., Market Place, Dewsbury	1	1	0
Goggs, N. W., South Town, Great Yarmouth	0	5	0
Golding, W., 172, Albany Street, N.W.	0	5	0
Goode, C., Congleton	0	10	6
Gorton and Sons, 144, High Street, Whitechapel	1	1	0
Gostling, G. J., Ipswich Street, Stowmarket	0	10	6
Goulden, E. B., Uckfield	0	5	0
Gower, A. J., 1, Grosvenor Terr., Falcon Lane, Battersea	0	10	6
Granger, E. G., High Road, Upper Clapton	1	1	0
Grant, E., 119, Fore Street, Exeter	0	2	6
Greaves, A., Chesterfield	0	10	0
Greaves, A. W., Chesterfield	0	5	0
Greaves, F. W., St. John Street, Ashbourne	0	5	0
Greaves, W. S., Ironville, Chesterfield	0	5	0
Green, J., 196, Lower Street, Deal	0	10	6
Green, S., 2, York Place, Nunhead	0	5	0
Green, T., Corn Market, Belfast	0	5	0
Greenish, T., 20, New Street, Dorset Square	1	1	0
Griffith, R., High Street, Slough	0	10	6
Griffiths, A. W., 41, Clerkenwell Green, E.C.	0	5	0
Griffiths, J. M., Waltham Abbey	0	5	0
Gristock, T., 42, South Street, Manchester Square	1	1	0
Grose, N. M., 5, Castle Street, Swansea	0	10	6
Hanbury, C., Plough Court, Lombard Street	1	1	0
Handley, C., 41, High Street, Stoke Newington	0	10	6
Hands, W., High Street, Cheltenham	0	5	0
Hargreaves, H. L., 30, High Street, Oldham	0	10	6
Harris, D. R., 55, St. James Street, S.W.	1	1	0
Harris, J., Alexandra Terr., W. Cross, Mumbles, Swansea	0	7	6
Harris, W. H., Rochester	0	10	6
Harrison, W., Kirby Lonsdale	0	10	6
Harrop, W. H., Hayley Street, Halesowen	0	5	0
Hart, J., 131, Embden Street, Hulme, Manchester	0	10	6
Harvey, J. S., 11, Market Jew Street, Penzance	0	10	6
Harwood, C., 5, Lee Place, Lewisham	0	5	0
Hatch, R. M., 167, White Ladies Road, Redland, Bristol	1	1	0
Hatfield, G. H., 817, Commercial Road, Limehouse, E.	0	10	6
Havill, P., Fore Street, Tiverton	0	5	0
Havill, P. W., Fore Street, Tiverton	0	5	0
Hawkins, H. F., Rugeley	0	10	0
Hay, T. A., Wavertree, Liverpool	0	10	6
Haydon, F. W., Fordingbridge	0	5	0
Haysworth, W. S., 133, St. George Street, E.	0	2	6
Heald, B., Sleaford	0	10	6
Heanley, M., Market Place, Peterborough	0	10	6
Heap, W., Fishergate, Preston	0	5	0
Henthorn, J., 37, Lees Road, Oldham	0	10	6
Henty, H. M., High Street, St. John's Wood	0	5	0
Herbert, W., 137, Lewisham High Road	0	5	0
Hewitt, J. S., 97, Eastgate, Rochester	0	5	0
Hewlins, E., Leatherhead	0	10	6
Hibbard, J., 24, North Street, Exeter	0	5	0
Hickey, E. L., 199, King's Road, Chelsea	0	10	6
Hicks, J. S., Fore Street, Looe	0	5	0
Higgins, J., 105 a, Crawford Street	0	10	6
Highley, W., 54, Drake Street, Rochdale	0	5	0
Hill, R., Bruton	0	5	0
Hill, W., Upper Brook Street, Ipswich	0	5	0
Hillidge, G., Friargate, Preston	0	5	0
Hills, T. H., 338, Oxford Street, W.	5	5	0
Hills, W., 338, Oxford Street, W.	1	1	0
Hind, T. W. L., Stricklandgate, Kendal	1	1	0
Hinds, H. D., The Mount, Pontardulais	0	5	0
Hinds, J., Coventry	0	10	6
Hocken, J., 31, Old Hall Street, Liverpool	0	10	0
Hodgkinson, J. S., Matlock Bridge	0	10	6
Hodgkinson, T., Prestons and King, Leadenhall St.	2	2	0
Hodsoll, T. W. H., 17, Cross Street, Hoxton, N.	1	1	0
Holford, T. C., 342, High Street, Stratford	0	10	6
Hollier, E., Dudley	0	10	6
Holloway, J., Finsbury Road, Wood Green	0	10	6
Hopton, E., Idle, Yorks.	0	5	0
Hora, H. W., 58, Minories, E.	1	1	0
Horsfield, J. M., 1, College Street, Rotherham	0	10	6
Howard, R., Rochester Place, Tunbridge Wells	0	10	0
Hudson, J., 3, Henry Street, Rotherham	0	5	0
Huggins, H., 210, High Street, Exeter	0	5	0
Hughes, J., 20, Castle Street, Swansea	0	5	0
Hughes, M., 70, Mill Street, Liverpool	0	5	6
Hughes, T., Red House, Llandilo	0	10	0
Hurst, J., 27, Bottom o' th' Moor, Oldham	0	5	6
Hutton, H., Bedford	0	2	0
Irish, T. C., Southgate, N.	0	5	6
Jackson, C., 83, Brompton Road, S.W.	0	10	0
Jackson, H., 29, School Lane, Liverpool	0	10	0
Jackson, R., Nottingham	0	5	6
Jackson, W. and H., 4, Cleveland Square, Liverpool	0	10	0
Jameson, W. E., 38, Robertson Street, Hastings	0	5	0
Jarvis, J., 4, Rue Serviez, Pau, France	1	1	0
Jeffrey, T. A., Cheltenham	0	5	0
Jenkins, J. T., Denman Street, New Radford, Nottingham	0	5	0
Johnson, J., 8, Brondesbury Terrace, Kilburn	0	10	6
Johnson, J. B., Uttoxeter	0	10	6
Johnson, R. D., 59, Camberwell New Road, S.E.	0	10	6
Joint, R. J., Chulmleigh	0	6	0
Jones and Bowles, Kensington	0	10	6
Jones, F., 175, Kentish Town Road	0	5	0
Jones, F. W., 11, Norton Folgate	0	10	6
Jones, J., Castle Square, Carnarvon	0	5	0
Jones, R., Broad Street, Chipping Sodbury	0	10	6
Jones, R. G., Commercial Place, Lye, Stourbridge	0	5	0
Jones, S. U., 4, Upper Parade, Leamington	1	1	0
Jones, W., 8, Richmond Terrace, Shepherd's Bush	0	5	0
Jones, W., 19, Berry Street, Liverpool	0	5	0
Jones, W., Winterbourne	1	1	0
Jones, W. R., 16, Jamaica Row, Birmingham	1	1	0
Jull, T., 2, Moreton Street West, Pimlico	0	5	0
Kaye, H., Berry Brow, Huddersfield	0	5	0
Keall, F. P., 199, High Street, Swansea	0	2	6
Kemp, D., 94, High Street, Portobello	0	10	6
Kent, T., 226, Blackfriars Road	0	10	6
Kent, T. R., 103, Westminster Bridge Road	0	10	6
Kirk, S., 89, Upper North Street, Poplar	0	10	6
Kirkman, C. J., Dedham, Essex	0	5	0
Lamb, T. C., High Street, Chatham	0	5	0
Lambert, T., 10, Ashton New Road, Bradford, Manchester	0	10	0
Lamble, J. A., 23, Pembroke Street, Devonport	0	2	6
Lang, W., Kirkdale, Upper Sydenham	0	10	6
Large, J. H., 65, New North Road, N.	0	10	6
Lasham, J. W., Romford	0	10	6
Lavers and Son, 5, Montpellier Vale, Blackheath	1	1	0
Laycock, R., Rotherham	0	2	6
Lee, A. M., 46, Clark Street, Edinburgh	0	5	0
Lescher, J. S., 60, Bartholomew Close, E.C.	1	1	0
Lewinton, A.B., 14, Cleveland Street, W.	1	1	0
Lindsay, G. W., 338, Oxford Street, W.	0	5	0
Lister, G., Cottingham	0	10	6
Little, H., 82, Seven Sisters Road, N	0	10	6
Lloyd, J. W., 90, Oxford Street, Swansea	0	5	0
Lockyer, G., 208, High Street, Deptford	0	10	6
Long, A. T., Bognor	0	10	6
Long, W. E., East Street, Chichester	0	10	6
Lord, E., Yorkshire Street, Rochdale	0	5	0
Loveridge, T. P., 5, Priory Place, Belvedere	0	5	0
Lowe, A. J. G., Woodcote, Reigate	0	5	0
Lucas, J., Birmingham	0	10	6
Luff, R., 1, Bute Street, South Kensington	0	10	6
MacDonald, A., Main Street, Coatbridge	0	2	6
Macfarlane, J. F., and Co., 17, North Bridge, Edinburgh	2	2	6
Macfarlane, A. Y., 255, Canongate, Edinburgh	0	5	0
McLean, K., Lofthouse, Yorkshire	0	10	6
Maggs, S. B., Marina, St. Leonards	0	10	6
Manfield, J. W., 78, Bury Street, Salford, Manchester	0	5	0
Manifold, J. J., Weaverham	0	10	6
Mann, R., Newcastle-on-Tyne	0	10	6
Manning, R. J., Wells, Somerset	0	10	6
Marsden, J., Lancaster Road, Preston	0	5	0
Marsden, T., 1, Market Place, Preston	1	0	0
Marsh, J., Plymouth	0	5	0
Marshall, G., 33, Blackburn Street, Accrington	0	10	0
Marston, J. T., 105, London Wall	0	10	6
Mason, F., High Street, Rotherham	0	5	0
Masters, H. J., 111, Commercial Road, Newport, Mon.	0	2	6
Mathew, W. H., 35, Fore Street, Saltash	0	5	0
Matthews, E., Royston, Herts	0	10	6
Maurice, T., Llwyneclyn, Llanfyrlach, near Whitland	0	10	6
May, J., Garden Wharf, Battersea, S.W.	0	10	6
Mayger, W. D., Regent Square, Northampton	0	10	6
Mays, R. J. J., 3, Market Place, South Shields	0	10	6
Meredith, J., High Street, Brecon	0	5	0
Merrell, J., 1, Queen's Terrace, Camden Villas, N.W.	1	1	0
Merrick, T. J., Drapery, Northampton	0	10	6
Metcalf, E. H., Great Malvern	0	10	6
Middleton, F., 338, Oxford Street, W.	1	1	0
Millar, J., 1, Alphington Street, St. Thomas, Exeter	0	2	6
Miller, C. B., 50, George Street, Richmond, S.W.	0	5	0
Miller, N., London Road, Preston	0	5	0
Mole, W. T., Market Square, St. Neots	0	2	6
Moore, E., Cheltenham	0	2	6

	£	s.	d.
Moore, W. J., King Street, Stirling	0	5	0
Mould, S., 21, Moorgate Street, E.C.	0	10	6
Mullock, R., Charing Cross, Birkenhead	0	10	0
Mundy, A. O., 11, Norton Folgate	0	10	6
Muskett, A. C., 64, Park Street, Southwark	0	10	6
Muter, Dr. J., Central Public Laboratory, Kennington Cross	3	3	0
Napier, G. L., 56, South Street, Exeter	0	5	0
New, W. W., 238, Essex Road, N.	0	10	6
Newman, W. F., Market Street, Falmouth	0	5	0
Newton, W., Frenches, Greenfield, Saddleworth, Oldham	0	2	6
Nicholson, H., 38, Argyle Street, Birkenhead	0	10	6
Nind, G., Wandsworth	0	10	6
Noble, Alexander, 24, Circus Place, Edinburgh	1	1	0
Norburn, A. H., 92, St. John's Road, Hoxton	0	10	6
Norman, E., Effingham Street, Rotherham	0	2	6
Norman, J. L., 4, Adelaide Place, Bedford	0	5	0
Norris, G., 10, Wellington Street, Teignmouth	0	5	0
North, G. T., 86, Amherst Road, Hackney	0	10	6
Northcroft, J., Plymouth	0	5	0
Northway, J., 27, Great Tower Street	1	1	0
Nosworthy, R., 236, Clapham Road, S.W.	0	10	6
Oldfield, H., 86, Villa Street, Boyson Road, Camberwell	0	10	6
O'Neill, J., Southbank	0	5	0
Osborne, J., St. John Street, Ashbourne	0	5	0
Paine, S., 7, Exchange Street, Manchester	0	10	6
Palmer, C. F., Fiveways, Edgbaston, Birmingham	0	10	6
Parker, A., High Street, Uttoxeter	0	10	6
Parr, S., Long Row, Nottingham	0	10	6
Pasmore, G.. 1, Southernhay, Exeter	0	5	0
Pass, H., 245, Wandsworth Road, S.W.	0	10	6
Pattison, G., 139, St. John Street Road, E.C.	1	1	0
Pattison, T., 418, High Street, Cheltenham	0	5	0
Payne, J. B., 63, Piccadilly, Manchester	0	5	0
Payne, S., Wallingford	1	1	0
Peake, H. F., Twickenham	0	5	0
Pearce, J., Sheep Street, Crewkerne	0	5	0
Peatson, H. R., 102, Broughton Road, Salford	0	10	6
Pegg, H., Birmingham	0	10	6
Pertwee, E., Romford	0	10	6
Pheysey, R., Waterloo, Liverpool	1	1	0
Phillips, J. P., Bideford	0	2	6
Picnot, C., Strood, Kent	1	1	0
Pickburn, G. H., 24, Heathcote Street, Kidsgrove	0	5	0
Pierson, C., North Street, Leeds	0	5	0
Pockington, J., Sydenham	0	10	6
Pollard, H. H., 140, High Street, Ryde	0	10	6
Pooley, J. C., 8, George Street, Bath	0	5	0
Portbury, G. H., 20, The Brittox, Devizes	0	5	0
Porter, J., Coalville, Leicester	0	5	0
Potts, T., Grainger Street, Newcastle-on-Tyne	0	10	6
Pound, M., 60, Leather Lane, E.C.	1	1	0
Powell, E. F., Fiveways, Edgbaston, Birmingham	0	10	6
Power,—Cheltenham	0	5	0
Pratt, E., 8, Upper Berkeley Street West, Hyde Park Square	1	1	0
Pratt, G. W., 49, Cavendish Street, Manchester	0	10	6
Price, J. M., 290, Brixton Road, S.W.	0	10	6
Pridgeon, W. J., Hawkhurst	0	5	0
Pullin, W. H., 115, Warwick Street, Leamington	0	10	6
Purnell, H. A., 337, High Street Cheltenham	0	10	0
Raimes, Blanchard and Co., Edinburgh	1	1	0
Raimes, Messrs., Hanover Street, Liverpool	0	10	0
Rainey, E., Spilsby	0	10	6
Rait, R. C., Partick	0	5	0
Raw, J. H., Parkgate, Darlington	0	5	0
Rawdin, J., Jedburgh	0	5	0
Rees, D., 188, High Street, Swansea	0	10	6
Rees, J., Llandovery	0	2	6
Rees, W. H., Duke Street, Dartmouth	0	10	0
Rhodes, S., 196, Union Street, Oldham	0	5	0
Richardson, E., Eagle House, Tottenham	1	1	0
Richardson, G., 12, Norland Place, Notting Hill	0	10	6
Richardson, R. T., 1, Wellington Road, Smithdown Road, Liverpool	0	10	6
Riches, T., Victoria Parade, Torquay	0	5	0
Rieveley, C., Cleveland Street, Birkenhead	0	5	0
Roberts, J., New Brighton, Cheshire	0	5	0
Robertson, J., 53, George Street, Edinburgh	1	1	0
Robertson, W., 52, North Bridge, Edinburgh	0	2	6
Robinson, A. F., Northgate, Darlington	0	10	6
Robinson, B., 1, Broad Street, Pendleton, Manchester	0	5	0
Robinson, J., Darlington	0	5	0
Robinson, R., 58, Yorkshire Street, Rochdale	0	10	0
Rogers, W., 38, High Street, Maidstone	0	10	6
Romans, T. W., Wrotham, Sevenoaks	0	10	6
Rook, E., Sittingbourne	0	10	6
Rossiter, F., Hastings	0	5	0
Rossiter, G., Bampton Street, Tiverton	0	5	0
Rouse, F. J., 114, High Street, Clapham	0	10	6
Rowell, R., Laygate Lane, South Shields	0	5	0
Rowland, W. H., 195, Vauxhall Road, Liverpool	0	2	6
Rowling, S., Headingley	1	1	0
Rowntree, T., 1, Westbourne Road, Barnsbury	0	10	6
Sanders, G. L., Gold Street, Tiverton	0	2	6
Sandiland, R. B., Bicester	0	10	6
Sangster, A., 66, High Street, St. John's Wood	1	1	0
Sansom, H., 30, Upper Parade, Leamington	0	10	6
Sapp, A., Winchester Street, Basingstoke	0	10	6
Saul, W. B., 2, Parade, Northampton	0	5	0
Saunders, G. J., The Cross, Oswestry	0	5	0
Saville, J., Market Place, Howden	1	1	0
Scholefield, H., Ravensthorpe, via Normanton	0	10	6
Scott, W., 43, Cadzow Street, Hamilton	0	5	0
Seath, A., Bridge Street, Dunfermline	0	10	6
Serjeant, J., 53, High Street, Bedford	0	5	0
Serpell, S., Lemon Street, Truro	0	10	6
Severs, J., 23, Stricklandgate, Kendal	1	1	0
Sharples, C. H., Fishergate, Preston	0	5	0
Shaw, R. H., Brighton Street, Seacombe	0	5	0
Shelley, H., Twickenham	0	10	6
Shephard, T. F., All Saint's Road, W.	0	10	6
Sheppard, A., 51, Hollywood Road, Brompton	0	10	6
Shields, R. J., 104, High Street, Mexborough	0	10	6
Shillcock, J. B., Bromley	0	10	6
Shipman, J. J., Bridge Street, Northampton	0	10	6
Simpson, H., 5, Hanover Place, Regent's Park	0	10	6
Simpson, R., 16, Henry Street, Dublin	0	5	0
Slater, J., Sadler Street, Wells	0	5	0
Sloman, R., Higher Union Street, Torquay	0	5	0
Smith, E., Strand, Torquay	0	5	0
Smith, J. J., Walton-on-the-Hill, Liverpool	0	10	6
Smith, N., Cheltenham	1	1	0
Smith, P. J., 2, Archer Terrace, Balham	1	1	0
Smith, W., Beast Market Hill, Nottingham	0	5	0
Smith, W., Friargate, Preston	0	5	0
Smithurst, J., Dispensary, Broad Street, Nottingham	0	5	0
Southall and Co., Birmingham (per Mr. Bannister, Clayton Square, Liverpool)	0	10	6
Southall, Bros. and Barclay, Birmingham	2	2	0
Spurling, W., 187, Marlborough Road, Chelsea	0	5	0
Spyer, N., Watlington	0	5	0
Stafford, W., Gloucester	0	10	6
Stanley, H., 10, Upper Parade, Leamington	0	10	6
Stansfield, R., 7, Steele's Terrace, Haverstock Hill	0	5	0
Steel, F. W., 283, Liverpool Road, N.	0	10	6
Stenson, J., 116, High Street, Camden Town	0	5	0
Stewardson, H., 5, St. Cuthbert Street, Bedford	0	5	0
Stratton, M. O., St. Loyes, Bedford	0	2	6
Sumner, R., 50 a, Lord Street, Liverpool	1	1	0
Swain, J., High Street, Roehampton	0	5	0
Swenden, J., Darlington	0	10	6
Sykes, T. H., 201, Lord Street, Southport	0	10	6
Taylor, E., 24, Yorkshire Street, Rochdale	0	10	6
Taylor, H. H., Linthorpe Road, Middlesborough	0	5	0
Taylor, J. B., Bedford	0	2	6
Taylor, J. U., 19, High Street, Bedford	0	10	6
Taylor, R., Simon Street, Ryde	0	10	6
Taylor, W., Saltburn-by-the-Sea	0	5	0
Terry, T., Withington, Manchester	0	5	0
Thomas, R., 2, Mill Street, Liverpool	0	10	6
Thomas, W. J., 10, Commercial Place, Aberdare	0	10	6
Thompson, H., 101, Southwark Street, S.E.	0	10	6
Thompson, J., Thirsk	0	10	6
Thompson, J. T., Richmond, Yorks	0	5	0
Thompson, T., Richmond, Yorks	0	10	6
Thorne, J. J., 338, Oxford Street, W.	0	10	6
Thring, E. J. H., Ironbridge	0	5	0
Throssel, J., 116, Fitzroy Street, Cambridge	0	2	6
Tippett, B. M., 3, Sloane Street, Knightsbridge	0	10	6
Todd, L., Fishergate, Preston	0	5	0
Tomlinson, Brothers, Fishergate, Preston	0	10	6
Tomlinson, T., 2, Lower Seymour Street, W.	1	1	0
Toone, J. V., 14, New Bond Street, Bath	0	10	6
Tribe, J., High Street, Chatham	0	10	6
Trist, R., High Street, Pinner	0	5	0
Troughton, C., 72, Old Hall Street, Liverpool	0	5	0
Tuck, W. H., 630, Mile End Road	0	10	6
Turner, C. E., 63, Great Russell Street, W.C.	0	10	6
Turner, R., Oundle	0	10	6
Turton, R. C., 70, Lansdowne Road, Clapham Road	0	5	0
Twinberrow, J., and Co., 53, Broad Street, Worcester	1	1	0
Vaughan, D., The Cross, Oswestry	0	10	6
Vigis, J. L., 12, Chapel Row, Bath	0	10	6
Wain, W., High Street, Ripley	0	5	0
Wakefield, C. H., Malvern Wells	1	1	0
Walker, J. E., Church Street, Preston	0	5	0
Walker, T. D., Dresden, Staffs.	1	1	0
Walker, W. H., 167, Lord Street, Southport	0	10	6
Walmsley, S., Kingston-on-Thames	0	5	0
Walsh, A., 50, George Street, Richmond, S.W.	0	5	0
Ward, H. S., 89, Poulton Street, Kirkham	0	5	0
Wastie, F., 183, Lower Kennington Lane, S.E.	0	10	6
Waterworth, A., Friargate, Preston	0	10	6
Wavell, J., Union Street, Ryde	0	10	6
Welch, T. K., 68, Broad Street, Worcester	0	10	6
Welford, W., Lower Parliament Street, Nottingham	0	10	0
Wellington, J. M., Oakham	0	10	6
Weston, S. J., 151, Westbourne Terrace, W.	1	1	0
Whincup, W., 404, Essex Road, N.	0	10	6
Whitburn, A. R., 174, Regent Street, W.	0	10	6
White, F., London Road, Nottingham	0	10	6
Whitfield and Sons, 45, High Street, Worcester	1	1	0
Whitfield, J., 113, Westborough, Scarborough	1	1	0
Wibmer, L. M., Tunbridge	0	5	0

	£	s.	d.
Wickham, W., 509, New Cross Road, S.E.	0	10	6
Wilford, W., 7, Lower Parliament Street, Nottingham	0	10	0
Wilkinson, G., Waterloo Road, Manchester	0	10	6
Wilkinson, W., 263, Cheetham Hill, Manchester	1	1	0
Wilks, M., Sheffield	0	5	0
Willan, W., 3, Friargate, Preston	0	5	0
Williams, J. J., 13, Desborough Place, Harrow Road, W.	0	5	0
Williams, J. T., 19, Nelson Street, Swansea	0	10	6
Williams, R. W., Liscard, Seacombe	0	5	0
Williams, W., High Street, Tenby	0	5	0
Williams, W. J., 137, Cannon Street, E.C.	0	10	6
Williams, W. P., Long Row, Nottingham	0	10	6
Williamson, E., High Row, Darlington	0	10	6
Wilson and Kitchen, 27, King Street, Whitehaven	1	1	0
Wilson, A. G., 256, Manchester Street, Oldham	0	5	0
Wilson, C. A., 10, Upper Parade, Leamington	0	5	0
Wilson, J., 11, George Street, Bath	0	5	0
Wilson, J., Horse Market, Darlington	0	2	6
Wilson, T., Beck Street, Nottingham	0	5	0
Wood, H., Westexe, Tiverton	0	2	6
Woodcock, P. D., St. Faith's, Norwich	0	10	6
Woodman, G., Basingstoke	0	5	0
Woods, C., Harleston	0	5	0
Woolrich, C. B., Uttoxeter	0	10	6
Wootton, W., 33, Liverpool Road, N.	0	10	6
Wretts, J. R., 338, Oxford Street, W.	0	10	6
Wright and Barnaby, Oxford Street, Manchester	1	1	0
Wright, Layman and Umney, 50, Southwark Street	2	2	0
Wright, G., Derby Road, Burton-on-Trent	0	10	6
Wright, W. F., 30, Regent Street, Leamington	1	1	0
Wyles, W., 338, Oxford Street, W.	0	5	0
Wyleys and Co., Coventry	1	1	0
Yates, S. P., Plough Court, Lombard Street	0	5	0
Young, G., 12, Ebenezer Terrace, Millwall	0	5	0
Young, R. F., Station Road, New Barnet	0	10	6

DONATIONS.

Atkins, Francis Thomas, 85, Lewisham High Road	5	5	0
Davis, H. L. E., 4, Stratford Road, Kensington, W.	0	10	6
Hogarth, William, Preston	10	10	0
Morgan, F. G., Petworth	0	5	0

SECRETARY'S FUND FOR CASUAL RELIEF.

Barnaby, H., Rochester	0	10	0
Hills, Thomas Hyde, 338, Oxford Street, W.	2	2	0
Holloway, John, Wood Green	0	3	6

Erratum.—From the February list of subscriptions to the Benevolent Fund, published in Journal No. 299, omit from second column of page 752, the name of—

	£	s.	d.
Morris, John, Friar Street, Worcester	1	1	0

Provincial Transactions.

ASSOCIATION OF CHEMISTS AND DRUGGISTS FOR WOLVERHAMPTON AND DISTRICT.

A meeting of the council took place in the library of the Association on the afternoon of Thursday, 26th ult. The President, Mr. W. Fleeming, occupying the chair.

After due deliberation it was decided that the following prizes should be competed for by associates attending the several classes:—

(*a*) Pharmacy and Pharmaceutical Chemistry (combined).

1st. Books chosen by the successful candidate, of the value of one guinea.

2nd. Ditto, half-a-guinea.

(*b*) Botany and Materia Medica (combined).

1st. Books chosen by the successful candidate, of the value of one guinea.

2nd. Ditto, half-a-guinea.

(*c*) Latin and the Subjects for the Preliminary Examination.

1st. Books chosen by the successful candidate, of the value of one guinea.

2nd. Ditto, half-a-guinea.

(*d*) For the best Herbarium collected between the 1st of May, 1876, and the 1st of May, 1877.

1st. Books chosen by the successful candidate, of the value of one guinea.

2nd. Ditto, half-a-guinea.

It was also resolved to request the permission of Mr. Thomas Hyde Hills (President of the Pharmaceutical Society) to apply his donation of five guineas (given to the library and museum fund) for the purpose of giving annually a prize of one guinea for the best original essay written by associates on some subject connected with pharmacy or pharmaceutical chemistry, to be called the "Hills Prize."

It was then decided to postpone for the present an application to the Pharmaceutical Society for a grant to assist in the extension of the library and museum.

After due examination several accounts were ordered to be paid, and other routine business was transacted.

On the evening of the same day the last sessional general meeting was held in the Committee Room of the Agricultural Hall, under the presidency of Mr. W. Fleeming. There was a fair attendance of members and associates.

Mr. F. J. Barrett, F.C.S., Hon. Sec., having read the minutes of the preceding meeting, announced the receipt of the following donations:—From Mr. T. Morson, F.C.S., a framed portrait of the late Mr. T. N. R. Morson. From the Editor, copies of *Burgoyne and Burbidge's Monthly Magazine*. From Mr. A. Payne, F.C.S., one guinea. From the Secretary of the Pharmaceutical Association, the 'Year-Book of Pharmacy.'

In proposing a vote of thanks the President said he felt sure their members and associates would be greatly pleased to have the portrait of a gentleman so highly venerated and esteemed added to their collection of portraits of eminent pharmaceutists, and he felt that an especial vote of thanks should be unanimously accorded Mr. T. Morson for his valuable and very acceptable donation.

The votes of thanks were then seconded by the Treasurer, Mr. Alexander Gow, and heartily carried.

Mr. Wentworth Lascelles Scott, F.C.S. (county analyst), then proceeded to make some remarks upon the "Relation between Light and Motion," exhibiting in illustration a "Crookes's Radiometer."

The experiments showed that the greater the action of light or rays of heat upon the vane the greater its velocity. Light without heat, and heat without light, alike produced a revolution of the vane. He also illustrated the absorbing of heat rays, leaving light alone to act upon the vane, and the consequence was a diminution of the velocity. The heat from gas or from the burning of spirits alike produced a revolution of the vane upon its axis.

Mr. Payne, F.C.S., proposed a vote of thanks to Mr. Scott for his address. Mr. E. W. T. Jones, F.C.S., borough analyst, seconded the motion, which was carried unanimously.

Mr. Stephen Sibthorpe, an associate, then made the following remarks on—

THE PREPARATION OF THE COMPOUND SYRUPS OF THE PHOSPHATES.

Mr. Sibthorpe said the wish that prompted him to make a few practical remarks on Parrish's Syrup was that a free discussion of the subject would lead to some useful information and solve some of the difficulties met with in making this preparation. To be successfully and properly prepared some slight deviation from Parrish's formula was necessary. Since preparing his notes he had had great pleasure in reading the valuable paper by Mr. Howie of Edinburgh, which throws very considerable light on the subject. As he had to make a supply of the syrup he borrowed from the Society's collection of useful books

'Parrish's Pharmacy,' and tried a small batch of three times the quantity ordered in his formula, but with a result so unsatisfactory that he would never try it again. The following was the method followed and the results. For some time back he had been in the habit of following the B.P. formula for making phosphate of iron as ordered in the syrup. ferri phosph., viz.—

Ferri Sulph.	30 drachms.
Soda Phosp.	27 „
Soda Acet.	10 „

He need hardly mention that on testing the filtrate from the precipitate with soda phosph. a further precipitate of ferrous phosphate was deposited, showing a loss of iron to commence with. He used the ordinary tricalcic phosphate, dissolved it in water and pure hydrochloric acid, then precipitated it with solution of ammonia. As the lime salt takes a much longer time to wash than the iron he put it on a calico filter and washed it all day with distilled water, the following morning he put the iron on to a similar filter, and washed them both thoroughly, testing the filtrates from the one for hydrochloric, and the other for sulphuric acid. Having dissolved the glacial phosphoric acid in 13 ounces of water, he then unsuccessfully attempted to dissolve the precipitates in the acid solution. After adding the two carbonates he divided the solution into two parts, to one he added 2 ounces of hydrochloric acid before getting the precipitate dissolved, and the same result was obtained by adding 4 drachms of syrupy phosphoric acid. He used the remaining 34 ounces of water to dissolve the sugar with heat, and when nearly cold divided the syrup into two equal parts, to one of which he added the solution of phosphates containing the syrupy phosphoric acid. There was at once a bulky gelatinous precipitate formed. Having filtered the syrup there remained 18 ounces of this precipitate mixed with syrup. Having washed it well with distilled water, drained it on a paper filter and dried it, it yielded 200 grains of a grey coloured powder, a mixture of ferrous and ferric phosphate and lime. Sp. gr. of filtered syrup 1·339. The solution of the phosphates containing hydrochloric acid on mixing with the syrup gave 3¾ ounces of a precipitate similar to the above, which on being washed as the former yielded 32 grains of dry powder with a similar composition. Sp. gr. of the filtered syrup 1·359. Samples of the above were laid on the table, also a sample of syrup made six weeks previously with a slight modification of the original formula. For this was used—

Glacial Phosp. Acid . . .	10 drachms.
Syrupy „ „ . . .	10 „
dissolve in	
Dilute Phosph. Acid . . .	4 ounces.

He then dissolved the precipitates and soda and potass carbonates, dissolved the sugar in 12 ounces of water and added the dissolved phosphates as usual. The result was a very fine syrup without any precipitate, and as clear when exhibited as when first made. The author added that he always made it a point to wash the precipitates quickly and with distilled water. Sp. gr. of this syrup 1·429.

After some discussion Mr. Barrett said he was very pleased to see the good example set by an associate at a former meeting followed by Mr. Sibthorpe. Really the papers read by these gentlemen were more attractive to members and associates because they were on subjects immediately connected with their every day work. And while they ought to be very thankful to the gentlemen who read interesting papers and made such elaborate experiments upon scientific subjects, he hoped that next session they would be able to bring forward more papers upon practical pharmacy than they had hitherto done. He advised the associates to take up some speciality, and thoroughly work it out, and he certainly thought that next session there would be no lack of interesting and useful notes upon matters connected with their everyday employment.

A hearty vote of thanks was then unanimously passed.

Mr. W. Long then exhibited and explained the new "Thermo-Electric Pile." He stated that Clamond's Thermo-Electric Generator possessed many advantages over the ordinary batteries. It was always ready for use, and was not readily injured. With an ordinary battery it was different; the zinc and carbon had to be frequently cleaned, the acids were liable to upsets and the fumes evolved acted upon any bright metal work that might be near. It, however, possessed some disadvantages, for the power was much less than that obtained from ordinary batteries costing not nearly so much. It might be very advantageously used for medical purposes and for electroplating and gilding. It was also useful for bells, the current being very constant. However, he thought in spite of these many advantages, most persons, on account of the expense, would put up with the inconvenience of the old ones.

Mr. Scott, in proposing a vote of thanks to Mr. Long, said if the instrument accomplished all that was stated in the prospectus, and was adopted generally, it would cause a revolution in science and also in the trades dependent upon the use of the galvanic battery.

Mr. T. Reade seconded the motion, which was carried unanimously.

The President announced that the council had that afternoon decided to award at the close of the course of lectures two prizes in each class. A written examination would be held (full particulars of which would be made known to all associates), and he trusted there would be a large number of competitors. He wished particularly to urge upon all associates the great advantages which would accrue if they competed for the prize awarded for the best original essay upon some subject connected with pharmacy or pharmaceutical chemistry; he felt sure that there would be many competitors for the herbarium prize, especially as they would be able also to send in their collections to the Pharmaceutical Society, and thus possibly win two prizes at the same time. He said that most members were aware that the present meeting brought them to the close of the present session. In looking back and taking a retrospect of the work of the Association since it was formed, he thought they had every reason to be gratified with the results of their labours. Their lectures and experiments had been of an interesting and practical character, and, with the exception of one unpleasant incident, which should be a bygone, their gatherings had been very unanimous, and a kindly spirit had pervaded them. He was sure the purpose for which the Association was formed had been fully answered. It had been said that some antagonism existed between chemists and druggists in the same town. He could not say that it had been so in that town, but, if so, nothing could be more conducive to do away with that antagonism than the friendly gatherings of this Association. He reminded the younger members of this Association that it was very necessary for them to study hard, as the examinations of the Pharmaceutical Society of the present day were much more difficult to pass than they were a few years ago. In conclusion, he proposed a cordial vote of thanks to the Secretaries for their earnest efforts in promoting the objects of the association.

This was seconded by Mr. Scott, and carried *nem. con.*

In responding Mr. Barrett remarked that although the council had arranged to give so many prizes and although they had actually received promises of help they had still a very considerable sum to collect so that they might not touch the general fund.

A vote of thanks to the Treasurer (Mr. Gow) and to the President brought a very pleasant meeting to a close.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, 18th May, 1876, Professor Abel, F.R.S., President, in the chair. The first paper read after the usual business of the Society had been transacted was on "The Action of Malt Extract on Starch," by Mr. C. O'Sullivan, showing that under these circumstances it is converted into a mixture of maltose and dextrin, the proportion of which varies with the temperature at which the reaction takes place. A communication was then made by Dr. H. E. Armstrong and Mr. Gaskell, on "Metaxenol," the metadimethylated phenol. There were also papers on "The Gases Enclosed in Cannel Coals and in Jet," by Mr. J. W. Thomas; on "Phenomena Accompanying the Electrolysis of Water with Oxidizable Electrodes," by Dr. J. H. Gladstone and Mr. A. Tribe; and on "The Estimation of Hydrogen Occluded by Copper with Special Reference to Organic Analysis," by Dr. J. S. W. Thudichum and Dr. H. W. Hake. The meeting was then adjourned until Thursday, June 1st, at 8, when the following papers will be read:—1. "On Hematine, and Phosphorized Compounds contained in Blood Corpuscles," by Dr. Thudichum and Mr. Kingzett. 2. "On the Liquid Carbon Dioxide from Different Sources," by Mr. W. N. Hartley. 3. "Note on the General Applicability of the Frankland and Armstrong Combustion Method for the Estimation of Carbon and Nitrogen in Organic Compounds," by Dr. Thudichum and Mr. Kingzett. 4. (1) "On Peroxides." (2) "On the Estimation of Nitrogen." (3) "On Chromic and Perchromic Acids," by Mr. Thomas Fairley. 5. On Aluminium Nitride," by Professor Mallet. 6. "Chemical Studies," by Professor Dewar. 7. "On the Volumetric Estimation of Mercury," by Professor Tuson and Mr. Neison.

SOCIETY OF ARTS.

Some Methods of Estimating the Illuminating Power and Purity of Coal Gas.*

BY A. VERNON HARCOURT, M.A., F.R.S.,

Reader in Chemistry at Christ Church, Oxford, and one of the Metropolitan Gas Referees.

(*Concluded from page* 916.)

Selenium thus employed is said to be unaffected by the obscure heat rays, but to be affected by the red end of the spectrum in a greater degree than corresponds to the impression produced by that part of the spectrum upon the human eye. This defect may be remediable, as Dr. Siemens suggests, by interposing a sheet of glass with a green tinge. But a difficulty which must be overcome before any physical effect of light is accepted as a substitute for its impression upon the eye, is that of proving an exact correspondence between the physical and optical effects.

This vacuous globe containing the finely poised discs, which revolve rapidly when brought near a lamp, has already become familiar. It is called by its inventor, who is also the discoverer of the repulsive force exercised by radiant heat and light, a radiometer. Mr. Crookes has ascertained that the difference between the repulsive effect exerted upon the black and white surfaces of the discs, respectively, as measured by the rate of rotation, varies directly with the amount of light or radiant force falling upon them. Two candles, for example, at any given distance produce twice the rate of rotation which is due to one, and the effect upon the instrument of a given light varies inversely as the square of its distance.

But in this case, much more than as affecting the electric conductivity of selenium, radiant light needs to be separated from radiant heat, before the motion due to its repulsive force can be employed as a measure of illuminating power. Through the kindness of Mr. Crookes, I am able to show you the instrument which he has devised for comparing the amounts of light, separated from the rays of greater and less refrangibility, issuing from two or more sources. A pith beam, suspended horizontally in a vacuous globe by a single fibre of silk, is blackened on both sides, for half its length. When light falls upon one side of this beam, the blackened half recedes, and in the absence of other forces, the beam would set itself with its white end pointing towards the light. To the centre of the beam are attached, in a transverse direction, a small magnet and mirror. The former serves, when a magnet is placed beneath the apparatus, to make the beam assume a particular position, from which it can be displaced more or less, by the incidence of a stronger or weaker light on one side, but to which it returns when no longer solicited by other forces. The latter serves, by reflecting a pencil of light on to a scale some distance off, to render evident a small displacement of the beam. If two sources of light are placed on each side of the beam, such and at such distances that no displacement occurs, the amounts of radiant force emanating from each and acting on the two sides of the beam are equal. In order that the forces thus compared may be due to radiant light only, two glass cells with parallel sides are filled with solutions of sulphate of quinine and of alum, to cut off the invisible rays at each end of the spectrum.

Errors of observation in judging of the relative brightness of the two sides of a partially translucent disc may hereafter be got rid of by the adoption of one or other of the methods which I have attempted to describe. But two problems remain, a satisfactory solution of each of which is more necessary to the establishment of a trustworthy system of photometry than the substitution for the disc of some more absolute criterion of illuminating power.

The first problem is, what standard shall be used for the measurement of artificial light; the second, what burner shall be used in testing the illuminating power of coal gas.

The present unit, as defined by Act of Parliament, is a sperm candle of six to the lb., burning 120 grains an hour. This is convenient as an unit, since the light given by different lamps and gas-burners may be described, without the use of high numbers or of decimals, as a light of 10, or 15, or 20 candles. But without further definition it is by no means satisfactory as a standard, since the light which a candle gives depends not only upon the material of which it is made and the rate at which it burns, but also upon the construction of the wick. Some differences of opinion exist among those experienced in candle photometry as to the extent of fluctuation to which the results thus obtained are liable. According to my own experience, sets of observations made one after the other with the same sample of gas, and with candles from the same packet, often agree very closely, and seldom differ to the extent of one candle. Occasionally, however, without any apparent cause, the results are more divergent; and I have found a considerable difference in the results and in the degree of uniformity with different packets of candles obtained from different dealers. What the burner is to gas, its wick is to a candle; and just as the definition of the illuminating power of gas has been unsettled by improvements in the burner used for testing, so it may also be altered by the application of similar attention and skill, on the part of the candle maker, to the conditions under which the maximum illuminating power can be developed from the combustion of 120 grains of sperm per hour.

If it be possible, as I hope to show that it is, to furnish a more constant standard of comparison for artificial lights than the sperm candle, the term candle might still be retained as the name of an unit otherwise defined, just as "foot" has come to be the name of an exact measure.

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* Paper read before the Chemical Section of the Society of Arts, March 31st, 1876.

In Paris the photometric standard is the Carcel lamp, burning colza oil at a given rate. Some years ago Mr. Keates proposed the use of sperm oil, and I understand that such a lamp has recently been constructed on an improved principle by him and Mr. Sugg, I have not personally made trial of any of these lamps, but probably they give a light more constant and more comparable with that of a gas flame than is the light given by a pair of candles. At the same time, the very fact that an improved form of lamp has recently been constructed,—if, as I believe, the improvement relates not only to the constancy but to the illuminating power of the lamp—suggests the likelihood that one standard lamp might differ in some degree from another, and that further improvements might gradually creep in. With a lamp, as with a candle, the wick is a most important element, and one which it is exceedingly hard to fix or define.

It was to meet the uncertainty as to the construction of the wick—and also that as to the composition or purity of the liquid fuel—that Mr. Crookes devised this little lamp which he has kindly lent me. Its wick consists of a certain number of platinum wires of a certain size. The liquid which burns is a mixture of two pure substances, alcohol and benzol. The light is said to be much more constant than that of a candle; but the flame in its present form is too small to be conveniently compared with that obtained from gas burning at the rate of five cubic feet an hour.

At present, I think it must be admitted that the problem of devising a satisfactory photometric standard, which can easily be obtained at different places, and is easily applied, and is such that when prepared with due care, absolute confidence may be placed in its uniformity, has still to be solved.

Upon this problem I have been working at intervals during the last two or three years, and though I am still occupied with the work and have not yet completed it, I may be permitted to lay before you the results at which I have arrived, and to show what would be the operations required for testing the illuminating power of coal gas under the system which I propose.

In place of candles or lamps I propose to use a standard gas. As no single gas exists which is suitable, a mixture of gases must be employed; and that which I believe to be most suitable is a mixture of hydrogen with pentane or with pentane and hexane. The two substances last named constitute the most volatile portion of American petroleum. Under a pressure of one atmosphere pentane is a liquid at temperatures below 30° C., and hexane at temperatures below 68° C.; but under a pressure of one-tenth of an atmosphere, and probably under somewhat greater pressures, both these substances are gases. To reduce the pressure upon them, and also to reduce their illuminating power to that of ordinary coal gas, they must be mixed with another gas. I have tried both air and hydrogen for this purpose, and I prefer hydrogen for the following reasons. A smaller quantity of petroleum, in about the proportion of two to three, is needed with hydrogen than with air for the same illuminating power, and thus the petroleum gas is under a less pressure, and further from its point of condensation. The gas prepared with hydrogen has about the same specific gravity as coal gas, and therefore, presumably, the same burner is suitable for both, whereas the gas prepared with air is, of course, heavier than air. In preparing the standard gas with air, a meter must be used to measure its volume, and corrections applied for the variations of barometer and thermometer, whereas by acting on an excess of zinc with a known weight of sulphuric acid, a quantity of hydrogen is obtained, which is accurately known without the need of either measurement or correction.

The following, according to Cahours, are the constituents of petroleum boiling below 100° C.:—

Pentane, C_5H_{12}, sp. gr. at 17° C., 0·628, boiling point, 30°.
Hexane, C_6H_{14}, sp. gr. at 16° C., 0·669, boiling point, 68°.
Heptane, C_7H_{13}, sp. gr. at 16° C., 0·6995, boiling point, 92° to 94°.

Starting with the lightest petroleum which is obtainable commercially, I have rectified it with the following results. The composition of the samples is calculated on the supposition, which is probably nearly correct, that by rectification below 65° heptane may be excluded.

Petroleum	rectified	below 45°	sp. gr.	at 15°,	0·635
,,	,,	45°—55°	sp. gr.	,,	0·647
,,	,,	55°—56°	sp. gr.	,,	0·664
,,	,,	below 65°	sp. gr.	,,	0·646

		Below 45°	45°–55°	55°–65°	Below 65
Composition of samples	Pentane	82·9	53·7	12·2	53·1
	Hexane	17·1	46·3	87·8	43·9

The proportion of hydrogen, which must be added to the hydrocarbons to produce gas of constant illuminating power, will vary slightly according to the composition, or specific gravity, of the sample of petroleum employed. It is on this point chiefly, a point of capital importance, that I need still to make further experiments. I have worked chiefly with the sample whose specific gravity is 0·646.

To prepare standard gas I employ the following apparatus:—A flask of from 3 to 4 litres capacity, into the mouth of which a thistle-funnel and elbow tube pass through a plug of india-rubber; a wash bottle of about a litre capacity; a gas-holder capable of containing 7 or 8 cubic feet; one or more graduated vessels for measuring out the required quantity of dilute sulphuric acid; a Winchester quart, fitted with pinchcock and inlet-tube for air, to hold the measured quantity of acid and deliver it by degrees into the generating flask; a pipette of 70 or 100 cubic centimeters capacity, to measure the required dose of petroleum, and deliver it into the wash-bottle.

The operation of preparing standard gas is as follows:—The flask is filled one-third with granulated zinc, and connected with the wash-bottle, two-thirds of which is filled with water. About 100 cubic centimetres of dilute acid is first poured upon the zinc, which generates sufficient hydrogen to sweep out air from the flask. When the evolution of hydrogen has ceased, which requires about half an hour, the wash-bottle is opened and the pipetteful of petroleum discharged into it, after which the wash-bottle is at once closed and connected with the gas-holder. The Winchester quart, holding the measured volume of dilute acid, is supported in an inverted position, and its pinchcock is so adjusted that the acid may flow in a rapid succession of drops into the generating flask. Hydrogen passes in a rapid stream through the water in the wash-bottle and through the layer of petroleum which floats upon the surface of the water, and the mixed gases pass on into the holder. From this point the operation needs no further attention. When all the acid has run in, the evolution of hydrogen gradually diminishes, and almost ceases by the time that the liquid, heated by the action, has become cold. The gas-holder then contains the whole of the petroleum which was taken, and a quantity of hydrogen which is also exactly known, since the sulphuric acid has saturated itself with zinc and consequently has yielded 1–49th its weight of hydrogen.

The water in the wash-bottle serves to prevent any acid spray passing to the holder, to provide a level floor for the evaporation of the petroleum, and to furnish the heat which the petroleum needs to pass from the liquid to the gaseous state. The absorption of heat, as the petroleum volatilizes, reduces the temperature of the contents of the wash bottle considerably below that of the surrounding air. Consequently the standard gas is formed at a temperature below that to which it is afterwards subjected. In spite of this reduction of temperature, the whole of the petroleum has generally disappeared when two-thirds of the hydrogen has passed over. Consequently the standard gas is formed under a pressure exceeding by at least ¼th that to which it is afterwards subjected. It is therefore a permanent gas under any conditions to which it is likely to be exposed.

I have here two similar tubes, standing vertically in a vessel of water, which have been filled to the same level, one with air, the other with standard gas. When ice is placed round them, so that their temperature falls to 0°, the contraction is the same in both cases, showing that the standard gas behaves like a permanent gas, and that no liquid petroleum is condensed out of it.

The dilute sulphuric acid which I have employed has the specific gravity 1·217, and contains 0·352 grains of pure sulphuric acid in 1 cubic centimetre. It may be made, approximately, by mixing 26·5 volumes of oil of vitriol with 100 volumes of water. The strength of the dilute acid is unimportant, provided it be exactly known, and provided it is not such that sulphate of zinc crystallizes out and hinders the action of the acid.

It will be seen that the adjustment of the illuminating power of the gas is thus practically brought, with an acid of known strength and a particular sample of petroleum, to a question of rightly proportioning the volume of acid to the volume of petroleum. The following are some of the results I have obtained with acid of the above-mentioned strength and petroleum distilled below 65° and having the specific gravity 0·646. The numbers given under the head of illuminating power are in most cases the mean of four or five different sets of observations made with different samples of standard gas prepared according to the same recipe.

Vol. of Dilute Acid. Sp. Gr. 1·217	Weight of pure Sulphuric Acid.	Weight of Hydrogen.	Weight. of Petroleum.	Ratio of Petroleum to Hydrogen by weight	Illuminating power (candles).
c. c.	Grams.	Grams.	Grams.		
1680	593	12·07	45·22	3·75	14·5
1640	579	11·78	”	3·84	1·52
1615	570	11·6	”	3·9	15·9
1610	568	11·57	”	3·91	15·97
1605	567	11·53	”	3·92	16·1
1550	588	11·35	”	3·98	16·6

Hence it appears that a mixture of one part by weight of hydrogen and 3·91 parts by weight of light petroleum, form a gas of 16 candles' illuminating power. I propose the use of this gas as a photometric standard. It consists of 90·9 volumes of hydrogen and 9·1 volumes of gaseous petroleum. It contains in one litre 0·265 grain of carbon. It is easily prepared of constant composition, and in any required quantity.

I have still to determine what modification needs to be made in the proportion of hydrogen, that is, of dilute acid employed, with samples of petroleum of different specific gravities. Probably it will be possible to connect by a simple formula the specific gravity of any sample of light petroleum with the proportion of sulphuric acid which must be used with that sample, in order to furnish 16 candle standard gas.

It remains for me to describe briefly the form of photometer which Mr. F. W. Hartley has arranged for me, in which to compare the sample of gas to be tested with the standard gas. It corresponds to the ordinary open photometer, with a 60-inch bar, except in the following particulars.

Both ends are furnished with similar "London" argand burners, with the usual appliances for measuring and regulating the current of gas, all in duplicate. By a suitable arrangement of cocks either sample of gas may be sent into either meter, and thus to either burner. The centre line of the bar is numbered 16, and two scales having this line in common are drawn out, one beneath the other, so that the position of the pointer which travels with the disc can be read upon each.

One scale is to be used when the standard gas is burning on the right, and indicates the value in candles of the gas compared with it; the second scale is the reversed image of the first (corresponding to it as the image of an object in a mirror does to the object), and is to be used when the standard gas is burning on the left. When a reading has been made on one scale, the samples of gas are to be reversed and a second reading made on the other scale. The geometric mean of these two readings is the true illuminating power of the sample of gas tested, depending for its accuracy upon the quality of the standard gas, but independent of variations of temperature and pressure, and of all inequalities in burners, meters, or disc.

Comparing thus directly one gas with another it is likely that the nature of the burners employed will make little, if any, difference, at least where the gas tested has nearly the same illuminating power as the standard gas. If so, an indirect but important advantage that would accrue from the adoption of this method is, that a question which has been hotly debated, as to what kind of burners ought to be employed in testing the illuminating power of gas, would disappear altogether.

Parliamentary and Law Proceedings.

PROSECUTION UNDER THE SALE OF FOOD AND DRUGS ACT OF A WHOLESALE DEALER UPON A WARRANTY.

At the Bradford Borough Police Court, on Saturday last, Joseph Nuttall, 33, North Wing, was charged with selling milk which had been adulterated with ten per cent. of water. The Town Clerk prosecuted.—He said that the Act provided that when a charge was brought home to the vendor of selling an adulterated article, the bench might allow him to go if he should produce a warranty that the article he sold was represented by the person from whom he himself bought it to be good and genuine. When Nuttall was spoken to on the subject of the charge, he claimed the benefit of a warranty which he held from a person named John Hanson, who supplied him with the milk. The warranty ran in this form:—"I, John Hanson, agree to supply Joseph Nuttall, of 33, North Wing, Bradford, with genuine pure milk." This was a continuing agreement, and under it Nuttall said he had bought the milk. He (the Town Clerk) had had a good deal of trouble to find a case of this kind, and bring it in a complete form before the bench, but he was in a position in this case to accommodate either Nuttall or Hanson. If Mr. Nuttall wished to bear the responsibility of the sale, he was before the court; if he sought to escape under the guarantee then he would bring Mr. Hanson before them.

Mr. Brooker, inspector of nuisances, proved the purchase of the milk, and also produced two certificates of analyses which he had received from Nuttall, as obtained by him in reference to Hanson's milk. One was dated May 31st last year, and stated that the sample had been deprived of a great proportion of its cream; and the other was dated 24th February last, and stated that the sample submitted was adulterated with 10 to 15 per cent. of water. He also produced the agreement between Hanson and Nuttall, which was dated March 1st, 1876, and which provided that the former should supply genuine pure milk to the latter at the rate of 9d per gallon in summer, and 10d. per gallon in winter, delivered clear. Nuttall told him that he bought the milk under that guarantee, that it was sold in the same condition as he received it. Nuttall also wished him to go to the Midland Station and see the milk taken out of the can as it arrived there. Witness did so, took out a sample, and had obtained a certificate of the analysis of it, on which other proceedings would be taken.

Nuttall, in his defence, said he sold the milk as he had received it, and he relied on the guarantee for its purity. The magistrates suspended their judgment until the case against Hanson was heard.

John Hanson, farmer, Salterfirth, near Colne, was then charged with giving a false warranty, in writing, to Joseph Nuttall, in respect of the milk. Nuttall was called as a witness to prove the agreement. He said it was signed only about a month ago, though it was dated March 1st.

Mr. Rimmington and Mr. Booker having given evidence, Mr. Hutchinson adressed the court for the defence. He contended that the Act did not contemplate the giving of a guarantee for an article which was not in existence. The warranty produced was for a year, and referred to milk which was not in existence. What was contemplated by the Act was a warranty for an article in existence.

The Town Clerk: Then he must have a warranty for every can of milk.

The Magistrates said they had entirely agreed the warranty was a good one.

Mr. Hutchinson also contended that there was no certainty that the milk was adulterated with water, as milk in its normal condition contained about 88 per cent. of water. He called a brother of the defendant, who swore that the milk was sent to Bradford in the same condition as it left the cows, but the can (which was supplied by the defendant Hanson) was unlocked.

In reply to a question, Nuttall stated that he had shown Hanson the certificate of analysis he obtained in February last, and after that time the milk improved.

The magistrates fined Hanson £10 and costs, or two months' imprisonment, and the case against Nuttall was dismissed.—*Bradford Chronicle.*

POISONING BY WHITE HELLEBORE.

A long inquiry has been held by a coroner's jury at Strood, near Rochester, as to the death of Mr. Charles Collier, a retired publican. It appeared that Mrs. Collier some weeks ago applied at the shop of Mr. Stevens, chemist, Strood, for some black brimstone for her husband. He did not use any medicine obtained at this time, but he took some on Sunday. He immediately became ill, and died after great suffering. It turned out that an apprentice in the shop had by some means supplied white hellebore in mistake for black brimstone. The jury returned this verdict:—"The jury believe that Charles Collier died from taking the poison called white hellebore, and that it was bought at Mr. James Stevens's, Strood, and that it was supplied by misadventure."—*Times.*

Notes and Queries.

[512]. -FURNITURE CREAM.—"Jabez" would be glad if anyone would kindly give a good receipt for Furniture Cream.

Obituary.

THOMAS DRYDEN MOFFAT.

We regret to have to announce the death on 15th inst. of Mr. Thomas Dryden Moffat, of Union Street, Glasgow.

Mr. Moffat after acquiring a knowledge of pharmacy during a five years' apprenticeship with Messrs. Gardner and Ainslie, Edinburgh, came to Glasgow in 1856, where he soon became one of the most active members of the Chemists and Druggists' Association, of which he was elected President in 1867–8.

Having carried on business successfully as chemist and druggist for several years he turned his attention to the study of medicine, and in 1872 passed the examination of the Faculty of Physicians and Surgeons, Glasgow, and subsequently that of the Royal College of Surgeons, Edinburgh.

His great practical knowledge led to his being appointed in 1874 lecturer on Materia Medica to the Royal Veterinary College; and as a teacher he was remarkable for his earnest efforts to train his students to be content with nothing less than a complete mastery of the subject.

Although his energies were now turned in a somewhat different direction, he preserved a warm interest in everything connected with pharmacy, and the last public act of his life was to attend the closing meeting of the Chemists and Druggists' Association, four days only before his death.

His frank and kindly manner endeared him to all who came into contact with him, and the wide range of his information in all things bearing on natural history, joined to the readiness with which he imparted to others the results of his carefully obtained experience in his own more peculiar department of pharmacy, render it a matter of profound regret to his friends that one before whom a long and prosperous career seemed opening should be taken from them at the early age of forty.

Notice has also been received of the death of the following:—

On the 9th of May, 1876, suddenly, of heart disease, Mr. Christopher Bancks, Chemist and Druggist, of Market Place, Lichfield. Aged 53 years.

On the 14th of May, 1876, Mr. Frederick Septimus Prosser, Chemist and Druggist, of Gateshead. Aged 47 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE MILK OF SULPHUR QUESTION.

Sir,—My own experience in this matter has been ten times as long as that of "Jacobus," and I have never known any person to prefer the impure to the pure milk of sulphur who understood the difference.

The preference for the "adulterated variety," as Pereira calls it, I have invariably found to be due to ignorance. In my opinion it is not by following when we ought to lead—not by fostering the ignorant prejudices of our customers—that we shall best serve either ourselves or them, but by honestly striving to direct their judgment aright, and to rid them as far as possible of erroneous notions, whether of old or recent origin.

JOHN T. MILLER.

May 22, 1876.

THE SALE OF PATENT MEDICINES BY UNREGISTERED PERSONS.

Sir,—I regret I cannot agree with the remarks of your correspondent, "J. R. S.," on the above subject. Our compulsory examinations have necessarily abolished, as in the higher grades of surgeons and physicians' practices, the application of the "free trade" principle to our transactions; if not, where is their use? As far as the public is concerned they are now well protected, but unfortunately the chemist is but very little better off for his forced examinations. The drugs and chemicals he is examined in can, in most instances, be sold by the grocer or the cobbler, *sine exam.* I maintain, sir, that the law existing in France as to the rights of pharmacists is a wholesome and just one, and one that I should like to see extended to the chemists of England; and I hail with great satisfaction the movement that I see advetrised in the Journal towards suppressing this unjust system of indiscriminate dealing.

GEO. DELVES.

187, *High Street, Exeter, May* 15, 1876.

Sir,—I think your correspondent, "J. R. S.," must be one of those who, I regret to say, set the bad example now followed by so many grocers of selling patents at cost price.

I sincerely hope the trade will not take his advice, for what could be more absurd than that all of us should retail at cost price or 5 per cent. profit. Why the public would have to swallow physic as they now do bread and butter, for us to get even a bare existence! And should it even have the effect of stopping the grocers' sale, what benefit should we derive? We should be obliged to continue selling at the same price, for we all know how difficult it is to raise the price after once lowering it. I certainly think we have a right to some protection from the legislature; the examinations are now compulsory and it is only after much expense and time that a man can commence business as a chemist and druggist, and yet when he has gone through all this, obtained his diploma, and opened his shop in the fair hope of getting a respectable and remunerative business, he perhaps finds (as is the case in this neighbourhood) two or three larger establishments publishing bulky price lists of every drug, chemical (barring the dangerous poisons), and article he has in his shop at a very trifle over his own wholesale price list, and in some cases, less.

For my own part I mean to keep up my prices, candidly telling my customers I get a fair profit on every article I sell, and cautioning them not to be deceived by the unfair price charged on a few prominently priced articles, as practised by these grocers, since they must get an exorbitant profit on others, or sell inferior articles. If the worst comes to the worst, and I find the trade gradually merging into the grocers' hands (as it undoubtedly must should the present system continue and increase), why, I'll cut the trade altogether, but meanwhile I will not cut the prices.

FAIR PROFIT.

"HOMŒOPATHIC SOLUTIONS."

Sir,—Your reprint of Dr. Farquharson's paper fully exposes the anomalous evasion of important Acts of Parliament; it is difficult to comprehend why homœopathic druggists have not been compelled to comply with the provisions of the Pharmacy Act, either for the sale of mother tinctures and solutions, or attenuations of any strength whatsoever, it being equally incumbent on the allopathic chemist to register the sale of 1-12th grain of strychnine in solution, as it would be for 5 grains, for the Act does not permit the exercise of private judgment as to the quantity of any poison it is necessary to register; yet, in the face of this, the homœopath neither registers the sale of strong solutions, nor even labels his ordinary dilutions "Poison."

Dr. Farquharson states that he has never been able to obtain any physiological effect from the attenuations, and that they will not present any analytical indication of the presence of their supposed active principles. Now, if this be so, surely it is more within the scope of the Adulteration Act than the excusable sale of milk of sulphur in place of sulph. præcip. P. B. If I sell 1 oz. sp. vin. ten. for 1 oz. sp. æth. nit., and label accordingly, I feel certain I should be deservedly mulcted in a heavy penalty; but the public analyst is ignored by the vendor of a solution labelled "Tr. Aconit," entirely destitute of that potent alkaloid; logically, one fails to distinguish the difference between the two examples.

Again, the mere fact of a pamphlet or counter bill recommending a preparation of the Pharmacopœia for the most trivial ailment is held at once to necessitate a patent medicine stamp, yet the homœopathic chemist retails his preparations and tinctures (accompanied by circulars or manuals advising their use for every conceivable illness) without the remotest apprehension of a visit from the Inland Revenue authorities; this however is a matter merely affecting the trading interest; but the free sale of poison endangers the whole public safety. The preamble of the Pharmacy Act shows abundant evidence that the intention of the legislature was to include all retail vendors of poisons and apparently the wording of the Act presents no legal difficulties in the way of making it practically effective.

20, *Greenwich Road, S.E.* LEO ATKINSON.

THE EXAMINATION PASS LISTS.

Sir,—The change recently made in publishing the names of successful candidates in the examination pass lists alphabetically instead of in order of merit can hardly be considered to have been one of necessity and is certainly no improvement. Such being the case one wonders what reasons should have actuated the Board of Examiners in recommending the change, and since they have not transpired, whether they are good, bad, or indifferent, outsiders have no means of estimating.

There are, however, good reasons on the part both of principals and students why the original plan should have been retained; these have been clearly stated by Mr. Proctor. Personally, as a student, I consider the original plan much to be preferred and have reason to believe I am not alone in such preference.

I would, therefore, urge with Mr. Proctor and your Belfast correspondent that the matter should be re-considered, with the view of a return to the original plan of publishing the names of successful candidates in order of merit.

ADOLESCENS.

T. Heighington.—(1) The plant sent is probably *Orchis mascula*, but it is impossible to say unless the flower be sent. (2) The 'Handbook of British Plants,' by Lowndes Notcutt, published at 171, Fleet Street. (3) It is only necessary to preserve such roots as present characteristic peculiarities; as a rule they should be preserved separately from the remainder of the plant.

L. Thompson.—Hooker's 'Student's Flora of the British Islands,' published by Macmillan.

J. W. Yeats.—The formula of the so-called Aitkin's syrup was given in vol. iv. of the present series of this Journal, p. 610.

"*Suum Cuique.*"—In accordance with general custom we do not return letters that are not considered suitable for publication. Though we are always glad to receive communications, and if possible to publish them, you are mistaken in supposing that our "correspondence columns were at anybody's service." In some instances the supplementary institution of the waste paper basket is an indispensable requisite.

J. H. B.—We must disclaim any responsibility for statements made by advertisers.

T. Thompson.—Wanklyn's 'Water Analysis' and Sutton's 'Volumetric Analysis,' are good books on the subject, but we are doubtful whether they would be of much service under the conditions mentioned.

E. Nuthall.—(1) Refined cane sugar may be obtained from most grocers. (2) Try Schorlemmer's 'History of the Carbon Compounds.'

B. C. E. Brodie.—We do not understand the first part of your question. In the second case the bichromate of potash would probably be reduced, resulting in the carbonization of the tartaric acid.

R. Lincolne.—We think it probable that you misunderstood or misinterpreted the remark.

C. R. H.—*Chelidonium majus.*

G. H. Seward.—The specimens are zoophytes, not seaweeds: *Flustra foliacea* and *Cellularia reptans.*

J. Wylde.—The "injustice" that you have "felt so strongly from the first" and which you say has caused you to protest by holding aloof from the Society and also from subscribing to the Benevolent Fund, has no existence except in imagination. It is not true that "at present any person in business before a certain date is entitled to be registered as a Pharmaceutical Chemist," unless he has passed the Major examination. We hope therefore that your misapprehension being removed, your protest will cease.

T. Casely.—Add the phosphorus to the oil of lemon contained in a bottle and heated by means of a water-bath, cork, and shake well till dissolved, then add the spirit.

N. J. Lewis.—It is probably due to the separation of some resinous matter held in solution by the spirit in the concentrated infusion.

Stowmarket.—Whichever way you make the mixture there is sure to be a separation of quinine, if the citrate be B.P. We think your mode of dispensing it is wrong. It is a rule to have as little chemical action take place as possible. You mix three active medicines and on the addition of water a change is evidenced by the difference in colours. The only way to dispense such a mixture accurately is to send the Sp. Ammon. Ar. in a separate bottle and order so many drops to be taken with each dose, or consult the prescriber and point out the incompatibility of the mixture.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. Sowerby, Mr. Coram, Mr. Barclay, Mr. Lewis, Messrs. Young and Postans, Beta, S., "*Enitar.*"

SOLUBLE MERCURIAL ALBUMINATE.*

A New Mercurial Preparation for Hypodermic Use.

BY PROFESSOR H. V. BAMBERGER, VIENNA.

In a paper that has appeared in the Vienna *medizinischen Wochenschrift* (No. 11), Professor Bamberger treats of the hypodermic use of medicaments, and especially of experiments which he has made to discover a mercurial preparation suitable to this method of administration. The exceedingly rapid action of such injections in cases of cutaneous disease and syphilis is established; but not unfrequently the injection is followed by a very vehement smarting, local inflamation, abcesses, indurations, and in some cases even gangrenous affections.

After various experiments to discover a sufficiently non irritant compound of mercury for hypodermic use Professor Bamberger thought of the mercuric albuminate, using sodium chloride as a solvent.

If a liquid containing albumen be precipitated with mercuric chloride and then a moderately concentrated solution of sodium chloride added, the precipitate formed is perfectly redissolved or only a slight turbidity remains, and the solution is permanent. The solution is neutral or has only a weakly alkaline reaction. Towards nitric acid, tannin, potassium ferrocyanide and alcohol, and when heated, it behaves like a solution of serum albumen; but towards acetic acid and tribasic phosphoric acid its behaviour is different, the albumen being completely precipitated by both of them.

If the mercurial albuminate be placed on a filter, allowed to drain, washed, and then treated with sodium chloride, it will be found that the solubility decreases in proportion to the length of time it is subjected to these processes.

If to a liquid containing albumen—for instance, diluted egg albumen—mercuric chloride is added insufficient to precipitate all the albumen a distinct mercurial reaction can be detected in the filtrate with sulphuretted hydrogen, ammonium and sodium sulphides, etc. This is due to the fact that egg albumen, and probably all albuminous liquids, contain alkaline chlorides, which hold a part of the mercurial albuminate in solution. Consequently from such a liquid the whole of the albumen can never be precipitated by mercuric chloride.

In preparing the soluble mercurial albuminate it is best to use egg albumen. This is freed from membrane, diluted with water and filtered, then precipitated with solution of mercuric chloride, and the precipitate immediately without filtering dissolved in sodium chloride and filtered. The process can be varied by adding first the sodium chloride solution and then the mercuric chloride solution, in the correct proportion as mentioned hereafter. In this case no precipitate is formed, but a directly soluble albuminate.

There are, however, a number of details to be observed. The chief difficulty in the process is in the filtration. It is known how slowly concentrated solutions of albumen filter and how difficult it is to obtain them perfectly clear, though this is of especial importance for hypodermic injections. The albumen diluted with water is first strained through a not too coarse cloth, then allowed to flow through a glass funnel having a bulb filled with glass thread; in this way it is obtained clear or at the most slightly opalescent.

If now the albumen is precipitated with mercuric chloride and the precipitate dissolved in sodium chloride the solution is always somewhat turbid and should stand at least two or three days quietly in a covered or closed vessel. It is then filtered either once more through glass thread or through a previously moistened filter of Swedish paper. The first portions pass through more or less opalescent; gradually the liquor passes through more and more slowly, but it is now perfectly clear.

At first Professor Bamberger avoided making the solution dilute, because as the liquid cannot be subjected to heat subsequent concentration can only be carried out in a vacuum or over sulphuric acid; he therefore diluted the albumen with only 1½ or 2 volumes of distilled water; the sublimate solution was made to contain 5 per cent. and the sodium chloride solution 18 to 20 per cent. of the respective salts.

The following was the formula originally published by Dr. Bamberger, as representing the proportions used in preparing a solution, a cubic centimetre of which should represent one centigram of mercuric chloride:—

Solution of Albumen (1 in 1½ or 40 per cent.)	100	parts
Solution of Mercuric Chloride (5 per cent.) .	60	„
Solution of Sodium Chloride (1 in 18 or 20) .	60	„
Distilled Water	80	„

The filtration, however, of a moderate quantity under these conditions lasted through several days, and the operation could not safely be hastened. The experiment made with one of Bunsen's rapid filters miscarried completely.

But subsequent experiments showed that the dilution of the albumen with three or four times its volume of water is quite permissible, as a solution can then be obtained representing, as shown by the foregoing formula, 1 per cent. of mercuric chloride, which is sufficient for practical purposes. Thus diluted, if passed first through a cloth and then divided between two plaited filters, 250 to 300 c.c. can be filtered in three or four hours, and the filtrate is perfectly clear.

Dr. E. W. Hamburger proposed* to overcome the difficulty by removing the precipitable albumen, *i.e.*, albumen held in solution by alkali, by previous treatment with an acid, taking care to use sufficient, and to avoid an excess which would redissolve the precipitate. The quantity required in one experiment for 260 c.c. of diluted albumen (1½ vol. of water) was 15·6 c.c. of dilute hydrochloric acid (10 per cent. of HCl). Dr. Hamburger found that the liquor then filtered quickly and clear, especially if the flocculent precipitate was thrown last upon the filter. Carbonate of soda is added to the filtrate to restore the original alkalinity. Dr. Bamberger, however, considers this an unnecessary complication of the process, and prefers the dilution of the albumen with four volumes of water.

As the injection should contain absolutely no free mercuric chloride this should not be added beyond the limit of precipitable albumen. On the other hand it is advisable to approach this limit as nearly as possible to facilitate filtration, which is more easy the less free albumen the solution contains. For this purpose Dr. Bamberger proposed to make a preliminary test with 3 or 4 c.c. of the albumen solution in a watch-glass placed on blackened paper or glass, by adding drop by drop the mercuric chloride solution from a burette, by which method the end of the reaction could be clearly observed, and then using a rather smaller quantity for the whole than the calculation would give. The amount of sodium chloride required for solution could be estimated in the same way, by adding sodium chloride solution from a second burette until only a slight turbidity remains which is not further decreased.

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* Abstract from papers in the *Zeitschrift des allgemeinen österreichischen Apotheker-Vereines*, Nos. 10 and 12, pp. 147, 177, and 179.

* *Wiener mediz. Wochenschrift*, No. 14.

Dr. Hamburger suggests an improvement upon this method of estimating the exact quantity of mercuric chloride to be added, by using sodium carbonate as in Liebig's urine test. A drop of mercuric albuminate placed in solution of sodium carbonate remains white if the mercuric chloride be not in excess, but if the mercuric chloride be in excess it becomes yellow, reddish or brown coloured, through the formation of mercuric oxyhydrate or a basic salt of mercury.

Some experiments made to ascertain whether the whole of the mercury used was present in the finished solution gave satisfactory results, almost exactly the calculated quantity being recovered.

As to the preservation of the solution, Professor Bamberger says there is no reason to fear the decomposition of the albumen, as some has been kept unaltered in a warm place all the winter. In the older solutions a deposit is sometimes noticed of a thin white layer of mercurous chloride, due to the reduction of the mercuric salt in the presence of organic matter. When, however, mercuric chloride is added to the extreme limit of precipitation of the albumen this reduction does not usually take place. Of course it is necessary to avoid the presence of the precipitate in the solution used for hypodermic injection, and this may be done by removing the supernatant liquor with a pipette or by fresh filtration, the solution being slightly altered in strength.

Professor Bamberger says that the albuminate of mercury may be used internally without inconvenience, as it does not act on the mucous membrane either of the stomach or mouth.

THE EFFECT OF FLEXIBILITY ON THE WORKING OF CHEMICAL BALANCES.*

BY B. S. PROCTOR.

Having expressed the opinion that the degree to which a balance beam bends under its load forms an element too important to be overlooked in any satisfactory theory of its sensitiveness, I undertook to make an examination of several beams, good and bad, that I might first ascertain the degree to which bending takes place, and then calculate the effect which that bending would have upon the turning of the beam.

I did not propose that my experiments should have any special accuracy, such as would be required in critical examination of the relative merits of two similar beams, but only that they should be trustworthy, as showing that flexibility has an influence—an influence greatly to the disadvantage of badly-designed beams, and not entirely to be overlooked in those of ordinary construction, but which almost vanishes in the beam in which Mr. Bunge has combined the advantages of superior mechanical principles with unusually good material and excellent workmanship.

I commenced with a beam of no value—a common dispenser's box-end beam, made of brass, its length between terminal bearings being 6·7 inches and its weight 680 grains. I bound it down against the edge of a strong steel bar—a file in fact, the box-ends forming the terminal supports of the beam, while the pressure was applied to the centre, and the bending estimated by the diminution of the distance between the centre of the beam and the bar. This movement was necessarily very small, and the value of the observations must depend upon the extent of this small movement being fairly estimated. After a few preliminary attempts the method I adopted was to cement a slip of glass upon the bar projecting beyond its edge towards the beam, and a piece of mica upon the beam projecting over the edge of the glass; the movement of the edge of the mica over the edge of the glass was observed by a microscope magnifying several hundred diameters, and measured on an ordinary scale of inches and fractions laid upon the microscope stage, and observed with the left eye while the mica was observed with the right eye through the microscope.

The pressure representing the load was applied by means of a spring, as the observations were most conveniently made with the movements in the horizontal plane. The spring used was a pair of microscope pliers having a distance of half an inch between their points, and it was found by experiment that each one-sixteenth of an inch compression represented a pressure equal to nearly 500 grains—sufficiently near for my purposes. This spring was held in place by pins in the board which carried the whole arrangement. I placed one end of the spring just in contact with the middle of the beam, while the other was free to receive pressure, the pressure being regulated by fixing a pin in the line of motion of the free end and at such a distance as limited the compression of the spring to the degree which was required to produce the pressure desired. When the pressure was 500 grains, that is equal to 250 grains in each pan, the flexure equalled $\frac{1}{3600}$ of an inch, and with four times the pressure the movement was $\frac{1}{90}$ inch, thus confirming the first observation. The observations were repeated many times with only such differences in the measurements as would naturally result from the nature of the experiment.

The second beam operated upon was a German dispensing beam of better quality than the above. Being of a different shape, it was found more convenient to fix one end and the middle, and apply the pressure to the free end of the beam, using the spring in the same manner as before, but adopting a new arrangement for microscopic observation. A microscope slide cemented to the end of the bar had diamond scratches upon its upper surface, a similar slip laid upon it with diamond scratches upon its under surface, the end of the beam rested upon this upper slip of glass, and was made to adhere to it with cement. The diamond lines being on contiguous surfaces of glass were readily brought into a sufficiently good focus for work, but a lower power was necessary in consequence of the thickness of the glass through which the observation had to be made. A magnifying power of 125 linear was, however, readily applied and found quite sufficient for the purpose. A drop of oil interposed between the glass slips rendered the focusing more satisfactory, but the motion rather less free. When the pressure equalled 500 grains in each pan, the bending thus observed equalled $\frac{1}{1000}$ inch, and when the pressure equalled 2000 grains in each pan, the bending was $\frac{1}{250}$ inch. These flexures must be halved to compare them with those of the first beam.

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* Paper read before the Newcastle-upon-Tyne Chemical Society.

The third beam examined was one of Oertling's, intended to carry 1000 grains on each pan, and turn with $\frac{1}{200}$ of a grain. The examination was conducted in the same manner as the last. The bending with the equivalent of 1000 grains in each pan was $\frac{1}{1250}$ inch, which observation, after being several times repeated, was further confirmed by doubling the pressure and finding that the flexure was also doubled.

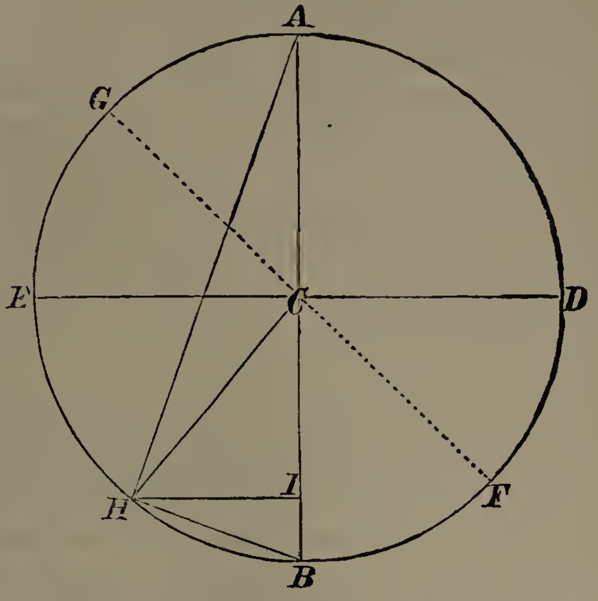
Finally, Bunge's beam was examined in the same manner; being designed to carry 3000 grains in each pan, and turn with $\frac{15}{10000}$ grain, it was not to be expected that flexure should be observed to a measurable extent with light pressures. I found them too small to be satisfactorily estimated with pressures less than 2000 grains in each pan; under this load the bending was $\frac{1}{2000}$ inch.

The following table shows the above results in a convenient form for comparison. The beams are arranged in the order in which they were examined. Their order also coincides with the development of the mechanical principles upon which they have been designed, and indicates progressive improvement in their working qualities, the second being both longer and lighter, yet less flexible than the first, as a consequence of the better distribution of its mass; so in comparing Bunge's beam with Oertling's we have both the weight and flexibility reduced to less than one-third, and the figures might have been still more in favour of Bunge's had it been practicable to make an equal reduction in weight upon those parts of the beam upon which there is little mechanical strain, but as in these parts there is not much excess in the old beams, there is not the same scope for reduction:—

	Length in inches.	Weight in grains.	Bending measured at one end, under 1000 grs. in each Pan.	Fall in Centre of gravity of Load.
Dispensing Beam	6·7	680	0·00222	0·00111
„ Better Quality . . .	8·3	635	0·00200	0·00100
Oertling's Balance	12·0	1786	0·00083	0·00041
Bunge's „	5·0	616	0·00025	0·00012

In endeavouring to calculate the influence which the bending (as estimated by the preceding experiments) has upon the sensitiveness of the beam, I have not attempted to follow the algebraic method as expounded by Professor Aldis, but have contented myself with the methods of plane geometry and arithmetic with which I am more familiar, but which appear to me to tend to precisely the same conclusions.

If we take C as the centre of a circle, A B and E D its diameters, E D also representing a beam of which C B is the pointer, two or three simple propositions will enable us to calculate the sensitiveness of the beam and the effect that bending has upon it. Let the lines A H, H B, and H I, be drawn, the latter being perpendicular to C B. I B will have the same ratio to H B that H I has to A H. Wherever the point H may be placed, these ratios remain the same. Now, let C H be the pointer deflected by a weight added to the beam at D, and having swayed the beam to the position F G, the weight and the distance taken together represents a certain mechanical power. If it be a foot pound, and the beam has come to rest at F, then the work performed by this power must be a foot pound also. Foot pounds being too large for present use, inch grains, or inch m.grms., will be more convenient.



If, now, we suppose C to be the fulcrum, and the centre of gravity of the beam, $\frac{1}{1000}$ gr. added to D and x gr. added to B, the length of the beam being 10 in., the fall of D being $\frac{1}{10}$ in., the deflection at B will also be $\frac{1}{10}$ in.—the fall of $\frac{1}{1000}$ gr. $\frac{1}{10}$ in. = $\frac{1}{10000}$ of an inch grain. The deflection at B being $\frac{1}{10}$ in., is $\frac{1}{100}$ of the length A B, and for practical purposes at these small deflections also $\frac{1}{100}$ of the length of A H. Now, as I B bears the same ratio to this $\frac{1}{10}$ as this $\frac{1}{10}$ in. bears to A B (10 inches), the weight added to B has been raised vertically $\frac{1}{100}$ of $\frac{1}{10}$ of an inch, or $\frac{1}{1000}$, and as this work done equals $\frac{1}{10000}$ of an inch grain, $\frac{1}{10}$ of a grain must be the weight so raised. Now, suppose the beam to weigh 1000 grains, and that no weight had been added to B, while the same deflection of the pointer had taken place and the same work consequently had been performed, the centre of gravity of the beam must have been raised by the turning just so much as to equal $\frac{1}{10000}$ of an inch grain, and that this may take place the centre of gravity must be as many times nearer the fulcrum as the weight of the beam is greater than that previously supposed to be acting at B. As its weight is 10,000 times greater, its distance will be $\frac{1}{10050}$ of C B (5 inches), or $\frac{1}{2000}$ inch. If it be admitted that the distance between the centre of gravity of the beam and the fulcrum must be so small under these circumstances, and smaller still when the beam is heavier of the same length, the amount of bending which I have obtained is sufficient to interfere with its sensibility; and the difference in flexibility between Bunge's beam and the forms at present in use in the laboratories, is sufficient to give Bunge's a distinct superiority in this respect.

In estimating the effect of the bending of the beam, it must be remembered that the centre of gravity of the beam does not fall to the same extent as the bending takes place, but only to a smaller extent, and an extent which it is not practicable to estimate; but the virtual centre of gravity of the *load* falls *to the full extent of the bending*.

In the above illustration, that of a beam weighing 1000 grains, with its centre of gravity 0·0005 below its fulcrum, and its end bearings on a line with its fulcrum when not strained, if we suppose a bending to take place when loaded such as takes place in the Oertling beam examined, then the resistance is increased from 1000 × 0·0005 to this product, plus 2000 × 0·0004—that is, the weight of the pans with their load multiplied by the fall which has taken place in their centre of gravity, leaving out of the question the falling in the centre of gravity of the beam due to its bending. Thus the resistance due to bending would bear to the original resistance the ratio of 8 to 5.

Supposing the pointer of the Oertling beam to move $\frac{1}{10}$ in. with $\frac{1}{200}$ grain, I calculate the centre of gravity to be 0·00027 below the fulcrum, and its resistance to the supposed movement would be thus multiplied by its weight 1786 grains, and the additional resistance due to bending would be 2000 × 0·00041. By this calculation the resistance due to bending is to the original resistance as 82 to 48.

Supposing the pointer of Bunge's beam to move 1 mm. with $\frac{1}{10}$ mgm., I calculate the centre of gravity to be 0·00304 inches below the fulcrum, and its resistance consequently 600 × 0·00304; while 1000 grains in each pan, = 2000 × 0·00012 (the extent of its bending), gives the additional resistance consequent upon its bending under its load. The resistance due to bending is to the original resistance as 24 to 182.*

Since the distance between the fulcrum and the centre of gravity may be indefinitely decreased, the sensitiveness of the beam may be indefinitely increased provided the mechanical defects of the beam do not stand in the way, but length and its consequence—either considerable weight or palpable flexibility—are prominent obstacles to this mode of increase of sensibility, and the palpable thickness of the knife edges is another obstacle. In the ordinary steel knife edges, however fine they may be at first, they can scarcely be brought with pressure upon the agate planes without a palpable thickness being imparted to them.† Those I have examined had a thickness visible to the naked eye, while Bunge's, made of quartz crystal, I have not succeeded in seeing with the aid of a lens. I must admit that a fine edge would be much less readily seen in a material like crystal than in metal, but it must also be admitted that the greater hardness of the stone would give a permanence to the edge which a steel edge would not possess. Suppose we admit that in the crystal edges and planes the imperfections of a fulcrum are as nearly as possible eliminated—that the flexibility has been reduced to its smallest practical amount by the use of the girder form adopted by Bunge—that the sensitiveness is under our command by screwing up the centre of gravity, and that the quickness has been obtained by reducing the length of the beam, where lies the practical limit to the smallness of the weight which will turn the beam? Mathematics would teach us that any weight, however small, would turn the beam to *some* extent, and that the limit is the limit of our vision. This points to the last particular in which Mr. Bunge has improved upon the old models. Having secured movement by the means already pointed out, he has magnified the motion by increasing the length of his pointer, and this is of more importance than would at first sight appear, for it gives the principal advantages of a long beam without its failings, for the long pointer adds very little to the weight, very little to the slowness of turning, and nothing to the flexibility.

In making these remarks I would not have it supposed that I am writing up the performances of Bunge's balance. I have simply endeavoured to understand and to explain by what principles the maker has obtained the very excellent results which we all admit.

I must also add, that while I have connected Oertling's name with a balance not equal to Bunge's I do not imply that Oertling's workmanship is inferior; on the contrary, requiring for the sake of comparison to experiment upon a beam of the form in general use, I preferred to take one of Oertling's on the ground that his name was a guarantee of good quality.

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* In a balance recently designed by Professor Mendeleef, the length of the beam is rather less than Bunge's, and it is stated to turn with $\frac{1}{1000}$ grain when loaded with 15,000 grains. I have not seen this balance, nor even a detailed description of it; such particulars as I have are quoted from the *Pharmaceutical Journal* of March 11, 1876. Mendeleef accomplishes this extreme sensibility by adding micrometer scales and cross threads at the ends of the beam, and a telescope for their observation—a refinement which was introduced by Professor W. H. Miller, and which, while it greatly increases the delicacy of the observation, removes it beyond the sphere of convenient daily appliances. I had not seen any notice of Mendeleef's balance till after I had drafted my present communication.

† Mendeleef says in the ordinary arrangement of steel knife edges upon agate bearings the wearing not only damages the stability of the balance, but also quickly destroys its sensibility.

THE DETERMINATION OF QUININE.*

BY A. H. ALLEN, F.C.S.

The method employed by the author in the estimation of quinine in various mixtures consists briefly of the concentration of the solution to a small bulk, addition of ammonia in moderate excess, agitation of the liquid with ether, and removal and evaporation of the ethereal solution. The concentration of the solution appears to be of secondary importance, except with regard to the economization of ether. The process is thus described:—

As a rule, I prefer to manipulate on 200 to 250 fluid grains (12 to 15 c.c.) of solution, concentrating the liquid to about that bulk if necessary. The concentrated liquid is introduced into a long tube or cylinder, of a capacity of about 800 or 1000 gr., furnished with a tightly fitting cork or stopper.

Enough ammonia is then added to leave a distinct odour of the gas, and then a volume of ether about equal to that of the liquid already in the tube. The cork or stopper is inserted, and the tube vigorously agitated for a minute or two. When brought to rest, the ether and aqueous liquid usually separate rapidly. (Separation is often facilitated by cooling the tube in a stream of water. In warm weather this precaution should always be taken to prevent loss of ether from the ebullition which sometimes occurs spontaneously on opening the tube). If the separation is difficult or imperfect it may be induced with certainty by a further addition of ether and subsequent agitation.

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* Read at a Meeting of the Society of Public Analysts, February 16, 1876. From the *Analyst*. With corrections by the author.

When the separation of the ether and water* is complete, the former is removed by a pipette† to a small weighed beaker, and the latter is shaken up with a further quantity of ether in a similar manner. It is seldom necessary to agitate with ether a third time, the amount of quinine thus extracted being rarely weighable.

The ethereal solution of the quinine when evaporated to dryness on a water-bath leaves the alkaloid in a solid weighable state.

I at first supposed that the quinine obtained by the evaporation of the ethereal solution would exist as trihydrate ($C_{20}H_{24}N_2O_2 + 3\,H_2O$); the precipitate by ammonia being stated to possess that composition. Further research, however, has conclusively proved this assumption to be erroneous, as the following experiments show:—

A sample of Howard's sulphate of quinine was completely analysed. The water was determined by drying at 110° C., the sulphuric acid was precipitated as $BaSO_4$, and the quinine was determined by the above described process, viz.: addition of ammonia and agitation with ether. It was conclusively proved that agitation of the ammoniacal solution with ether removes the *whole* of the quinine, the aqueous liquid showing no fluorescence when strongly acidified with sulphuric acid, and giving no green colour with the bromine and ammonia test.

The sulphate of quinine in question gave the following results. For convenience of comparison I have also stated the percentage composition of crystallized sulphate of quinine, containing 7 H_2O, and 8 H_2O. The freshly prepared salt is *said* to contain 8 H_2O, but practically that amount of water is not met with, owing to the rapid efflorescence which occurs.

It will be seen that the sample in question gave results agreeing very closely with the composition of the 7-atom hydrate:—

	Water.	H_2SO_4	Quinine.	
			Calculated.	Found.
$(C_{20}H_{24}N_2O_2)2H_2SO_4+8H_2O$ (=890)	16·18	11·01	72·81	
$(C_{20}H_{24}N_2O_2)2H_2SO_4+7H_2O$ (=872)	14·45	11·24	74·31	
Experimental Results:				
1	14·18	11·35	...	77·93
2	14·41	11·30	...	77·92
3	...	...	...	77·14
4	...	...	...	77·45
5	...	...	...	77·05
6	...	...	...	77·73
7	...	...	...	77·91
Mean	14·395	11·325	74·28	77·59

The mean of the indirect estimations of quinine, obtained by subtraction of the sum of the percentage of water and sulphuric acid from 100·00, is 3·31 per cent. less than the mean of the direct estimations by agitation with ether.

The known hydrates of quinine have the following percentage composition as compared with the residue from the ether:—

	Quinine. Per cent.	Water. Per cent.
Trihydrate ($C_{20}H_{24}N_2O_2+3H_2O$)	85·71	14·29
Monohydrate ($C_{20}H_{24}N_2O_2+ H_2O$)	94·74	5·26
Ether Residue	95·72	4·28

It will be seen, therefore, that the ether residue contains about one per cent. less water than corresponds to the monohydrate.

In two of the above estimations of quinine the alkaloid was determined by concentrating the filtrate from the sulphate of barium precipitate, adding ammonia and shaking with ether. In the other cases the quinine was determined in separate portions, cane sugar being added in two instances. Of the three experiments giving upwards of 77·9 per cent. of residue, one was made in the $BaSO_4$ filtrate, and two in separate quantities, of which one contained sugar.

It appears, therefore, to be fully established that the ethereal residue is of constant composition, approximating to that of the monohydrate of quinine. Crystallized sulphate yielding 77·59 per cent. of residue, the amount of the former can always be found by multiplying the weight of the residue by $\frac{100 \cdot 00}{77 \cdot 59} = 1 \cdot 289$

If the quinine sulphate has undergone efflorescence, of course the amount will be over-estimated. The crystallized salt is liable to lose water till it approximates to the composition of a 4-atom hydrate. If the salt used have really this composition, and the ether residue be multiplied by the above factor, the calculated factor will be 106·6 per cent. of the true amount. It is evident, therefore, that the results are liable to be in excess of the truth.

As an example of the accuracy of which the process is capable in practice, I may quote the following results obtained from the analysis of a sample of sulphate of quinine which had been very much exposed to the air, and which, therefore, may be assumed to have possessed a composition approximating to that of the 4-atom hydrate. Unfortunately neither the water nor sulphuric acid was actually determined. It will be observed that most of the estimations were made on very small quantities, and that the substance obtained is of less weight than the substance sought, instead of greater weight, as is usual in analysis. The addition of a large excess of ammonia was not found to affect the accuracy, and equally good results were obtained by the use of soda. A considerable quantity of cane sugar was added to the solution in each case.

Determinations of Sulphate of Quinine in Solutions containing much Cane-Sugar.

Exp.	Quinine Sulphate taken.	Ether Extract.	=per cent.	×1·289=7 atom hydrate.	×·938=4 atom hydrate.	
1	2 grains.	1·61 grs.	80·5	103·7 per cent.	97·3 per cent.	
2	2 ,,	1·66 ,,	83·0	107·0 ,,	100·4	Mean 100·03
3	3 ,,	2·49 ,,	83·0	107·0 ,,	100·4	
4	10 ,,	8·21 ,,	82·1	105·9 ,,	99·3	
5	3 ,,	2·47 ,,	82·3	106·2 ,,	99·6	
6	3 ,,	2·49 ,,	83·0	107·0 ,,	100·4	
7	3 ,,	2·51 ,,	83·6	107·7 ,,	101·0	
Mean	......	......	...	106·36 per cent.	99·71 per cent.	

The above are *all* the determinations of quinine which were made on the sample in question. Experiments 1, 2, 3 and 5, were made with a very large excess of ammonia; experiment 4 with a slight excess. In experiment 6 soda was substituted for ammonia. In experiment 7 a large excess of sulphuric acid was employed to dissolve the quinine, and the solution was evaporated until considerable charring of the sugar had occurred. The ether residue was somewhat coloured.

The above results clearly show that the method is fairly accurate, and the results remarkably constant, considering the small amounts employed in each experiment.

Of six mixtures containing sulphate of quinine and simple syrup, which were made up by druggists in Sheffield from a physician's prescription in the usual way, four were found by the above process to contain the prescribed amounts within reasonable limits of variation, while in two, the amounts of sulphate of quinine found were respectively about ⅔ and ¾ of the prescribed quantities.

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* Cinchonine and other alkaloids insoluble in ether are indicated here at the junction of the two fluids, as described by Mr. W. W. Stoddart. Magnesia partially remains as a flocculent precipitate in the aqueous solution.

† The pipette should be furnished with a piece of narrow india-rubber tubing, so as to allow the eye to be brought into a convenient position for observing the progress of withdrawal.

I next tried if the process was applicable to the estimation of the quinine in the citrate of iron and quinine. This preparation is stated in the British Pharmacopœia to yield on addition of ammonia, a precipitate of quinine amounting to 16 per cent. of its weight. There is no mention made of any washing to which the precipitate is to be subjected, and no directions are given as to the mode of drying. As a matter of fact an exceedingly gentle heat causes agglomeration of the precipitate, and prevents its removal from the filter. In consequence of the solubility of quinine even in cold water, even careful washing causes a perceptible difference in the result.

In fine, the Pharmocopœia instructions are very imperfect. On this account, I estimated the total quinine in a sample of Howard's citrate, by precipitating the solution with a slight excess of ammonia, rinsing the precipitate off the filter and evaporating the rinsings and drying the residual quinine at 100° C. The filtrate from the ammonia precipitate was concentrated, and the quinine extracted by agitating with ammonia and ether. In one experiment, the precipitated hydrate of quinine was washed with cold water, in the other it was left entirely unwashed. The results were:—

	Unwashed. Per cent.	Washed. Per cent.
Precipitated Quinine . . .	17·71	15·13
Ether-residue from filtrate .	·83	1·32
„ „ „ washings	none	
	18·54	16·45

According to the above results this sample of citrate comes up to the British Pharmacopœia standard of yielding 16 per cent. of precipitated quinine, if the precipitate be left unwashed, but washing brings it below the proper amount. Two experiments were made by treating a strong solution of the citrate with excess of ammonia, and then agitating with ether in the usual way, when I obtained 16·35 and 16·40 per cent. of ether residue, results which show a very close accordance with that previously obtained. The ether process is remarkably easy of execution in the case of the citrate of iron and quinine, not requiring more than some twenty or thirty minutes for its completion, and I think it would advantageously replace the present unsatisfactory and badly-detailed Pharmacopœia process.

I have also tried the applicability of the ether process to the determination of the quinine in the official wine and tincture, but the results were somewhat in excess of the truth, owing to the presence of foreign matter of the orange taken up by the ether.

On the whole, it is evident that the ether process is capable of giving results which, under favourable circumstances, are strictly accurate, and in others it leaves the quinine in a convenient and nearly pure state for further examination. As my object was primarily to effect the accurate determination of quinine in the presence of sugar only, I have not worked out exhaustively the problem of estimating it in complex liquids, and have rather aimed at the determination of the *total alkaloid* present than that of the actual *quinine*, as distinguished from other cinchona bases.

ANOTHER NOTE ON RHUBARB.

Mr. J. R. Jackson, of the Royal Gardens, Kew, writes to us as under:

"As a contribution to the history of Medicinal Rhubarb and as supplementary to the notes by Professor Flückiger in the *Pharmaceutical Journal* for April 29th last, p. 861, the following may be interesting and worth reprinting, as I do not remember ever having seen the paragraph quoted, not even in the excellent history of Rhubarb in the 'Pharmacographia.'

"The account occurs in a work published in Edinburgh in 1788, entitled, 'Travels from St. Petersburgh in Russia to various parts of Asia, by John Bell of Antermony.' On the 26th September, 1720, the author entered the Chinese territory on the road to Pekin. He says,

"The weather was very fine, but not a single inhabitant was to be seen. In the evening I walked from our tents with some of our company, to the top of a neighbouring hill, where I found many plants of excellent Rhubarb; and by the help of a stick, dug up as much as I wanted. On these hills are a great number of animals called marmots of a brownish colour, having feet like a badger, and nearly of the same size. They make deep burrows on the declivities of the hills; and it is said, that in winter they continue in these holes for a certain time, even without food. At this season, however, they sit or lie near their burrows, keeping a strict watch; and, at the approach of danger, rear themselves upon their hind feet, giving a loud whistle, like a man, to call in the stragglers; and then drop into their holes in a moment. I should not have mentioned an animal so well known as the marmot had it not been on account of the Rhubarb. Wherever you see ten or twenty plants growing, you are sure of finding several burrows under the shades of their broad spreading leaves. Perhaps they may sometimes eat the leaves and roots of this plant. However, it is probable the manure they leave about the roots contributes not a little to its increase, and then casting up the earth makes it shoot out young buds and multiply. This plant does not run and spread itself like docks, and others of the same species, but grows in tufts at uncertain distances, as if the seeds had been dropped with design. It appears that the Mongalls never accounted it worth cultivating but that the world is obliged to the marmots for the quantities scattered at random in many parts of this country; for whatever part of the ripe seed happens to be blown among the thick grass can very seldom reach the ground, but must there wither and die; whereas should it fall among the loose earth, thrown up by the marmots, it immediately takes root and produces a new plant.

"'After digging and gathering the Rhubarb the Mongalls cut the large roots into small pieces, in order to make them dry more readily. In the middle of every piece they scoop a hole, through which a cord is drawn, in order to suspend them in any convenient place, They hang them for most part about their tents, and sometimes on the horns of their sheep. This is a most pernicious custom, as it destroys some of the best part of the root, for all about the hole is rotten and useless; whereas, were people rightly informed how to dig and dry this plant, there would not be one pound of refuse in an hundred, which would save a great deal of trouble and expense that much diminish the profits on this commodity. At present, the dealers in this article think these improvements not worthy of their attention, as their gains are more considerable on this than on any other branch of trade. Perhaps the government may hereafter think it proper to make some regulations with regard to this matter.

"'I have been more particular in describing the growth and management of the Rhubarb; because I never met with an author or person who could give a satisfactory account where, or how it grows, and I am persuaded that, in such a dry climate as this it might easily be so cultivated as to produce any quantity that could be wanted.'"

GLYCERIN AS AN EXCIPIENT FOR PILL MASSES.*

BY LOUIS EMANUEL.

As an excipient for pill masses, glycerin has been recommended in combination with starch or tragacanth for pills generally, and without any combination for pills of quinia and other chemicals. The latter was suggested by Dr. T. E. Jenkins in the *American Journal of Pharmacy*, 1869, p. 119. However, little or nothing has been said of its advantageous use as an excipient for pills generally. I have used it in compounding prescriptions for the last three years, and now am confident of its superior properties, and feel safe to recommend its use by every pharmacist whenever it is applicable. I prefer to use it without any intermixture, for it answers all purposes and is more convenient to use; being a liquid, it can be dropped from a phial, which is done with greater rapidity, accuracy and cleanliness than if combined with starch or tragacanth, which combinations being semi-fluids would have to be used with a spatula, and if the requisite quantity be known would have to be weighed. Syrup of acacia is most frequently used, over which glycerin has two important advantages. Pills made with syrup of acacia are all larger, and, if kept for a while, become very hard, while those made with glycerin never become perfectly hard, although they are firm and retain their shape, and, when held between the fingers for a while, and worked, they become very pliable. The amount of syrup of acacia necessary is invariably larger than that of glycerin, as will be seen by the following formulas; though trifling in some, the difference is sufficient to show that more syrup is required:

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* From the *American Journal of Pharmacy*, May, 1876.

℞	Acid. Tannici	gr. xvi
	Glycerinæ	gtt. iii
	(or Syrup. Acaciæ	gtt. iv)

M. ft. pil., No. viii.

℞	Pulv. Opii	gr. v
	Pulv. Camphoræ	gr. x
	Acid Tannici	gr. xxv
	Glycerinæ	gtt. v
	(or Syrup. Acaciæ	gtt. x)

M. ft. pil., No. x.

℞	Acid Tannici	gr. xv
	Pulv. Opii	gr. iii
	Glycerinæ	gtt. ii
	(or Syrupi Acaciæ.	gtt. v)

M. ft. pil., No. v.

℞	Pulv. Opii	gr. viii
	Pulv. Plumbi Acet.	gr. xl
	Glycerinæ	gtt. i
	(or Syrup. Acaciæ	gtt. ii)

M. ft. pil., No. xvi.

℞	Aloes Socot.,	
	Ferri Sulph. Exsic.	āā gr. xii
	Glycerinæ (containing 10 per cent. of Alcohol)	gtt. ii
	(or Syrup. Acaciæ.	gtt. vi).

If glycerin alone is used with these substances, the mass will be apparently adhesive, but upon rolling, it will crumble, and cannot be formed into pills; this difficulty is overcome by the small quantity of alcohol.

℞	Quiniæ Sulph.	gr. xxiv
	Ext. Colocynth. Co.	gr. xviii
	Pulv. Capsici	gr. xii
	Glycerinæ	gtt. xii
	(or Syrup. Acaciæ	gtt xii)

The quantity of glycerin in this formula seems insufficient, but upon working with considerable pressure, it will be found to be just enough to form a very good mass.

℞	Quiniæ Sulph.	gr. xxiv
	Pulv. Capsici	gr. xviii
	Glycerinæ	gtt. xii
	(or Syrup. Acaciæ	gtt. xii)

The quantity of glycerin required in this one seems quite large when compared with the one just before it, which is due to the absence of an adhesive substance; for if two grains of powdered acacia be added, only eight drops are required.

℞	Quiniæ Sulph.	gr. xxx
	Ferri. Sulph. Exsic.	gr. xv
	Strychniæ Sulph.	gr. i
	Glycerinæ	gtt. xii
	(or Syrup. Acaciæ	gtt. xv)

First rub the sulph. strychniæ with a drop of water, add the other ingredients and mix the whole thoroughly together; then add the glycerin, and triturate briskly until an even mass is formed, which divide into pills as quickly as possible. When done slowly, the mass becomes very brittle, and cannot be rolled out. In the above formula I first noticed the great advantage of knowing the exact quantity of this excipient for forming a mass, for which purpose eighteen drops may be added on a slow operation.

I have a list of formulas similar to the above always within reach at the dispensing counter, to which I can refer to ascertain the amount of glycerin necessary to form a mass, and also write the amount used on the prescription. The glycerin is best dropped by means of a glass tube drawn out at one end to an aperture of $\frac{1}{8}$ inch.

SANTONIN POISONING AND ITS ANTIDOTE.

Professor Binz has communicated to the Medical Society of the Lower Rhine, at Bonn, the case of a child, two years old, which went into violent fits after taking two chocolate lozenges, each of the strength of 0·05 gramme santonin, or about one grain and two-thirds in all. The spasms came on ten hours after, and commenced in the face, descending to the extremities, and endangering respiration. The seat of irritation was clearly within the sphere of the nerves of the third up to the seventh pair. The pupils, however, were dilated. The urine showed the usual greenish colour. By means of the warm bath, vinegar enemas, abundant drink and artificial respiration, the patient recovered after three days, the spasmodic attacks becoming weaker and less frequent by degrees. The want of a reliable antidote caused Binz to entrust experiments on the subject to one of his pupils. Subcutaneous injections of large doses of santonic soda were required in frogs to produce spasms which could be arrested in the extremities by dividing the medulla between occiput and spine, but were not prevented by the removal of the large hemispheres. Rabbits and kittens require also larger doses, according to body weight, than men for the production of intoxication, but they show exactly the same symptoms. The attacks commence likewise with slight convulsions in the sphere of the mentioned nerves, opisthotonus and emprosthotonus may follow. The heart remains rather intact, the body heat falls slightly, irritation of the urinary system seems to be the rule; the urine dyes linen yellow and becomes purple coloured by addition of liquor potassæ. Amyl nitrite inhalations and strong morphia injections proved ineffectual. Chloral hydrate given before santonin poisoning was effected prevented the appearance of convulsions. Inhalation of chloroform proved for this purpose most effectual, and inhalation of ether suppressed the attacks altogether when administered at the first twitching of eyelids and ears, and curtailed the spasms in duration and violence when resorted to after their appearance. The same dose of santonin given to an animal under the influence of ether, and to another not so narcotized, will kill the latter within three or four hours, whilst the former will recover perfectly in a few days. Artificial respiration, by means of tracheotomy and the bellows, will diminish the attacks, but not subdue them as thoroughly as the named hypnotics. Binz recommends them, therefore, in cases of santonin poisoning in the human subject as the most reliable, and advises purgatives and plenty of drink to be given for the elimination of the drug.

TESTS FOR PURITY OF SODIUM SALICYLATE.*

Complaints having been made of some impure samples of this salt having been put on the market, Dr. H. Hager furnishes the following tests of identity and purity:—

Sodium salicylate is a white crystalline bulky powder, soluble in at least an equal weight of water, forming a clear, syrupy, faintly-yellow solution of a sweetish and afterwards biting taste. A drop of the concentrated or somewhat diluted solution mixed with a drop of hydrochloric acid produces a thick, white magma. It is only little soluble in absolute alcohol, but soluble in eight parts of alcohol of 90 per cent. The alcoholic, as well as the aqueous solution, diluted with 500 parts water, strikes the well-known violet colour with ferric chloride. The dilute aqueous solution, treated with cupric sulphate, yields a grass-green liquid; 100 parts of the salt leave, on ignition, 33·3 parts of sodium carbonate.

The purity of the salt is ascertained: 1. From its solubility in water and alcohol. In the latter menstruum some white particles often remain undissolved, consisting of sodium carbonate, which is probably an unavoidable admixture. 2. It must be completely soluble in aqueous ammonia; this solution, mixed with argentic nitrate and boiled, must undergo no change. 3. The aqueous solution is indifferent, even when heated, towards alkaline copper solution, except that it changes the blue colour of the latter to green.† 4. It must be unaffected by sodium carbonate. 5. The aqueous solution yields, with argentic nitrate, a white precipitate, which is again dissolved after addition of alcohol and nitric acid, forming a clear, colourless solution. 6. Barium chloride should be indifferent towards it.

BAY ESSENCE.‡

BY R. ROTHER.

Formerly, when imported Cologne water was comparatively cheaper than now in the United States, a domestic article was scarcely known; now the foreign article is but little used, chiefly owing to its high price, and in its place a variety of unquestionably inferior imitations are consumed. Bay rum has a similar history; only a few years since an "artificial" bay rum was a novelty. At present, it can be safely estimated that three-fourths of the bay rum consumed is a domestic imitation compounded by the pharmacist. Genuine bay rum now is said to be prepared in the West Indies, by distilling rum with the leaves of the bayberry tree. If this is the true method of its preparation, it explains the fact why the genuine remains clear when mixed with water, whilst the imitation almost invariably becomes turbid or milky. All the volatile oils have boiling points higher than that of water, but at the boiling temperature of water they emit vapour of sufficient tension to enable them to rise mechanically with the the steam, and thus be carried over with it. A strongly alcoholic liquid, as rum, for instance, distills at a much lower heat, and, therefore, but comparatively little volatile oil, if present in the still, will pass into the receiver along with the alcoholic vapour; if the distillation is, however, pushed after that, then the aqueous portion will naturally bring the volatile oil with it. As the genuine bay rum contains so little of the aromatic substance that water fails to precipitate it, it is evident that the distillation was stopped at an early stage. The belief is, however, entertained that no imitation can, in point of fragrance, at all compare with the imported rum. Doubtless the aroma of the rum added to that of the bayberry leaf, determines a different perfume from that obtained by simply dissolving the bayberry oil in alcohol. It is also highly probable that, owing to the adulterated character of the bay oil as found in commerce, a fair approach to the imported essence is prevented. Owing to some erroneous opinions regarding bay oil, it has been subject to various methods of sophistication, but no dealer has yet resorted to alcohol as an adulterant.

No thorough investigation of the oil of the bayberry tree has yet been made, and therefore it is not known whether bay oil is a simple hydrocarbon or terpene, as, for instance, oil of lemon; a terpene hydrate, as oil of peppermint; an aldehyde, as oil of cinnamon; a mixture of a terpene and a compound ether, as oil of wintergreen; or a mixture of a terpene and an acid, as oil of cloves. Oil of bay evidently belongs to the latter class; that is a terpene associated with an acid. It is lighter than water, and has a moderately warm, pungent taste, quite free from acrimony, which soon disappears, leaving but little impression on the tongue. Treated with aqueous potash, the greater part of it dissolves to a yellow solution, on the surface of which the insoluble portion collects. The yellow solution filters clear, from which the addition of an acid precipitates an oil heavier than water. This heavy oil, as well as its alkaline solution, has a hot, acrid, enduring taste, resembling oil of cloves, to which its odour also approaches. From this it appears that eugenic acid, common to the oils of pimento and cloves, is also the chief ingredient of oil of bay, and that the difference in the odour and taste of the oils of cloves, pimento and bay berry is determined by the characteristic terpenes.

Early last summer, the writer obtained several parcels of bay oil, which was remarkable for its insolubility in alcohol; and as bay oil is said to be but sparingly soluble in alcohol, the writer for a time believed that he had now found a pure article. On examination, this oil was, however, ascertained to contain about fifty per cent. of some fixed oil insoluble in alcohol. As a general thing, volatile oils are now adulterated with castor oil, which, being soluble in alcohol, is not so easily detected. But in this case the dealer evidently found it necessary to conform to the prevailing belief that bay oil possesses but little solubility in alcohol.

The writer has, however, noticed that oil of bay, when pure, mixes with alcohol in all proportions, producing, however, an opalescent solution in whatever proportion the alcohol is used, excepting in great excess, when an apparently clear liquid is obtained. It appears, therefore, that a third body, yet in small amount, is also present. If the pure oil is dissolved in a large volume of alcohol, and water in not too large proportion is added, an opalescent liquid is obtained which cannot be cleared by filtration through paper. Magnesium carbonate added to such a mixture clears it, but at the same time removes the most essential part of the bay oil, in the shape of an insoluble magnesium salt; therefore, magnesium carbonate should not be used in this case. Yet, if oil of bay, alcohol and water in the same proportions be used, but compounded by mixing the alcohol and water first and then adding the oil, a clear solution is obtained, in which a minute quantity of fatty matter, aggregated in small lumps, floats on the surface. The solution now filters with great rapidity, and remains permanently bright.

At the time the writer was experimenting with the sophisticated oil, he also applied the ordinary glacial acetic acid of the shops as a means of detecting fixed oils when mixed with volatile oils. It was then found that pure bay oil and glacial acetic acid mixed, but did not form a clear solution. The mixture, upon standing, reparted upon its

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[*] From *New Remedies*, May, 1876.

[†] Certain aromatic (benzol-) derivatives are capable of preventing the precipitation of hydrated cupric oxide by alkalies. Salicylic acid, mixed with cupric sulphate and soda solution, yields, as above, an intensely green solution, from which even a large excess of soda does not precipitate any oxide. It is found that 1 mol. salicylic acid in presence of at least 2 mol. soda prevents the precipitation of ½ mol. of cupric oxide. On adding to a certain quantity of salicylic acid only 1 mol. of soda, addition of the cupric salt produces a precipitate of ordinary cupric salicylate, easily soluble in excess of the alkali.—*Weith*, in *Ber. d. d. chem. Ges.* 1876, 342.

[‡] From the Chicago *Pharmacist*, May, 1876.

surface the peculiar body precipitated by the alcohol. The writer believed he had found a convenient method of testing volatile oils for fixed oil, but it was also noticed that the presence of alcohol in mixtures containing castor oil formed perfect solutions, even a small proportion of alcohol sufficing to unite the castor oil and acid. Subsequently, Mr. Barnes announced "that fixed and volatile oils unite with glacial acetic acid in all proportions," which statement he afterwards modified considerably. It was, however, proved that certain proportions of fixed oils and acid would unite, but the acid used by these experimenters was very much stronger than the glacial acetic acid found in the United States market.

In the preparation of bay essence, many pharmacists also add other spices, as pimento and cloves, together with various colouring matters, with a view of imparting a yellowish tint, as for instance, caramel, sanguinaria and curcuma; others even add aqueous potash. Imported bay rum has very little if any colour when new, but soon gets coloured from the staves of the barrels. Very little imported bay rum that is not coloured can, however, be found, as the precaution is not taken to draw it off in glass when received.

The writer believes that since bay rum is officinal, but as a genuine and undiluted article is difficult to obtain except directly from the custom house, that it might be advisable to incorporate bay essence with the preparations, and have an officinal formula for it. The writer finds the following formula to yield a satisfactory product which, whatever influence the presence of rum may have, is certainly much stronger in aroma than the imported perfume:—

Take of—

Oil of Bayberry Tree	1 fluid ounce
Jamaica Rum	1 pint
Strong Alcohol	4 pints
Water	3 pints

Mix the rum, alcohol and water, then add the oil; mix and filter.

Of course Jamaica rum is not officinal, but it is doubtful whether its presence adds any thing besides colour, as a solution of the oil in diluted alcohol is probably the best form.

It is possible that New England rum in place of diluted alcohol might be appropriately used with oil, or perhaps with the berries or leaves by maceration; but the writer thinks that diluted alcohol would better conform with the title of bay essence.

WATER-CRESS IN THE MATERIA MEDICA.

In a recent letter from the Paris correspondent of the British Medical Journal he writes:—

"In the vegetable kingdom there are several substances that possess the double quality of food and medicine, and as such might be usefully employed in therapeutics. Among the vegetables that possess the valuable property referred to I may mention the water-cress. According to an analysis by M. Chatin, Director of the School of Pharmacy of Paris, and present President of the Academy of Medicine, water-cress contains, 1. a sulpho-nitrogenous essential oil; 2. a bitter extract; 3. iodine; 4. iron; 5 phosphates, water, and some other salts. As medicine the water-cress has been vaunted for its efficacy in all cases in which the digestive organs are weak, in cachexia, in scurvy, in scrofula and lymphatism; it has even been prescribed as a cure for phthisis. The medicinal principles which it contains are more or less abundant according to the culture or maturity of the plant. Thus when the plant is in flower they are in greater quantity in the plant than before that condition; the essential oil increases according to the quantity of the sun's rays it receives. The proper culture of the plant develops in it the bitter and tonic principles, and the phosphates will be found in proportion to the manure employed. Finally, the quantity of iron will depend upon the richness of the water in which the cress is planted.

"As food, water-cress ought to be used in its green or uncooked state, in the form of salad or without any seasoning. Where a large quantity is to be taken, the juice alone of the fresh plant is recommended. This is obtained by expression in a mortar; it is then filtered and administered in doses of thirty or forty ounces a day. The juice contains all the active principles of the plant. M. Dupuy, a pharmacien, keeps a supply of the juice in a concentrated form, and as obtained from the seeds of the water-cress, a resinous yellowish looking substance, to which he has given the name of "cressine." This, however, is not yet introduced into practice, as it requires further study and experience before it can be classed among the immediate principles or other medical substances. Water-cress enters largely into the composition of the 'sirop antiscorbutique' of the French Pharmacopœia, which is commonly prescribed in scrofulous and scorbutic affections."

ASARUM CANADENSE AS AN AROMATIC.*

BY ALBERT H. VAN CORDER.

This officinal drug, which is in the secondary list of the United States Pharmacopœia, is known under the popular names of wild ginger, Indian ginger, colt's foot root, and Canada snake root, and is used instead of ginger by the country people in some parts of New England. On account of its medicinal properties, it has been noticed by American writers on native medicines; but it seems to be little used in regular practice.

That the rhizome possesses properties adapting it to be classed with the aromatic stimulants, is shown by its constituents, as given by Bigelow, Rushton and Procter. According to Rushton, it contains gum, starch, resin, fatty matter, chlorophyl, volatile oil, salts of lime, potassa and iron, to which may be added lignin. Of the volatile oil he says: "It is of a light greenish-yellow colour, having a warm, slightly bitterish aromatic taste, and contains all the virtues of the plant."

Wm. Procter, jun., says: "The essential oil seems the most energetic element; the root possessing neither emetic nor cathartic properties, but is an aromatic stimulant with diaphoretic powers. It contains neither asarite or asarum camphor, nor substances analogous to them." It is thus seen to possess none of the emetic or cathartic properties of its congener, the *Asarum Europœum*, which would render it unfit for use as an aromatic.

Possessing such pleasant and strongly aromatic properties, this neglect of the root is, doubtless, in a great measure, owing to the want of suitable pharmaceutical preparations. If the aromatic properties of this drug can be exhibited in such a way as to be substituted for more costly ones now used in so many officinal preparations, it would certainly afford these preparations at a much less cost to the pharmacist.

Joseph L. Lemberger ('Proceedings Am. Pharm. Assn.,' vol. xvii., p. 382) recommends the substitution of asarum and calamus for the cardamom in extract. colocynth. comp., and says: "We can easily dispose of cardamom, and substitute some of our indigenous aromatics."

With a view of making some pharmaceutical preparations of asarum which might serve the physician as a vehicle or adjuvant, the writer has made several experiments, the results of which he records. Before attempting the preparations, however, experiments were made, in order to become better acquainted with the constituents furnishing the aromatic properties of the root.

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* From the *American Journal of Pharmacy*, April, 1876.

Eight ounces of dried root were ground, and macerated with five pints of water for twenty-four hours; introduced into a copper still, and two pints distilled over. This distillate was of a milky appearance, having a layer of volatile oil on top. The volatile oil being separated, the water was saturated with sodium chloride and redistilled as long as the second distillate came over odorous—amounting to one and a-half pints. The second distillate was slightly milky, having small oil globules on the surface. The oil being separated by means of a pipette, the water was again treated with sodium chloride, and distilled. This time twelve ounces were obtained, having the odour and taste of the volatile oil. The small portion of oil floating on this distillate was separated, and the water, for the third time, saturated with sodium chloride and distilled. After four ounces were recovered, the water passed over odourless and tasteless. The oil floating on this fourth distillate was in such minute quantity as to be with difficulty separated. The volatile oil thus obtained amounted to two per cent. of the root employed, and corresponded to the description given of it by Rushton and Procter.

The mother liquor left in the still after each operation, consisting of a saturated solution of sodium chloride, was found to still contain organic matter. Four portions were agitated with ether, chloroform, gasolin, and bisulphide of carbon, respectively, each separated, and evaporated spontaneously, leaving, in each case, a slight residue. Ether appearing to be the best solvent, the whole of the mother-liquor was agitated with it, the supernatant liquid separated evaporated spontaneously, residue dissolved in alcohol, and again evaporated. A soft resinous product was thus obtained, neutral to test-paper, having a strong, agreeable odour, entirely different from the volatile oil, and peculiar to itself. It possessed a persistently warm, pungent taste. The amount of this principle obtained was too small to institute any further experiments. It would seem from this, however, that the essential oil is not the only volatile constituent representing the aromatic properties of the root; for this new volatile principle, although in very small quantity, exhibited its characteristics in a very distinct manner, thereby being easily distinguished from the volatile oil.

In addition to these volatile principles, asarum also contains a considerable amount of a resin which is by no means inactive. In preparing a fluid extract and tincture, alcohol was used as menstruum, for the purpose of obtaining all this resin. Using ether as menstruum, an oleo-resin was first prepared.

Eight troy ounces of the dried root, sufficiently fine to pass through a No. 40 sieve, was percolated with strong ether, until the percolate passed through colourless. The greater portion of ether was recovered by distillation, the remainder evaporated spontaneously, leaving an oleo-resin of a liquid consistence, amounting to 10 per cent., by weight, of the root employed, and possessing all the properties of the drug.

A fluid extract was made according to directions given by Parrish, in his second-class of fluid extracts.

Several tinctures were prepared, using different proportions of alcohol and water; but alcohol (sp. gr. ·835) seemed to afford the best menstruum. The strength of the tincture made was four ounces to the pint.

From the fluid extract two syrups were made, one possessing the virtues of the resin, as well as the volatile oil, while the other was deprived of the resin by trituration with magnesium carbonate. A marked difference was to be observed in the taste as well as appearance of these two syrups. The one freed from resin was, of course, much the handsomer, being transparent and of a dark amber colour, while the one containing the resin, although of a lighter colour, was hardly transparent. The first syrup would be the best for use where only a flavouring ingredient is wanted; but where something is needed to disguise the taste of a medicine prescribed, the syrup containing the resin would answer an excellent purpose, as it has a very strong taste, precisely like that of the root, and at the same time so pleasant as to be agreeable to the taste of almost every one.

The preparation of the above syrups may be comprised in the following formulæ:

Syrup of Asarum (first process).

Fl. Ext. of Asarum	f℥i
White Sugar	℥xv
Water	f℥viii

Triturate one-half the sugar with the fluid extract, and heat moderately to evaporate the alcohol. Add the remainder of the sugar, then the water; raise to boiling point, and strain.

This gives rather more than a pint of syrup of a light colour, and with only a slight turbidity.

Syrup of Asarum (second process).

Fl. Ext. of Asarum	f℥i
Magnesium Carbonate	grs. cxx
White Sugar	℥xv
Water	f℥viii

Rub the fluid extract with the carbonate of magnesium and a small quantity of sugar. and then with the water, gradually added, and filter. To the filtered liquid add the remainder of the sugar, dissolve with the aid of a gentle heat, and strain.

IODINE AS AN IMPURITY IN NITRIC ACID.*

Mr. Friedburg having stated in a paper read before the German Chemical Society that, on treating carbon disulphide with fuming nitric acid he had observed the former to assume a rose-red or violet colour, which he ascribed to some impurity in the CS_2, Mr. P. Marquart replies that commercial nitric acid nearly always contains iodine, which may easily be shown by subjecting it to distillation to dryness. During the end of the process violet vapours are frequently given off, and handsome crystals of iodine are found in the neck of the retort on cooling.

In order to convince himself whether the coloration of carbon disulphide, when treated in the above mentioned manner, was really owing to the presence of iodine, Mr. Marquart agitated a sample of fuming nitric acid chosen at random, with carbon disulphide, added water and found the CS_2 coloured rose-red. Treated with water and dilute sulphurous acid it lost its colour, and the aqueous solution gave the usual reactions for iodine with starch and palladium nitrate. A specially prepared acid, known to be free from iodine, when shaken with carbon disulphide imparted no colour to the latter whatever.

When searching for iodine in this manner it is immaterial whether the water be added to the previously separated carbon disulphide or to the mixture of the two substances. If iodine is present the colour appears invariably, and at once.

HANBURY MEMORIAL FUND.

Subscriptions Received.

	£	s.	d.
Amount previously acknowledged	163	19	6
Bell, John and Co. ...	1	1	0
Bell, F. J., In memory of	1	1	0
Bell, Jacob ,, ,,	1	1	0
Bell, James ,, ,,	1	1	0
Bell, John ,, ,,	1	1	0
Bevan, Charles Fred.	0	5	0
Clapton, Dr. Edward	1	1	0
De Vrij, Dr. J. E. ...	1	1	0
Duncan, Alexander ...	1	1	0
Eve, Charles	1	1	0
Frankland, Edward, F.R.S.	1	1	0
Gostling, Thos. Preston	1	1	0
Lloyd, James R. ...	1	1	0
Rimmington, Felix Marsh	1	1	0
Schweitzer, Julius ...	1	1	0

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* *Ber. d. Deutsch. chem. Ges.*, 1876, p. 127; from *New Remedies.*

The Pharmaceutical Journal.

SATURDAY, JUNE 3, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the Editor, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to Mr. Elias Bremridge, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to Messrs. Churchill, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

"MILK OF SULPHUR."

The decision of the Birmingham magistrates in the prosecution of Mr. Hughes for infringement of the Sale of Food and Drugs Act will not, we think, suffice to establish the illegality of selling as "milk of sulphur" the preparation which is familiarly known under that name, and has been in use as a popular domestic remedy since the time of the Arabian alchemist, Geber. Mr. Kynnersley has evidently been at great pains to arrive at a just conclusion in this matter, and to inform himself as to the facts of the case; but though his judgment contains much that we thoroughly concur with, we cannot share with him the opinion that it realizes his desire that it should be in the main consistent, either with law or with common sense.

The question whether the term "milk of sulphur" in the sense in which we have made use of it, should be understood to represent a preparation consisting of one third sulphur and two thirds sulphate of lime, seems a very simple one at first sight, but it is in reality complicated in so many ways by the confusion of facts, opinions, and sentiments, that it is extremely difficult to avoid looking at it with a certain degree of bias according to the manner in which they may be associated together. Thus, for instance, in regard to the question as to injury to health, which must naturally have considerable influence upon the decision whether the sale of a particular article is legal or not, it is constantly a source of embarrassment to magistrates to hear, not only opinions, but assertions, put forward authoritatively by medical men on the one hand that sulphate of lime has a constipating effect, while others declare that it is rather a laxative agent itself, or one that serves in some way to promote the action of sulphur as a mild purgative.

In the case to which we now refer this conflict of opinion is not wanting. The borough analyst, Dr. Hill, even went the length of declaring that "all lime salts had constipating power," while another medical man as unresevedly stated that sulphate of lime was not injurious to health, and that the sulphur was made more laxative by its presence. The opinion of Dr. Hill, however, was shared by a medical man who was one of the magistrates and thus the preponderance of opinion in that direction may be naturally understood to have, in some degree, influenced the decision. For our own part we believe that in regard to this question there is so little evidence one way or the other that no great weight ought to be attached to either opinion.

Then comes the question whether the sale of this preparation is a fraud and here again we perceive the biassing influence of a principle which itself is indisputably sound but has nothing to do with the "milk of sulphur" case. We refer to the obligatory adherence to Pharmacopœia directions in the manufacture of preparations, mentioned by Dr. Hill with the effect of introducing into the case the idea that "milk of sulphur" is a Pharmacopœia preparation. That is indeed the opinion of some; but to our apprehension the only ground upon which it can be maintained is the assumption that "milk of sulphur" is the same thing as the precipitated sulphur of the Pharmacopœia, and the question whether this assumption be well founded or not is, as we think, the essential issue upon which the whole matter turns. Dr. Hill's views on this point are distinct: he holds that milk of sulphur is identical with precipitated sulphur and that the latter preparation made according to the Pharmacopœia directions should be supplied when "milk of sulphur" is asked for. If that opinion be correct, there can be no question that the sale of the old preparation of the 1724 Pharmacopœia would be a fraud, and on that ground an infringement of the Sale of Food and Drugs Act. This view appears to have been fully accepted by the magistrates and it is to a great extent the basis upon which their judgment was arrived at.

In that opinion we cannot acquiesce, and examination of the argument by which it was supported by Dr. Hill will, we think, suffice to reveal a want of logical consistency that is fatally opposed to its adoption. Dr. Hill quoted from the Pharmacopœias of 1724 and later dates to show that while the method by which the *lac sulphuris* of the former was directed to be prepared necessarily involved the presence of sulphate of lime, there was, in the later Pharmacopœias, what he called an "alternative mode of preparation," which precluded the presence of sulphate of lime. The distinction between the methods directed by different Pharmacopœias is quite correct. We should not, however, call the method of the later Pharmacopœias an "alternative" but another method, and in fact one so essentially different that it furnished a preparation totally different from the *lac sulphuris* of 1724. This difference was moreover accompanied by the introduction of another name for the new preparation, viz. *sulphur præcipitatum,* and no mention is made of *lac sulphuris.* Strange to say, however, it is precisely by the adoption of the new name that Dr. Hill sought to prove the identity of the two preparations and left out of consideration the fact he had just before pointed out that they were necessarily different, inasmuch as one contained sulphate of lime which the other did not.

If we may venture to construe what was in Dr. Hall's mind when he put forward these views we should regard him as intending to convey that the term *sulphur præcipitatum* was introduced to represent an improved preparation corresponding to, though different from, that which has been known as *lac sulphuris.* And the view acquires additional force from the fact that *sulphur præcipitatum* is not called *lac sulphuris* in any of the later Pharmacopœias.

But apart from the authority given by the Pharmacopœia of 1724 for the preparation containing sulphate of lime, it must not be forgotten that such a preparation was in use long before it was made a Pharmacopœia article, and directions had been given as to the method of making it. This usage of the preparation known as "milk of sulphur," dating back to a remote period, and continued as it is with many by preference up to the present time, is, in our opinion, a fact that cannot be put aside in such a manner as to make the sale of the article an offence under the Sale of Food and Drugs Act. A tradesman who supplies precipitated sulphur to a customer who asks for "milk of sulphur," and has been accustomed to use the article containing sulphate of lime, would not be supplying an article of the nature, substance, and quality demanded by such purchaser, and although we think an endeavour should be made, at least by the pharmacist, to explain the reasons for giving a preference to precipitated sulphur, we can perceive no reason why any tradesman should be precluded from supplying the particular article demanded of him.

No doubt the justice of the view we have just ventured to put forward is very considerably obscured by the conflicting opinions held as to the relative merits of the two preparations in question. In addition to this there is discordance prevailing as to the practice of different tradesmen, which operates in the same direction. In the case now referred to this was evidently of considerable influence for Mr. Kynnersley mentioned the fact that out of twelve purchases of "milk of sulphur," ten of them consisted of precipitated sulphur, and in only two of them the article contained sulphate of lime. Mr. Kynnersley adopted this fact as evidence in disproof of the contention that milk of sulphur and precipitated sulphur are totally different things. He did so although evidence to that effect was given by several most respectable chemists, gentlemen, as he admitted, of the highest possible character, and this result was, we believe, an illustration of one of those difficulties by which the consideration of the subject is beset.

For what does the fact of discordant practice prove but the existence of different opinions as to which is the better or the proper thing to use, the old-fashioned milk of sulphur or the precipitated sulphur? Beyond this it does not go, and the circumstance that in certain price lists furnished by wholesale houses to the trade both preparations are classed together under one or other name, serves only to show more clearly the prevalence of differences in the wants of purchasers, and of endeavours on the part of wholesale dealers to meet the various requirements of their customers.

In expressing these views we are not unmindful of the opinions of such authorities as Pereira and others, as to the objections to the use of milk of sulphur containing sulphate of lime, neither do we underrate those opinions, though, at the same time, in common fairness we cannot overlook the fact that those opinions are not universally accepted, even among medical men, and still less by those who make use of this popular remedy. For our own part we should, on principle, prefer to see the old milk of sulphur superseded by precipitated sulphur, but, under the circumstances the realization of such a course seems to be impracticable. Many druggists systematically endeavour to bring about this change and some do not even keep the old "milk of sulphur" at all, but they often find it impossible to induce their customers to accept precipitated sulphur in place of the preparation containing sulphate of lime.

The point raised in the judgment as well as by some of the witnesses as to the price at which "milk of sulphur" is sold being the same as that of precipitated sulphur, is one that we do not consider to be of much importance, since the value of such preparations depends more upon the time and labour expended in their production than upon the actual amount of any particular ingredient. Mr. Herbert's argument that poor people were prejudiced by being forced to pay for what he termed the impure article the same price as ought to be charged for the pure article was based more upon sentiment than anything else. The real question is whether the purchaser, poor or rich, obtains at a fair price the article which he desires to have. No evidence has been given to show that this is not the case, and therefore we need not dwell further on this apparently *ad captandum* argument.

In conclusion we thoroughly share with Mr. Kynnersley the sense of satisfaction which he expressed at the prospect that his decision is subject to be questioned by an appeal to one of the Superior Courts, inasmuch as it is desirable that a matter which is considered of such importance should be finally settled. We cannot, however, agree with him in thinking that its importance is exaggerated, for the question at issue is whether tradesmen in satisfying the reasonable demands of their customers, in accordance with long established usage, do or do not make themselves amenable to the law as wrong-doers.

THE LOAN COLLECTION OF SCIENTIFIC APPARATUS.

It is announced that a number of scientific men have consented to give lectures in connection with the Loan Collection of Scientific Apparatus on the evenings on which it is open free. The first lecture is to be delivered this (Saturday) evening, in the Conference Room, by Professor Roscoe, of Owens College, the subject being, "Dalton's Instruments, and what he did with them."

Mr. William Goulding, Pharmaceutical Chemist (Ireland) was last week returned to serve in Parliament as Member for Cork.

Provincial Transactions.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The Annual Meeting of this Association was held at Britannia Chambers, Pelham Street, on Thursday, May 25, the President, Mr. J. H. Atherton, in the chair. There was a large attendance of members. After a few preliminary remarks by the Chairman, the Honorary Secretary (Mr. R. Jackson), read the following :—

Annual Report of Council.

"At the conclusion of another session your council have the pleasure of presenting their annual report, and in doing so congratulate the members on the increased activity shown in the work of the society during the past year.

"At the last annual meeting the position was very seriously considered as to the advisability of carrying on the work of the Association in the face of so large an amount of apathy and indifference exhibited by the members—and even the associates—and it was nothing but a strong sense of the moral responsibility attaching to the members, as masters, to provide as far as possible for the technical education of the young men which at length induced the meeting to make a further and final effort to carry on the work.

"Accordingly, your council succeeded in obtaining suitable rooms at Britannia Chambers, Pelham Street, at a moderate rent, in which the evening meetings should be held, the library and museum located, and where the young men might meet together for mutual improvement. New specimen cases were erected in the room, which now presents a very comfortable and furnished appearance.

"Arrangements were made to have the room open every Monday night for the associates' meeting, and Mr. Knibb was appointed librarian and the responsible officer, acting between the council and associates.

"Arrangements were again made with the science committee for the attendance of the associates at the classes on inorganic chemistry, laboratory practice, and botany, at the Mechanics' Institution, and with a view to encourage practical chemistry, tickets were sent to each associate who was eligible for laboratory practice under Mr. Copley. It was also decided to present council prizes to the two associates who stood highest in the pass-list at the examinations in inorganic chemistry and botany. The attendance at these classes has been fair, and also at the associates' meetings.

"The evening meetings have been held regularly. The first was held on 5th November, when the President delivered the inaugural address, which was, with his permission, printed, and a copy sent to each member and associate, and also to each other chemist and druggist in the town and neighbourhood, in the hope of exciting new interest in the Association. The second meeting was held on 3rd December, when Mr. G. E. Smith exhibited and explained a new thermo-electric pile, and new method of generating ozone. Mr. Rayner also read a paper on 'Stray Thoughts on the Future of Pharmacy.' The third meeting was called for February 18th, but the attendance was so meagre that it was adjourned until February 25th, when the President exhibited and explained a new process of printing by means of the 'Papyrograph,' and Mr. C. A. Bolton read a paper on the 'Position of the Pharmacist.' The following subjects were introduced for discussion by the President : 'Recent Interference with Counter Prescribing,' 'Prosecution under Patent Medicine Act,' 'Dispensers of Medicine and Public Analysts.' The last meeting was held on March 30th, when Mr. H. Major, B.A., delivered a lecture on 'Wonders of Plant Life.' The annual supper was held as usual in January.

"There have been several donations to the library and museum during the session, but your council hope that some united effort will be made during the next session to further increase the utility of both library and museum.

"Your council congratulate the members on the very satisfactory state of the treasurer's balance sheet, showing a balance in hand of £16 14*s.* 2*d.*

"With that balance and 50 paid up members, and 27 associates, your council feel sanguine that during the next session much successful work may be done.

"In conclusion your council earnestly ask the members and associates to show by their personal attendance at the meetings, their mutual interest in the work, and their determination to uphold an Association established to promote the furtherance of pharmaceutical education in the town and neighbourhood of Nottingham."

Mr. Humphreys and Mr. Jenkins were appointed auditors of the treasurer's account, which were next read, and showed a balance in hand of £16 14*s.* 2*d.*

A long discussion took place as to the best means to be adopted to advance the work of the Association, and it was ultimately decided that it was advisable to purchase a good microscope for the use of members and associates, and also to increase the museum; the arrangements being left in the hands of the incoming council.

Votes of thanks were given to all the officers for their services during the past session, and the following officers were appointed for the ensuing year :—

President, Mr. J. H. Atherton, F.C.S.; Vice-President, Mr. R. FitzHugh, F.C.S.; Treasurer, Mr. J. Rayner; Hon. Secretary, Mr. Roberts Jackson; Council, Messrs. Bolton, Fletcher, Jenkins, Lewis, Lomas, Smith, White, and Wilford.

Proceedings of Scientific Societies.

PHILADELPHIA COLLEGE OF PHARMACY.

The seventh meeting of the session was held on April 18th.

Amongst the donations presented to the museum were some resin of podophyllum, crystals from prickly ash bark, and some roots illustrating a bale of *Hydrastis canadensis*. Concerning these, the donor, Mr. Lloyd, of Cincinnati, wrote :—

"The resin exists in podophyllum peltatum, and is distinguished by being soluble in ether, while that prepared by the U. S. P. will but partially dissolve in this menstruum. It is being experimented with to ascertain its value as a medicinal agent.

"The crystalline substance marked from 'prickly ash bark' is a proximate organic substance which exists in considerable amount in the barks of *Xanthoxylum fraxineum.* It has never been experimented with as a medicine that I am aware of. It is tasteless, colourless, insoluble in cold water, very slightly soluble in boiling water; somewhat in cold alcohol; quite soluble in boiling alcohol. Nitric acid turns it yellow, and dissolves a small amount, turning yellow. Sulphuric acid dissolves it freely, forming a beautiful transparent deep-red solution; water added to the solution produces a white precipitate; the liquid in which it is suspended is colourless. The precipitate presents the exact properties of the original substance. At 212° F. the sulphuric acid solution decomposes, sulphurous acid being evolved freely and a black precipitate formed. When water is added and the mixture thrown on a filter, the filtrate passes colourless. It will not reduce an alkaline solution of sulphate of copper. When boiled with dilute sulphuric acid, and tested for glucose, there is no reaction with the copper solution. It will not form salts with dilute acids. Solution of caustic potassa does not seem to affect it.

"A lot of about 500 lbs. of hydrastis canadensis was recently offered for sale in Cincinnati. Upon examination, it proved to be about half beth root (*Trillium pendulum*);

while mixed throughout the entire mass was serpentaria, cypripedium, sanguinaria, may-apple and other substances."

Professor Remington read a paper on

A Singular Reaction in a Prescription.

BY JOSEPH P. REMINGTON, PH.G.

The following prescription was sent to Professor J. M. Maisch by Joseph W. Hall, of Nashville, Tenn., who states in his letter that he noticed a reaction of a very singular nature take place when the various ingredients were mixed together; when first prepared the colour being a dark red, but changing in a few hours to a beautiful dark green. It is as follows:—

℞ Syrup. Pruni Virg. . . . . . f℥ii
Syrup. Tolu,
Syrup. Scillæ . . . . āā f℥i
Tinct. Lobeliæ,
Spt. Æther. Nitrosi . . . . . āā fʒii
Morphiæ Sulph. . . . . gr. i

M. ft. solut. Sig., a teaspoonful.

The writer was requested to look into the subject, and this was done with considerable interest as one point after another was developed.

(1) The prescription was compounded as given above, when the effect of the change in colour was distinctly observed, as noticed by Mr. Hall.

(2) The various ingredients were put together without the syrup of wild cherry. No change in colour was discovered on standing twenty-four hours.

(3) All of the ingredients were mixed together, leaving out syrup of tolu. The change in colour takes place on standing; the mixture darkens and assumes a green tint.

(4) In this, syrup of squill was omitted—all of the other ingredients combined. The liquid becomes darker red, but does not change to geeen.

(5) Tincture of lobelia was left out in this experiment. The change took place readily, the mixture becoming quite as green as in No. 1.

(6) All of the ingredients were mixed together except the spirit of nitrous ether. The reaction did not take place—but little change was noticed.

(7) Sulphate of morphia was omitted. The change in this case very decided. The mixture assumes a dark green colour.

These results pointed to the fact that syrup of wild cherry, spirit of nitrous ether and syrup of squill were alone concerned in the reaction, with little, if any, interference on the part of tincture of lobelia.

Spirit of nitrous ether and syrup of wild cherry, when mixed together, acquired a greater depth of colour, but did not become green. When syrup of squill was added, however, the green tint began to develop, and when allowed to stand as long as in No. 1, the shade was nearly the same.

From the peculiar coloration and its method of development, the presence of iron in minute quantity was suspected in the syrup of squill and spirit of nitrous ether; and, on applying the tests for this metal to the two preparations, as obtained from various sources, distinct evidences of a *minute* quantity of iron were obtained.

In order to show with what ease this contamination (it can hardly be called an adulteration) creeps into the preparation of spirit of nitrous ether, a small quantity was placed in a glass vessel and stirred for a few moments with an iron spatula, when a drop or two of solution of ferrocyanide of potassium was added—a characteristic blue precipitate resulted. The explanation is simple, sufficient acid being usually present in spirit of nitrous ether to act upon the metal and form a soluble salt. When a partly worn tinned iron measure is used by the manufacturer or wholesale dealer in measuring this preparation (as is often the case), a trace of this metal would surely be left in it, particularly if the liquid was allowed to stand in the measure any time. Commercial acetic acid, and even some of the finer grades, were found to contain slight traces of iron; and hence, in syrup of squill, we have the metal present in minute quantity.

Now, why does the green coloration appear? Wild cherry bark contains tannic and gallic acid, and these give, with small quantities of an iron salt, a dark green coloration in the presence of an acid like acetic.

In order to show that the tannic and gallic acids were concerned in producing the colour, an infusion of wild cherry was prepared carefully, by the U. S. P. formula, to which was added spirit of nitrous ether and syrup of squill in the same proportion as in the prescription. The same play of colours took place; first, a deepening of the red, then gradually changing, until the dark green appeared. The subsequent addition of a trace of iron still further deepened the coloration.

Part of the same infusion was deprived of tannic acid by shaking it with hydrated sesquioxide of iron, until a small portion of the filtrate failed to give a coloration with a weak solution of an iron salt. When to this infusion the same proportion of spirit of nitrous ether and syrup of squill was added, as in the prescription, no change in colour was observed, even after standing.

The presence of a slight excess of acid favours the formation of the green coloration; and when an alkaline solution is added, the green coloration disappears, and a slight precipitation takes place.

The examination of this subject furnishes another illustration of the necessity for the most scrupulous care, not only in making preparations, but in guarding them from contamination after they are made. Although in this particular case, practically, no harm could possibly result from the presence of the trace of iron, yet we see in it a cause for annoyance, and the prescription would very likely be returned by the patient with suspicions of an error in compounding.

Professor Maisch exhibited a sample of belladonna ointment, which, at the house of the patient, had separated into a bright, pale-green lower layer, the upper stratum being of a brownish colour. It had, probably, been subjected to changes in temperature.

Professor Maisch exhibited, from Walter E. Bibby, ammoniac in powder, retained in this condition by admixture with sugar of milk; also mercury one part and sugar of milk two parts, rubbed together in a dry mortar without any further addition. The extinction of the mercury being rapid, and little labour required, this process suggests itself as a convenient way of getting the various preparations of mercury.

Dr. Miller exhibited spermaceti obtained from oil of rose, one fluidounce, purchased as the best oil in the market, having yielded eight grains of the adulterant.

Statements by two writers to the *Druggists' Circular*, reporting the occurrence of an effervescence on mixing spirit of nitre and fluid extract of uva ursi, being referred to, Professor Maisch read a paper on this subject, which he had just received:

Uva Ursi and Spirit of Nitre.

BY M. S. BIDWELL.

Two communications have recently appeared in the *Druggists' Circular*, asserting that sweet spirit of nitre and fluid extract of uva ursi would form, in some cases, an explosive mixture. Other ingredients were mentioned—syrup in the one case and fluid extract of buchu in the other, but the two former were supposed to be the dangerous agents. As every pharmacist has frequent occasion to mix these ingredients, and no disturbance has ever before been made public, I was sceptical as to the reality of the startling phenomenon, and paid no attention to the first statement, but on the appearance of the second, proceeded to the following simple experiments, which any one can verify:—

(1) Fluid extract of uva ursi, of my own make, about twenty months old; sweet spirit of nitre, also of my own make, about a month old, and kept standing on crystals of potassium bicarbonate, to prevent any acidity. Two drachms of each were mixed, with no perceptible action of any kind.

(2) Fluid extract, made by Squibb, several years old; spirit of nitre, as above, and result the same.

(3) To each of these mixtures was added about one drachm of dilute nitric acid, U. S. P.; a decided effervescence at once occurred, the surface of the liquid being nearly covered with minute bubbles, with a decidedly nitrous odour. The reaction continued perhaps ten minutes, and would very likely have been more energetic in a larger quantity of the materials.

It seems fair to conclude, therefore, that the liquids mentioned will not produce any disturbance if the spirit of nitre is in good condition; but that if it is old and strongly acid, effervescence will be produced which, if the ingredients are in considerable quantity and in a closed bottle, might amount to an explosion. As to the chemical reaction, I can offer no suggestion.

Parliamentary and Law Proceedings.

IMPORTANT DECISION UNDER THE SALE OF FOOD AND DRUGS ACT.

THE SALE OF MILK OF SULPHUR.

At the Birmingham Police Court, on Monday May 22, before Mr. T. C. S. Kynnersley and Dr. Heslop, Richard E. Hughes, grocer and drysalter, of Prospect Row, was summoned at the instance of Chief Sanitary Inspector Woolley for selling, on the 19th of February, as pure, two ounces of milk of sulphur which was adulterated, thereby infringing the Sale of Food and Drugs Act. Mr. Herbert (instructed by the Town Clerk) appeared in support of the summons, and Mr. Rowlands defended.

Mr. Herbert, in opening the case, pointed out that it could not be pleaded in law that the preparation had been unavoidably mixed, because it was purchased in a pure state, and was extensively adulterated with sulphate of lime when sold by the defendant, and there was no label or any intimation given that it was not a pure article. Even supposing that the adulteration did not render the sulphur injurious to health, defendant was bound, if people preferred it in that state, to affix a label stating the nature of the article. The prosecution desired the Court to decide whether the poor people who purchased that article should be forced to pay the same price for the impure as ought only to be charged for the pure. It would no doubt be contended, as in the case at Coleshill, that milk of sulphur and precipitated sulphur were distinct articles; but he should show that they were the same, and that the ingredient with which the compound sold by the defendant was adulterated was injurious to health.

Mr. Rowlands remarked that the points involved in this case were fully argued at Coleshill, and he thought that they had been decided once and for all.

Mr. Herbert, having quoted extracts from various works in the library of the Royal College of Surgeons and from Pharmacopœias as to show that the two drugs were not distinct, called the following witnesses.

George Leighton, an assistant sanitary inspector, deposed to purchasing, on the 19th of February last, from defendant's shop, two ounces of milk of sulphur, for which he paid 1½d. Defendant served him with it, and witness told him that it was his intention to have it analysed, and offered to divide it into three parts if he wished. Witness did so, and numbered each part. One of the parts was afterwards handed to Dr. Hill. Witness purchased twelve other samples from grocers and druggists in the town the same day.

Mr. Robert Woolley, chief inspector of nuisances, deposed to receiving samples of milk of sulphur from the last witness and handing them over to Dr. Hill for analysis. The certficate of analysis (produced) stated that the sample obtained from the defendant contained 67 per cent. of sulphate of lime, which was a fraud and injurious to health.

Dr. Hill, borough analyst, stated that of the thirteen samples submitted to him only three were adulterated with sulphate of lime, all the others being pure. All lime salts had constipating powers. There was only one sort of lime salt which was used in the form of chalk in medicines. The sulphate of lime contained in impure milk of sulphur was very injurious to health, and sulphate of lime was certainly not unavoidably mixed in milk of sulphur. There was an alternative mode of preparation which precluded the presence of sulphate of lime. Witness, in support of this statement, quoted from the Pharmacopœias of 1724 and 1746. To show the identity of the two compounds, witness stated that in 1746 it was no longer called lac sulphuris, but sulphur præcipitatum. In 1788 the use of lime in the preparation was abandoned. In the Pharmacopœia of 1809 lime was again used, but in order to prevent sulphate of lime mixing with the sulphur the acid was changed. Since 1809 all the Pharmacopœias directed that the milk of sulphur should be prepared with the sulphur, lime, and hydrochloric acid. Sulphate of lime was a fraud on the purchaser. Of the 335 grains of the preparation sold as sulphur by the defendant there would be only two drachms of pure sulphur. Cross-examined by Mr. Rowlands: Witness thought sulphate of lime was not unavoidably mixed with milk of sulphur, because sulphuric acid was used in the preparation when hydrochloric acid might be used, and was much cheaper. No pharmaceutical chemist should manufacture otherwise than as directed by the Pharmacopœia. The mixture sold by the defendant was decidedly injurious.

Mr. Rowlands said the question was whether there were two distinct kinds of sulphur known to the trade and the world at large—one as milk of sulphur and the other as precipitated sulphur. If the Bench were satisfied on that point then there would be an end to the case. He pointed out that several eminent "chemical experts" had proved beyond doubt that precipitated sulphur and milk of sulphur were different articles, and on that ground a similar case was dismissed by the Leeds stipendiary. It was a question which affected the whole of the trade as well as the public, and would be taken to the highest Court if necessary.

Dr. John Anthony said his attention had been directed to the question of milk of sulphur. There were two preparations—one called milk of sulphur, and one precipitated sulphur. They were totally different, and he could not imagine how one could be taken for the other. They were altogether different in appearance, in their modes of action, and physical qualities. Sulphur præcipitatum would not mix with water, and the public did not like it, and they would not have it as a substitute for milk of sulphur, to which they had been accustomed. The latter was readily mixed in water. Sulphate of lime could not be added to the milk of sulphur; it was produced in its preparation. He was sorry he could not agree with Dr. Hill, who had stated that the milk of sulphur in question was injurious to health. On the contrary, it was beneficial to health in many cases, and instead of being a constipative it was a laxative, and for the latter it was freely used. In cross examination by Mr. Herbert, he admitted that the public generally did not know that there were two kinds of sulphur. He was not surprised to hear that out of thirteen samples of milk of sulphur purchased ten were pure, because the chemists would be so terrified by proceedings such as these that they would sell it pure. He did not call the milk of sulphur such as was sold by the defendant pure or impure, for it was simply a cheap relaxative for the poor, and was used by a large number of the population.

Mr. Alfred Bird, chemist and druggist, of Worcester Street, Birmingham, stated that during his experience of more than half a century he had known that the preparation of milk of sulphur and sulphur præcipitatum were two distinct substances, and a chemist ought to keep both. If milk of sulphur were asked for, and the druggist supplied sulphur præcipitatum, he would be blameable. He would say, for himself and on behalf of the whole trade, that the chemists and druggists had no desire to sell lac sulphuris; but if the public asked for it he, as a fair and honest chemist, should not feel justified in refusing to supply it. In reply to Dr. Heslop, witness said if that gentleman came to his shop and asked for milk of sulphur he would supply him with lac sulphuris.

Mr. Wm. Jones, chemist and druggist, of seventeen years' experience, stated that his predecessor, Mr. Morris, supplied the milk of sulphur to the defendant. Milk of sulphur and sulphur præcipitatum were two distinct preparations, and were kept separately in stock. The milk of sulphur he sold in large quantities, while the precipitated sulphur was not in much request.

Mr. John Sumner, grocer, Mr. Edward Powell, chemist, and Mr. Henry Sanderson, chemist, gave confirmatory evidence.

The case was then adjourned for a week, Mr. Kynnersley intimating that he would then give his decision.—*Daily Post.*

On Monday last, May 29, at the Birmingham Police Court, decision was given in this case.

Mr. Kynnersley said he should like to ask, in the first instance, whether druggists would consent in future to use a distinctive label stipulating that the article they retailed as milk of sulphur contained sulphate of lime?

Mr. Tanner having consulted with his client, said, although Mr. Hughes would be perfectly willing, individually, to do this, still the case was looked upon as a representative one, and there were a number of persons who felt strongly on the subject, and would most likely object to concede to such a proposal. He thought it would be better, therefore, if the magistrates gave their decision upon the facts as proved.

Mr. Kynnersley accordingly gave decision as follows:—

On Monday last, the 22nd of May, the defendant, Richard Hughes, appeared before Dr. Heslop and myself on a summons obtained by Robert Woolley, Inspector of Nuisances for the Borough, under the 38th and 39th Vic., c. 63, sec. 6, which enacts "that no person shall sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser," under a penalty not exceeding £20; and it was proved that on the 19th of February, George Leighton, acting under the instructions of Mr. Woolley, went to the shop of the defendant, who is a drysalter and grocer in the borough, and asked for two ounces of milk of sulphur, and received from him as such milk of sulphur two ounces of a powder which was subsequently analysed by Dr. Alfred Hill, borough analyst, and found to contain, according to the certificate which was produced to us, 67 per cent. of sulphate of lime, and 33 per cent. of pure sulphur. The certificate also stated that the article was a fraud and injurious to health. Dr. Hill, also, on examination, gave it as his opinion that it was so injurious, because the effect of sulphate of lime, like all lime salts, would be to constipate the bowels and to promote the formation of calculi if there was any tendency in the constitution to such secretions. I may mention here that this opinion was controverted by Dr. Anthony, a witness called by the defendant, who stated that in his judgment sulphate of lime was not only not injurious to health, but that the sulphur was made more laxative by its addition. But I confess his evidence did not carry conviction to my mind. Dr. Heslop did not agree with him, and certainly I never heard that children's confectionery was improved by sulphate of lime being largely used in its composition. Now it was not contended on the part of the prosecution that the presence of so much lime was an adulteration in the sense of a deliberate addition to the sulphur, nor is the term adulteration used at all in the present statute, and when Dr. Hill speaks of it as a fraud he means, I am sure, a legal, and not a moral fraud; but it was contended that the article complained of was prepared according to the formation of an old fashioned, obsolete, and exploded Pharmacopœia of 1746, which necessarily involved the presence of sulphate of lime, whereas if it had been prepared as it ought to have been, in accordance with all the more recent Pharmacopœias, it would have been wholly free from lime, which Dr. Hill and others consider an unnecessary and a noxious ingredient, and therefore that the article sold was not of the "nature, substance, and quality demanded by the purchaser," and that the sale of it was "to his prejudice." The fact, as I understand it, is this:—In order to produce milk of sulphur (lac sulphuris) or sulphur præcipitatum (for it is contended by the prosecution, and, as I think I shall show, justly contended, that the two are synonymous and convertible terms) it is necessary that the sulphur and lime should be boiled or heated together in water, and treated with the addition of an acid. Under the Pharmacopœia of 1746 the acid employed was sulphuric acid, and this involved the formation of a substance called sulphate of lime, which only requires drying or heating to become the well-known plaster of Paris. This is mixed with the sulphur, and is the identical article sold by the defendant, except that the proportion of lime appears to be much larger than in any of the other cases that have been made the subjects of prosecution under the section. In all the recent Pharmacopœias, the acid employed is hydrochloric or muriatic acid, and in this preparation the lime wholly disappears and the produce is the pure sulphur præcipitatum, which contains no lime at all. I may not be technically exact in this description, but that is what I understand to be the case. The value of the latter is exactly double that of the former, and the question is whether a person who sells under the same name with the pure article a mixture of which only one-third is pure sulphur and two-thirds plaster of Paris does not come under the provisions of this statute as selling a drug which is not of the nature, substance, and quality of the article demanded. Now the defendant contends and calls several most respectable chemists, gentlemen of the highest possible character, to support him, that milk of sulphur (lac sulphuris) and sulphur præcipitatum are totally different things, that lac sulphuris is not sulphur præcipitatum, and sulphur præcipitatum is not lac sulphuris; that the substance containing lime is properly called lac sulphuris, and the substance which does not contain it is properly called sulphur præcipitatum, and that this is a distinction well-known and acted upon by all druggists, grocers and drysalters, and therefore he does no wrong in selling the impure article under the name of milk of sulphur, which he contends is the article demanded under that name. But I am convinced that this is a question which cannot be maintained. The evidence in this case is entirely against it. On the same day on which the article in question was purchased from the defendant as milk of sulphur, twelve other purchases were made of milk of sulphur from other tradesmen. In ten of them the article was found to be pure sulphur præcipitatum without a particle of lime, and in only two others was any lime detected. Moreover, in a general trade list which was shown to us, the two articles appeared under the same name "sulphur præcipitatum," but with this distinction: the first was what the defendant calls "milk of sulphur," but attached to it was this note, "this contains sulphate of lime." The other, the price of which was exactly double that of the first, was described as "pure" and this really appears to be decisive on the whole question. Moreover, in Dr. Pereira's Materia Medica and in several other books of undoubted authority, the pure article is called by both names—lac sulphuris and sulphur præcipitatum, and the impure one is not recognized at all, or, if it is, it is distinguished as containing sulphate of lime. This being the case, can it be just and right that the practice advocated by the defendant of selling the impure article under the same name and at the same price as the pure should be allowed to continue? I think not, and it ought to be put a stop to, and therefore I am of opinion—and in this I am most happy to say I am borne out by Dr. Heslop, to whom I beg to record my deep obligation for the invaluable assistance which he has most kindly afforded me, though he is not responsible for the language in which I have conveyed my opinion or the reasoning which I have employed—that a person who sells as milk of sulphur an article which contained only one-third part of pure sulphur and two-thirds of plaster of Paris does sell to the prejudice of the purchaser a drug which is not of the nature, substance, and quality of the article demanded by such purchaser. If, as is stated, there are many persons who prefer the impure article on the ground that it is more easily dissolved in water, by all means let them have it, but let them demand it *eo nomine*, and let it be sold with a distinctive label, stating, as in the trade list, that it "contains sulphate of lime." There can be no hardship in this to the druggist, but without such label I think it ought not to be sold as milk of sulphur. I should be very glad if the trade generally would have consented to adopt such a distinctive label and to relieve me from the necessity of pronouncing a decision which will, I fear, give pain and offence to many most respectable tradesmen; but, as I must decide the question, I must do it according to what I believe to be consistent with law and common sense. It is a great comfort to me to know that my decision may be very easily questioned by an appeal to one of the superior courts, and it is most desirable that a matter which is considered of such importance—though I confess I think the importance is a good deal exaggerated—should be finally settled. My decision must therefore be in favour of the prosecution, but as the object is not to punish for an act the illegality of which has been denied, but to declare it illegal and to prevent its repetition, I impose merely a nominal penalty of one shilling, and make no order about costs.

Mr. Tanner applied for a case, which was granted. He said he thought the better course would be to go to the Court of Queen's Bench instead of the Court of Quarter Sessions, and he should take the necessary steps in the matter.—*Daily Mail.*

POISONING BY LAUDANUM.

Mr. C. Aspinall, the Liverpool borough coroner, held an inquest on Wednesday, May 24, on the body of Robert Ramsey, forty years old, who was found dead in bed at the Canton Hotel, Victoria Street, on the previous Monday. The deceased was a widower, and had come to Liverpool a fortnight ago in search of a situation as druggist. When he was found on Monday there were on the table in his room two bottles and a tumbler containing a dark fluid. The deceased had for some time suffered from pains in the shoulders and temples, and had often taken sleeping draughts. It appeared from a *post mortem* examination that the cause of death was poisoning by laudanum. The jury returned a verdict to the effect that Ramsey died from the effects of an opiate poison, but under what circumstances the laudanum was taken there was not sufficient evidence to show. They added that it was not unlikely that the laudanum had either been taken in the night inadvertently or that an overdose had been taken to alleviate pain or procure sleep.—*Liverpool Daily Post.*

POISONING BY CHLORAL HYDRATE.

On Wednesday an inquest was held at Bothamsall, near Retford, on the body of a young farmer named Thomas James Pindar, who died the previous night after taking chloral. From the evidence it appeared that the deceased suffered from sleeplessness, and to procure sleep he purchased a bottle of chloral from Mr. Crowe, of 47, Princes Street, London. This bottle contained 16 undiluted doses, and another purchased of Mr. Whitfield, Scarborough, contained only two doses. The bottles were of the same size and were placed in the same drawer, and deceased took by mistake the one containing 16 doses and died in half an hour. A juryman asked the doctor if he thought it was right to sell chloral so strong to non-professional persons. The doctor thought there should be some restrictions. The jury returned a verdict of "Death from taking an overdose of chloral."—*Times.*

WINDING UP OF A CO-OPERATIVE STORE.

In the High Court of Justice, Chancery Division, on Saturday, May 27, before the Master of the Rolls, a petition was presented by creditors of the Yorkshire Civil Service Supply Association for a winding-up order.

Mr. Davey, Q.C., appeared for the petitioner, whose debt amounted to £278 12*s*. 2*d*.

Mr. Chitty, Q.C., appeared for Mr. Roney, one of the directors, and said it would be most desirable that this business should be sold as a going concern, by which the creditors would get more than if there was a winding-up of the company. His client was willing to pay the petitioning creditor's debt, together with £30 for costs, if the petition were dismissed.

Mr. Walker, Q.C., for the company, concurred in this proposal.

Mr. Phear appeared for another creditor, and pressed for a winding-up order.

The Master of the Rolls said the petition might stand over till Monday, and if the money was not paid by twelve o'clock on that day the order would be made.

Mr. Walker then applied for his costs, but, upon Mr. Chitty stating that he had no authority to pay more than he had offered, the order was made for winding up the company.

Review.

ON POISONS IN RELATION TO MEDICAL JURISPRUDENCE AND MEDICINE. By ALFRED SWAINE TAYLOR, M.D., F.R.S., etc. Third edition. London: J. and A. Churchill.

The third edition of Taylor's work on Poisons lies before us, which is in itself a proof of the high value this book possesses.

To say more of its value in this place would be superfluous. Such an abundance of illustrative material, in relation to medical jurisprudence, and such an exhaustive treatment of these materials, have not been furnished in any book except Taylor's. And a comparison of its list of contents with that of the second edition readily shows that the author has in this new edition again supplemented the facts gathered with the more recent results from current literature, that he has recast several chapters and thoroughly and entirely revised the whole work.

Especially he has made use of the English and American literature upon the subject, partially also of the French and less completely of the German.

The cases and the medico-legal portions of the book appear to have the highest value. It would have been worth while to have recognized more fully the physiological experiments with poisons that have in recent years appeared in so great number. Even though these experiments have been mostly made only upon lower animals, many of the results may without doubt be predicated of the human subject, and through them a clearer understanding be attained of the symptoms of poisoning in man.

When, however, the author deals with the materials for recognizing poisons and the methods for their detection, the great exactitude with which the subject of the properties of the poison in question in a state of purity is treated deserves commendation. The crystalline form, especially, of the poison is thoroughly represented by description and illustration. The methods, however, by which the residue of poison yet present in the poisoned body can be again isolated and the form under which it can be recovered from the corpse and made evident to the eye have not been so carefully treated by the author. It cannot be denied that respecting most poisons we are not so far advanced as to separate traces in a chemically pure state, so that the crystalline form and other sufficient *physical* properties can be recognized. We must be satisfied if we so far isolate them that we can observe their more important *chemical* reactions. That we have succeeded in discovering for many poisons methods by which this is made possible is already an advance, and in respect of these acquisitions the author might well have drawn somewhat more upon German literature. Probably it would have been to the gain of his book had the author given over the preparation of the chemical portion to a chemist, as Tardieu has done in the preparation of his work on poisons. Such a one would have been able to treat the question still more thoroughly than is here the case, in so far as the forensic importance of the individual chemical and physical properties of a poison isolated from a corpse might be recognized.

The figures of such parts of plants as are known to contain poison have been multiplied in the present edition, and thereby essential service is rendered to medical men, who at the opening of a body meet with such portions of plants. Unfortunately, however, some of the figures serve only to show the approximative magnitude, but not the peculiar characteristics of form; for instance, Colchicum, p. 512, and Digitalis, p. 799, in which especially the crenate margin of the leaf should be more noticeable, etc. In the figure on p. 498, with the best will, we cannot recognize Sabina.

But these points are unessential in comparison with the excellence of the work. Even as it stands, Taylor's work is *one of the most important productions in the department of medical jurisprudence*, and the appearance of a new edition will be welcome to all acquainted with the subject.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

EXAMINATIONS AND ORDER OF MERIT.

Sir,—Unless there is some urgent necessity for the change that has taken place in the manner of publishing the lists of the examined it is greatly to be desired that there should be a speedy return to the old system, as the new regulation will undoubtedly have an injurious effect upon students and hinder the progress of pharmaceutical knowledge, for the stimulus of emulation being withdrawn and no apparent advantage being obtainable from increased study, the tendency to learn no more than sufficient to pass (already too prevalent) will be encouraged and the majority of the candidates reduced to one dead level of mediocrity.

Of course, abstractedly considered, the desire for knowledge should be the one all-sufficient inducement to study, and its acquisition the most noble reward, but in all times the public recognition of excellence has been added as an additional incentive, and never accounted an unworthy one, nor an injustice to those who failed to attain a high position.

FREDK. ANDREWS.

23, *Leinster Terrace, W.*
May 29, 1876.

Sir,—The tone of your article on this subject encourages me to hope that it will meet with the re-consideration, which it was the object of my last letter to suggest. I now beg space for a few lines in reply to what appears to be the argument in support of the present arrangement.

No one will question the fulfilment of the letter of the law, when the board of examiners have sifted the candidates, and certified those who have shown skill enough to pass through the meshes of their net, but it does not follow that they are bound to do no more than the law compels them to do. This would be a very poor world if nothing better was aimed at than to escape the infringement of law; if the students followed the example of the board they would seek only the dead level, which would save them from purgatory. And such a result could not be regarded as a fulfilment of the object for which the Pharmaceutical Society was founded —the advancement of chemistry and pharmacy, and in accordance with which good object the charter was granted and the Pharmacy Act passed.

That there is nothing in the Act inconsistent with the classification which has recently fallen out of use, its previous continuance for so many years is sufficient proof, and I fail yet to see any reasons either legal, practical, or sentimental, why the custom, which has worked well so long, should be discontinued, but on the contrary, that it should be continued, and not only continued but developed. The board certify that the whole batch of successful candidates have taken 50 per cent. of the total marks, but they certify nothing more. Is it desirable to certify of a man who has taken 80 or 90 per cent. of the total marks that he has taken 50? I have no hesitation in saying, that the right thing to do is to publish the number of marks taken by each successful candidate, and if a man does not like it to go forth to the world that he has taken the lowest position which will enable him to carry on his trade, he will strive the harder and take a better.

The Society makes considerable effort by prizes, medals, and scholarships, to urge forward a few picked men, for it it is only such that are acted upon at all by such incentives, and it would be inconsistent and retrograde to neglect the health giving and bracing action of the knowledge that every man must stand according to his merits.

BARNARD S. PROCTOR.

11, *Gray Street, Newcastle,*
May 30, 1876.

Sir,—I have been very much pleased to notice the reference made to this subject in the columns of the Journal by Mr. Proctor, "Aggrieved," and "Adolescence," as well as in the leader in last week's issue. I trust the opinion of many more pharmacists may be given, on the propriety or impropriety of placing the names of those who have passed the Minor, in the order of merit, so that we may judge who are for and who are against the present plan.

In common with many others, both registered and unqualified, I regretted from the very first the alteration and would have corresponded on the subject before this were it not that I preferred some other and more able pen than mine to take the lead. Such has been done, and I am glad that employers even have observed the unfairness of the arrangement, and if the parties most concerned were appealed to I feel confident that the majority of them would express their disapproval of the late adopted measure, much preferring the old method which is in vogue in nearly all technical competitive examinations.

I hope the matter will be reconsidered by the Council at the end of the session, for one would reasonably expect that those most interested, viz., the candidates themselves, should have been consulted on the subject by vote or otherwise, before the alteration was made.

In addition to the introduction of alphabetical order in the official lists there has been a discontinuance of the awards of the "Hills Prize," and the "Prize of Books," (value £2), the former instituted by our worthy President, as a reward to the best candidate at each meeting (provided he deserved it); the latter eligible for competition by students of the Society who took honours in the Minor. All these disadvantages combined have the influence of discouraging young men in the trade from devoting so great a portion of their limited leisure time to the prosecution of their studies as they might have done, while the former arrangements were in force.

In my own experience I found that the prospect of success beyond a mere passing of the examination, often served to spur me on to greater exertion and increased study, when I was disheartened by slow progress, or other difficulties, and I believe that in the case of many more who were preparing for the ordeal their flagging spirits were oft inspired with new energy and more zeal when they thought of the goal in the distance, and should they even fall short of their aim they might still comfort themselves with the thought that they made a better figure than those who simply read to pass.

Now, I think that painstaking investigation and plodding perseverance, in contradistinction to careless working or systematic cram, ought to receive its reward. "*Palmam qui meruit ferat.*" Under the existing circumstances, however, the only pleasure—viz., aspiring to higher honour than "getting through by the skin of one's teeth" (as I have heard one of the examiners not very tersely style it), or, as some do, pass by the chairman or secretary's casting vote—is removed, and the whole affair becomes a rather uninviting, if not disagreeable, task to the willing worker, to be mastered with anything but good grace, for the simple reason that it is compulsory for him to try it, and there is no honour attached to him for succeeding in attaining his object. Of course, as "Charity covereth a multitude of sins," a few *ignoramuses* will chuckle over their good fortune—indeed, some of them whose surnames begin with "A," or "B," may possibly boast, to the uninitiated, of appearing at the head of the list. But we will seldom find virtue made of the necessity, and the Board of Examiners may yet discover with regret that want of stimulus tends to want of application, the result being detrimental to the interests of the Society, in so far as an indirect method of contributing knowledge to its future members is abolished, and in consequence thereof a large percentage of unprepared candidates will present themselves for examination, an occurrence which has already been found to be a source of increased expenditure in conducting these examinations, and has led to the enlarged fine, payable by those rejected. In your editorial article you give an explanation of the motives which induced the Council to make the change which has called up so many objections, but however much their reasons may satisfy your readers as regards the "Law Standard of Qualification," there remains a still greater cause for complaint regarding the "Major," which is not compulsory, but optional; and now that the title of "Pharmaceutical Chemist" can be obtained in Ireland by passsing a much easier examination, and at half the price, so that those who fail at either the English or Scotch boards have the opportunity of going over there and becoming flourishing members of the Irish Society—there is little honour in the title *per se*, for the public know no difference, and there is no incentive left (when there is most need of it) to go on to the higher qualification. You may surmise, therefore, that the future generation of pharmaceutists will be fewer in numbers and less learned than the present one unless the system of classification by merit be restored.

JAMES B. L. MACKAY.

May 29, 1876.

"PHARMACY IN PORTUGAL."

Sir,—That a pharmacist, foreign to a country, in his attempts to describe the condition of its pharmacy, should fall into some errors is almost natural, and scarcely to be avoided; and more especially must this be the case when, as in the instance of Portugal, the native pharmacists themselves and some members of the medical profession are not quite in accord on the several points in question. The personal observation of a foreigner cannot fulfil every requirement. He may be quite correct in his appreciation of the state in which he finds the pharmacy, but his inquiry, to be complete, must necessarily extend to the general education and the means of technical education; also to the curriculum of study required in order to obtain the legal qualification to open and conduct a pharmacy. For these details he must be mainly dependent on information obtained from the most reliable sources within his reach.

Last autumn I spent a month in Portugal, irrespective of the time occupied in the passage out and home. Although I remained some time in Lisbon, and also in Oporto, I did not by any means confine myself to those two cities, and the substance of the "Note on Pharmacy in Portugal," to which Senor Andrade has taken exception, was obtained from pharmacists in business and members of the medical profession, supplemented by information from private sources and personal observation in my visits to several pharmacies. My notes were not the result of casual inquiries; the object I had in view was explained, and a series of questions of a definite character and for a definite purpose elicited answers which, as the conversation proceeded, were entered in my note book. The condition of general education in Portugal was the first object of my inquiry, with the view of ascertaining the amount of education likely to be possessed by a lad in that class of society from whence pharmacists fill their ranks. Next, the curriculum of study required from intending pharmacists, and the special means provided for this purpose.

The pharmacist who detailed to me the course of study was a comparatively young man and the proprietor of a business. He described that course which enabled him to obtain his qualification and at the same time stated that it was the usual one adopted by students of pharmacy. In my note book now before me the statement that "Latin forms no necessary part of the curriculum of study" is underlined to emphasize it. On the question being repeated the reason assigned was that the directions of the 'Codigo' were in Portuguese, and also that physicians were required to write the directions of their prescriptions in the native language and not in Latin. Senor Albano Abilio Andrade himself, after describing the course of study required from a pharmacist of the first class, states that "Besides this method of obtaining the pharmaceutical qualification, the Portuguese law permits another with fewer studies, and without attending the special schools in the three above-mentioned establishments." If I am correctly informed—and it was confirmed from private sources quite unconnected with pharmacy—that, as a rule, the pupils filling the ranks of pharmacy in Portugal are drawn from a class lower in social position and in education than in England, then as the Portuguese law recognizes a pharmaceutical qualification with fewer studies enabling a man to open and conduct a pharmacy, the presumption is that this lower qualification would more fairly represent the pharmacy of Portugal. If therefore, additional information had been afforded by Senor Andrade with regard to the number of pharmacists of the first class as compared with that of all the other classes in business in Portugal, it would have been a valuable addition to our present imperfect knowledge.

I stated in my note that the pharmacy of Portugal "seems to be" superseded by foreign nostrums. For this piece of information I was indebted to a member of the medical profession in Portugal; probably it would have been better if I had repeated the bare fact without naming the two articles, iron and strychnia, but it so happened that those were the two drugs mentioned by him, as instances in point. And I may also add that a Portuguese gentleman, to whose assistance I was much indebted, drew my attention to some medicine sent in to a family, in confirmation of the statement made by the medical man as to the prevalence of this practice. As I consider this point important in its bearing upon the pharmacy of other countries equally with that of Portugal, I shall refer here to a summary of a lecture delivered at the College of Pharmacy at Barcelona, by M. Ronquillo. M. Ronquillo having examined the causes of the decadence of pharmacy in Spain, attributed it principally to the Pharmacy Laws and to the "importation of foreign galenical preparations." As a means of "regenerating pharmacy," in addition to an alteration of some of the pharmacy regulations, he urged "the obligation on the part of the pharmacist to conform in the preparation of his medicines to a codex or legal formulary."

I am aware that Spain is not Portugal, but a glance at the map will show that Portugal is only a geographical slice of Spain. They are separated for the most part only by a very faint line. Between the two kingdoms there is constant intercourse. The inhabitants of Galicia migrate to Portugal in search of employment, returning with the seasons, so that it is scarcely possible to conceive otherwise than that the conditions of pharmacy in one kingdom should have their counterpart in the other.

Dr. Philipp Phœbus, University of Geissen, an able writer, in his work 'On the Present Condition of Pharmacy in Various Countries,' says of Portugal "Business qualification essentially as in Spain; it is conferred through the pharmacy schools which are associated with the schools of medicine in Lisbon, Oporto, and Coimbra. These pharmacy schools still leave much to be desired. Portuguese pharmacy in a scientific point of view is not equal to that of France, or Belgium." From this quotation it would appear that these schools are not exclusively schools for pharmacy but are associated with the medical schools.

I am quoted as having stated that English pharmaceutical specialities are used "*con fanatismo*" in Portugal; what I did say was that they "are largely imported from France and also from America; England, too, is fairly represented." Senor Albano Abilio Andrade adds that only two English patent medicines are known in Portugal, Du Barry's Revalenta and Holloway's Pills. If he really means what he says I consider myself much better informed on this subject and have no hesitation in telling him that in my rambles among the pharmacies in one of the chief cities of Portugal, a Portuguese pharmacist kept me at the very least half an hour whilst showing me different nostrums and asking my opinion as to whether they could be relied on or otherwise. Some specialities were shown me from London makers whose names and preparations I had previously been a stranger to. Du Barry's and Holloway's formed no part of this exhibition. I mention this in confirmation of facts otherwise furnished me.

Objection is taken to my remarks on the fact that a formula for Morison's pills finds a place in the 'Codigo' and its insertion is justified from the circumstance that such a formula is found in Gray's 'Supplement' and Beasley's 'Receipt Book.' The distinction does not appear clear in Senor Andrade's mind between a pharmacopœia which has a legal force and a collection of receipts which may possess a certain amount of convenience. I think that the physicians of this country do not hold Morison's pills in such estimation as to justify the belief that a formula for their preparation will at any future time find its way into the British Pharmacopœia. Should the time arrive, probably Pil. Philip and Morison's pills will walk in arm in arm, followed by Linimentum Scorpio and syrup of phosphorus. Dover's Powder and Plummer's Pill are not parallel cases; they are peculiar combinations and to place the formula of an ordinary aloetic pill like Morison's, which has no feature in it to make it special, side by side with these in a National Pharmacopœia, because it has found a place in a book of receipts, is simply absurd and reminds one of Landseer's painting of "Dignity and Impudence."

I stated also that jaborandi finds little favour in Portugal and I repeat the statement advisedly, and it is nothing to the purpose to say that it has been tried and reported on. It is very rarely indeed, if at all, prescribed in Portugal, for satisfactory reasons assigned by my medical informant.

I remarked also that the 'Codigo' has no formula in it peculiar to the country, and farther on I stated what my expectations were: "that in a country that has so intimate a connection and such frequent communication with Brazil, Rio Janeiro, Pernambuco and other parts of S. America I expected to find some drugs the virtues of which had not reached England." The prodigious catalogue of formulæ enumerated is no reply to this observation and the principle of selection may very advantageously be adopted in the constitution of the pharmacopœia now in hand. It is a question whether the value of a pharmacopœia is not in an inverse ratio to the number of its formulæ and a national pharmacopœia without a national formula in it is an anomaly.

It is now refreshing to approach a subject admitted to be correct, that is the existence of a Government price list without a limitation of pharmacies; thus the price to be charged for medicine is regulated by Government, whilst there is no equivalent in the limitation of the number of those allowed to carry on business. The consequence is that in the chief cities of Portugal there is an average of one pharmacy to 2000 inhabitants, whereas in Germany there is a price list and a limitation of pharmacies averaging one to 10,000 inhabitants, and in no country in Europe can medicines of an equal quality be obtained at so moderate a price as in Germany. The limitation of pharmacies is a compensation for comparatively low prices; such an anomaly as that which exists in Portugal is inconsistent with a satisfactory condition of pharmacy.

Senor Andrade is a pharmacist of the first class in Oporto, and refers to an order just executed in England, containing strychnia, etc., as a proof that those drugs are required for the preparation of prescriptions of Portuguese physicians. Oporto has a floating population of foreigners which must to a certain extent influence its pharmacy, and I should not take an Oporto pharmacist as a fair example of Portuguese pharmacy.

There are some statements in connection with the pharmacopœia and its preparations which at present I have no means of criticizing; also as to the number of members of the pharmacopœia committee and their qualifications, I am in the same condition.

The writer of the article in the *Pharmaceutical Journal* 1871, states "that pharmacy in Portugal is far behind England, Germany and France;" Dr. P. Phœbus states "that Portuguese pharmacy in a scientific point of view is not equal to that of France or Belgium:" and these agree with my conclusion "that pharmacy in the chief cities of Portugal is not in a satisfactory condition."

I may have erred in my note on pharmacy through incomplete information supplied me, but I did not read a paper which cost me nothing, nor have I drawn on my imagination for details; and I still hold that as regards the condition of pharmacy in Portugal and its different phases that "Note on Pharmacy" is substantially correct.

THOMAS GREENISH.

20, *New Street, Dorset Square, May* 30.

H. L.—The legal provision on the subject occurs in the 16th section of the Pharmacy Act, 1868.

"*Oculus.*"—We are not aware that there is any such appointment as "Dispenser in the Civil Service," to apply for.

G. Sharples.—Bisulphite of lime is prepared by saturating a mixture of slaked lime and water with sulphurous acid.

G. E. G.—We have never heard of a syrup of super-phosphate of iron and lime.

M. H. Key.—Your letter has been forwarded to Mr. Bull, as requested.

R. N. Clark.—Several recipes for "Glycerine and Lime Cream," have already been given, one as recently as p. 593 of the present volume.

"*Enitar.*"—The specimen with the longer leafstalks belongs to the Caprifoliceæ. Send a specimen of the other plant when in fruit.

R. D. G.—Schorlemmer's 'History of the Carbon Compounds.'

"*Die Lunæ*" (Paris).—A note on Lithium Bromide, by M. Yvon, will be found on p. 221 of this volume.

"*L. S. D.*" is referred to the rule respecting anonymous communications.

"*In a Difficulty.*"—Try the Silvertown India Rubber Company, 100, Cannon Street.

F. Stevens.—We can only guess what the second set of initials are intended to convey; the first set is quite an enigma.

R. C.—Syrupy phosphoric acid, sp. grav. 1·500, may be obtained from any wholesale chemist.

Mr. Abraham (Liverpool), Mr. G. Brown (Sandown), Mr. Fairlie (Glasgow), Mr. Barclay (Birmingham), and Mr. Houghton (Cork), are thanked for their communications.

W. J. D.—If you refer to what are commonly called tattoo marks we cannot inform you.

"*Beta.*"—The best material for preparing uric acid is the excrement of serpents, which consists chiefly of ammonium urate. This should be boiled with dilute soda lye till completely dissolved, the solution filtered, and hydrochloric or dilute sulphuric acid added in excess, which throws down the uric acid as a gelatinous precipitate that afterwards becomes crystalline. Uric acid also occurs in combination with ammonia in the excreta of birds.

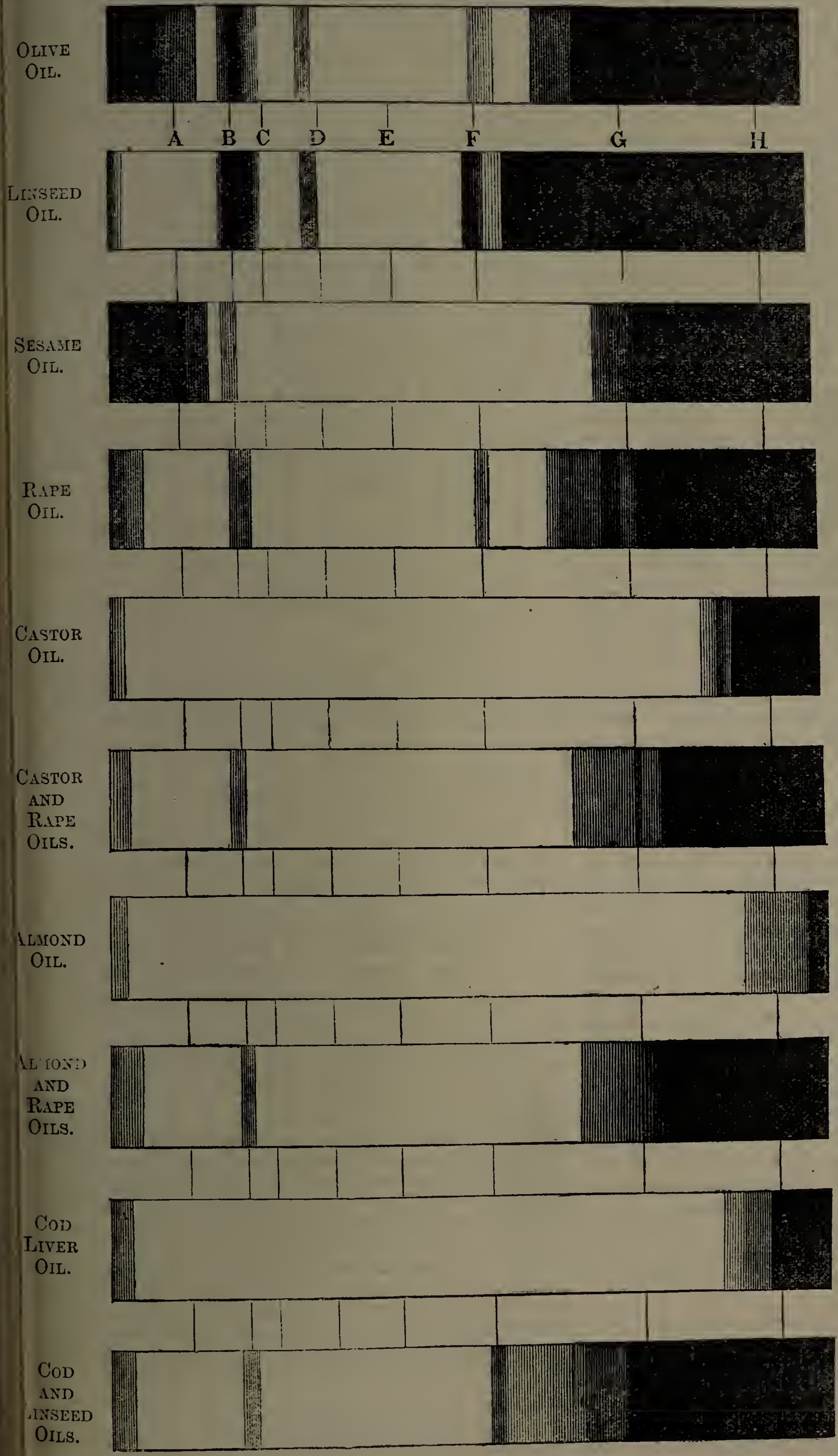
"*Chemicus.*"—In reply to a question addressed to the Board of Inland Revenue in October, 1872, an official reply was received stating "that *no licence* is required for the sale of quinine wine, if made according to the British Pharmacopœia, and not sold as a proprietary or patent medicine (See *Pharm. Journ.*, Oct. 26, 1876, p. 327). We have not heard of any alteration in this regulation.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. Houghton, Mr. Baker, Mr. Gilmour, Alpha, Reciprocity Stigma, Compensate, H. L.

THE SPECTROSCOPE APPLIED TO THE DETECTION OF ADULTERATION, ETC., OF FIXED OILS.

BY W. GILMOUR.

Having occasion recently to examine some olive and other oils, out of mere curiosity I placed a sample of one of them in my spectroscope (an ordinary two prism), and was much gratified to find that it gave a most beautiful and well-defined spectrum. Thus encouraged I was not long in trying other oils in a similar manner, and was much interested to find that each oil not only gave a spectrum in some respect or another quite characteristic, but that from the nature of the spectrum which each yielded all the fixed oils might conveniently be divided into two great classes—namely, band-giving and non-band-giving. Olive oil, for example, gave a most beautiful spectrum, being intersected by three dark bands, one of them near to the line B of the solar spectrum being very dark, and of some little breadth, and quite apparently a chlorophyll band, the other two near to the lines D and F respectively being much less marked, but still quite decided and readily recognized. The spectrum had this further characteristic—namely, that all the blue and violet rays were absorbed, as, also, some little portion of the extreme red. Linseed oil gave the same bands, all of them, however, being more decided, whilst the spectrum had only a small degree of shading beyond the dark band at F, and then broke abruptly off. The extreme red of the spectrum was also considerably brightened, and this, together with the abrupt absorption of all immediately beyond F, I found to be thoroughly characteristic of this oil. Sesame oil has only one band at B, faint in comparison with the two foregoing oils, but still distinguishable, whilst rather more of the red was absorbed and the blue transmitted than in the case of the olive. Rape oil gave two bands, one at B and the other at F, when the same depth of oil, as in the previous instances, was examined. On examining, however, a larger volume of oil the third band at D also appeared quite distinctly, whilst the absorption at the two



extremes of the spectrum differed very materially from that of the other oils. Castor, almond, and cod liver oils gave no bands, and in other respects, as shown in accompanying diagram, they closely assimilated. On mixing them, however, with even a minute quantity of any of the band-giving oils, their presence was at once indicated, not only by the bands, but also by their action on the extremes of the spectrum. I could readily detect the presence of linseed oil by the bands in any of these, to the extent of between two and three per cent., and probably the reaction might even be more delicate if the light in testing was transmitted through a greater volume of oil than I employed. The addition of a non-band to a band-giving oil was likewise very readily detected. In this case even a very minute addition quickly caused the two delicate bands at D and F to disappear, whilst the difference in other respects of the two spectra (the genuine and the mixed) could at once be detected on comparing the two by the help of the side prism. In short, little difficulty I think will be experienced in detecting not only any of the ordinary oils, but also if the sample be pure and unadulterated. This received a somewhat singular confirmation during the course of my investigations. Being anxious to test as many different kinds of oils as possible I endeavoured to obtain samples of at least all those in common use. Amongst others I obtained from a respectable warehouse a sample of what is known as lard oil. In placing it in the spectroscope I was much amused to find the dark band at B stand out very distinctly. Though totally ignorant of the characteristics of lard oil, I knew perfectly this could not be one of them, and a little further investigation proved it beyond all doubt to have been adulterated with rape oil. Were the spectroscope to do no more than this, namely, detect band-giving from non-band-giving, which would, in other words mean detect the presence of the band-giving in the non-band-giving oils, it would be an invaluable addition to the somewhat defective appliances presently at command for the detection of adulterations in oils. From all the experiments, however, which I have made (and they are not inconsiderable, having tried many experiments, and with oils not mentioned in the foregoing remarks), I am firmly persuaded it will do even more than this. I believe any one will be enabled with even little experience to detect adulteration, where such exists, and this with an ease and precision hitherto unknown in this department of pharmacy. In my experiments I have employed a column of oil varying from one to five inches in diameter, but after many trials I think the larger dimensions the more preferable. A set of beakers, for example, answer the purpose admirably, and having fixed upon one of a certain diameter the same should always be employed for purposes of comparison. The use of the side prism is also absolutely required in every step of the investigation.

These remarks I hope will be taken only as indicating the value of this as a new field of inquiry and investigation, and not in any way as exhaustive of the subject.

NOTE ON PHOSPHIDE OF ZINC.

An investigation carried out by M. A. Vigier, a Paris pharmacien, in conjunction with Dr. Curie, in 1868, led him to the conclusion that in phosphide of zinc, a stable grey crystalline body, we possessed a medicament destined to replace all other preparations of phosphorus. M. Vigier described it as possessing the property of decomposing in the stomach and giving rise to chloride of zinc, hypophosphite of zinc (in an inoffensive proportion), and phosphoretted hydrogen (PH_3), which exercised an action identical with that of phosphorus dissolved in oil.

From experiments it appeared that zinc phosphide is toxic to the extent of only half the phosphorus it contains. Thus whilst it required only 7 or 8 milligrams of phosphorus dissolved in oil to kill a rabbit of 3 kilograms, the same result was only attained by the use of 6 centigrams of phosphide containing, 15 milligrams of phosphorus. That phosphide of zinc containing as indicated by its formula (PZn_3) one fourth of its weight of phosphorus, should act toxically, as though it contained only one-eighth, is explained by the formation of hypophosphite of zinc in the intestines, a fact that M. Vigier has demonstrated.

M. Vigier has recently again brought the subject before the Société de Thérapeutique,* calling attention to the importance of using a pure phosphide. He recommends pharmacists to accept the phosphide of zinc only in the form of a very fine powder, resembling iron reduced by hydrogen, easily soluble in hydrochloric acid with an abundant disengagement of phosphoretted hydrogen. Manufacturers he urges to use only pure zinc, and during the operation to keep it free from access of air, as indicated in his paper in the *Annales de Chimie et de Physique*, vol. xi. (1867), p. 401. In examining several samples manufactured in Paris he has found them defective, and one parcel from Darmstadt contained a moiety of oxide of zinc, a result he attributes to it having been prepared in contact with air.

M. Vigier and Dr. Curie propose the following formulæ:—

Pills of Phosphide of Zinc.

Phosphide of Zinc, in fine powder	0·80	grams.
Liquorice Powder	0·30	„
Gum Syrup	0·90	„

For 100 pills, silvered.

Each pill will contain theoretically 2 milligrams of phosphorus, or 1 milligram of active phosphorus. Such pills can be taken without other inconvenience than alliaceous eructations. Two to four are usually administered daily.

Phosphide of Zinc Powder.

Phosphide of Zinc, in fine powder	0·40	grams.
Starch Powder	5·00	„

For fifty equal packets, each of which will contain 1 milligram of active phosphorus.

OXYNARCOTINE, A NEW OPIUM EDUCT.†

BY G. H. BECKETT, AND C. R. ALDER WRIGHT, D.SC., LOND.,

Lecturer on Chemistry in St. Mary's Hospital Medical School.

During the preparation and purification of narceine from opium liquors, an indistinctly crystalline mass is often left undissolved on boiling the partially purified narceine with water; a quantity of this material was obligingly given to us for investigation by Messrs. Macfarlan and Co., of Edinburgh; the results of our experiments tend to show that this crude product contains a new opium alkaloid, bearing to narcotine the relationship of benzoic acid to benzoic aldehyde, which new base we therefore propose to term *oxynarcotine.*

The crude material sent yielded to boiling water a large quantity of narceine, but it was found impossible to obtain anything like a complete separation of that substance by this means; the mass was therefore dissolved in just as much hot dilute sulphuric acid of known strength as was required to dissolve all the bases present (about 3–4 equivalents of acid); and the solution, filtered from undissolved humus, etc., was neutralized, whilst still hot, by addition of exactly as much soda solution as would saturate the acid employed. A thick magma of paper-pulp-like crystals was thus precipitated: after cooling and standing some hours, these crystals were drained and boiled with successive small quantities of water; much narceine was thus dissolved out, whilst sandy crystals of nearly pure oxynarcotine were finally left undissolved; the aqueous liquors thus obtained deposited on cooling crystals resembling paper-pulp, which, on again treating with boiling water, mostly dissolved, leaving, however, a few more sandy crystals. All the mother-liquors obtained were methodically treated by evaporation, crystallization and boiling the drained paper-pulp-like crystals with water, until finally an almost complete separation of narceine and oxynarcotine was effected.

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* *L'Union Pharmaceutique*, vol. xvii., p. 41.

† Paper read before the Chemical Society, reprinted from the *Journal of the Chemical Society* for April.

These sandy crystals were found to retain minute traces of narceine capable of being dissolved out by long-continued boiling with alcohol; the alcohol filtered boiling deposited on standing gritty crystals of oxynarcotine with a little of the feathery crystals of narceine, the latter being readily dissolved by hot alcohol, the former only very sparingly. To make sure that no narceine was retained by the sandy crystals, even after this boiling with alcohol, they were dissolved in hydrochloric acid, and the recrystallized hydrochloride precipitated by addition of a small excess of caustic potash to the hot solution; narceine is very readily dissolved by alkalies, oxynarcotine only to a lesser extent. The following numbers were obtained after drying at 100° for several hours.

A. Sandy crystals not purified by alcohol, 0·2850 gram gave 0·6410 CO_2 and 0·1560 H_2O.

B. Sandy crystals boiled several times with alcohol; undissolved portion 0·2940 gave 0·6605 and 0·1605 H_2O.

C. Sandy crystals boiled several times with alcohol; gritty crystals from alcoholic filtrate freed from narceine by several boilings with small quantities of alcohol; 0·2750 gave 0·6140 CO_2 and 0·1430 H_2O.

D. Sample precipitated by potash from hydrochloride, well boiled with alcohol and dried at 110°: 0·3865 gave 0·8700 CO_2 and 0·2060 H_2O; 0·7790 burnt with soda lime gave 0·1620 platinum.

E. D recrystallized from a large bulk of alcohol and dried at 110°; 0·2580 gave 0·5770 CO_2 and 0·1370.

F. Sample prepared like D from a specimen of hydrochloride that had been recrystallized and pressed: 0·3965 gave 0·8890 CO_2, and 0·203 H_2O.

These numbers will agree (like those given below for the chloride and the platinum salts) fairly well with either of the three formulæ, $C_{22}H_{23}NO_8$, $C_{22}H_{25}NO_8$ or $C_{23}H_{25}NO_8$, but on the whole they agree best with the first, which is moreover shown to be the true formula by the nature of the decomposition products of the base.

	Calculated.	Found. A.	B.	C.	D.	E.	F.	Mean.
C_{22} .	61·54	61·34	61·27	60·89	61·38	60·99	61·15	61·17
H_{23} .	5·36	6·08	6·07	5·78	5·92	5·90	5·68	5·90
N .	3·26	—	—	—	2·95	—	—	2·95
O_8 .	29·84	—	—	—	—	—	—	*29·98
								100·00

When oxynarcotine is dissolved in hot water containing 4 to 5 equivalents of hydrochloric acid, pulpy crystals form on cooling, containing (after well pressing in filter paper) $C_{22}H_{23}NO_8$, HCl, 2 H_2O.

1·0700 gram of crystals dried in filter paper lost at 100° 0·0885 gram = 8·27 per cent.

0·8820 gram of crystals dried in filter paper lost at 100° 0·0770 gram = 8·73 per cent.

Calculated for the above formula, 7·17 per cent.

The salt dried at 100° gave the following numbers:—

0·3115 gram gave 0·6490 CO_2 (H_2O lost).
0·2930 „ „ 0·6140 CO_2 and 0·1515 H_2O.
0·9805 „ „ 0·2970 AgCl.
1·3170 „ „ 0·4025 „

		Calculated.	Found.	
C_{22}	264	56·72	56·82	57·15
H_{24}	24	5·15	—	5·74
Cl	35·5	7·63	7·50	7·56
N	14	3·01	—	—
O_8	128	27·49	—	—
$C_{22}H_{23}NO_8HCl$	465·5	100·00		

The platinum salt, dried at 100°, gave the following numbers:—

From sample D: 0·4780 gr. gave 0·7365 CO_2 and 0·1900 H_2O.
„ A: 0·3730 „ 0·5760 „ 0·1540 „
„ D: 0 9445 „ 0·1450 Pt.
„ E: 0·6820 „ 0·1050 Pt.

	Calculated.	Found.	
Carbon . . .	41·55	42·03	42·11
Hydrogen . .	3·78	4·42	4·58
Platinum . .	15·55	15·35	15·40

Oxynarcotine forms minute, micaceous, sandy crystals, very sparingly soluble in water and in alcohol, even when boiling, and crystallizable without changing in gritty crystals from large bulks of either menstruum; both kinds of crystals are very dissimilar from those of narceine, but are not at all unlike those of narcotine prepared by precipitation from a hot solution of the hydrochloride, and by crystallization from alcohol respectively. It differs from narcotine in being partially dissolved by boiling water, and in being but sparingly soluble in boiling alcohol, and practically insoluble in benzene, ether, and chloroform. Fixed alkalies and their carbonates added to concentrated solutions of its salts precipitate it, but with more dilute solutions no precipitate is formed till after standing some time, whilst the base appears to be somewhat soluble in alkalies.

Like narcotine and narceine hydrochlorides, oxynarcotine hydrochloride breaks up in contact with hot water into hydrochloric acid and more basic salts; thus, a specimen of the hydrochloride examined above, when recrystallized from 50 parts of hot water, gave feathery crystals, of which 0·8540 gram dried at 100° gave 0·0570 AgCl. Cl = 1·65 per cent.

On recrystallizing these from boiling water, sandy crystals were left undissolved, whilst the second crop of crystals gave these numbers.

0·7170 gram dried at 100° gave 0·0315 AgCl. Cl = 1·08 per cent. $5C_{22}H_{23}NO_8 . HCl$ and $7C_{22}H_{23}NO_8 . HCl$, require respectively 1·63 and 1·16 per cent. of Cl.

The crude product obtained by Messrs. Macfarlan and Co., and examined by us as above described, was examined some few years ago by Herr Ludwig Mayer ('Proceedings of the Philosophical Society,' Glasgow, 1871), who, however, does not appear to have succeeded in obtaining the new base present in a state of perfect purity, to judge from his analytical figures, and his statement that his product, though virtually insoluble in ether, communicated to it a blue fluorescence; Mayer found in the free base: carbon, 59·46, 59·72; hydrogen, 5·95, 5·98; nitrogen, 2·79; and in the platinum salt: carbon, 39·93, and hydrogen, 4·62, the percentage of platinum not being determined: from these numbers Mayer deduced the formula, $C_{25}H_{29}NO_{10}$, the platinum salt dried at 100° being viewed as $(C_{25}H_{29}NO_{10}HCl)_2PtCl_4 . 4H_2O$ (!). Without doubt this substance was simply oxynarcotine, retaining some narceine and a trace of resinous decomposition-products, etc., giving the fluorescent property.

LITHIUM CARBONATE.*

The manufacture of lithium salts has been steadily increasing during the last few years, and has been estimated by E. Schering at between 2000 and 3000 kilos yearly. The carbonate, which twenty years ago cost 55 dols. per pound, can now be had for 4·20 dols. to 4·75 dols. The bulk of the lithium preparations, most of which are manufactured in Germany, are consumed in England and in the United States, for the treatment of gout and certain urinary diseases (uric acid diathesis); while the iodide and bromide are used in photography, and some other salts in pyrotechnics.

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* By difference.

* From *New Remedies*, May, 1876.

The process now in use for the manufacture of lithium carbonate from *lepidolite* is that of Filsinger or Schering. The previously powdered and sifted ore is placed in a trough of brickwork situated upon a warm part of the furnace, and mixed with concentrated sulphuric acid, which has been already in use, and contains small quantities of nitric acid, until it forms a thin milk; it is digested under occasional stirring until the mass has been converted into lumps, in which condition it may be easily transferred to the furnace. These lumps are heated with a moderate fire until hydrofluoric acid and the small excess of sulphuric acid are expelled; then more strongly heated, and, while still warm, lixiviated and exhausted with water in a series of vessels lined with lead. The residue consists of tolerably pure silica, which may be usefully employed for other purposes, and contains not more than 3 per cent. undecomposed ore. Former experiments having shown that lithium sulphate is incapable of taking the place of potassium sulphate in alum, enough of the latter salt (K_2SO_4) is added (after a previous analysis of the quantity of potassa and alumina) to the lye, to form alum with the aluminium sulphate already present. The solution is concentrated by boiling in large copper pans, and the alum deposit, as fast as formed, is removed. This is transferred, when cold, to a centrifugal machine to deprive it of mother water, and recrystallized from water, when it forms an almost chemically pure potash-alum. The remainder of the alumina still in solution (amounting to about 1·5 per cent. of the original weight of the whole solution) is precipitated, under continued boiling, by means of a pure, homogeneous milk of lime; the various mother liquids (viz., that separated from the precipitated alumina, and the drippings from the centifrugal machine) are united and precipitated as exactly as possible by solution of barium chloride. In this manner all the sulphates are converted into chlorides. The barium sulphate produced is utilized elsewhere. The resulting solution, containing the chlorides of lithium, potassium, sodium, calcium, and perhaps barium, is evaporated to dryness, the dry mass transferred to an earthen retort standing in a glycerine bath, and provided with a condenser, and digested with absolute alcohol, which dissolves lithium and calcium chlorides. This solution is transferred to another retort, the alcohol recovered, the residue dissolved in water, the lime precipitated by ammonium oxalate, and accidental metallic impurities by just sufficient ammonium sulphydrate. The pure lithium chloride thus obtained is now concentrated in a large silver boiler, when it will, on cooling, form magnificent fernlike crystal groups. To prepare the carbonate, the solution is precipitated with ammonium carbonate, and the precipitate washed with alcohol of 60 per cent., whereby all trace of chloride is removed. Finally, the salt is dried, sifted, and packed.—*Pharm. Centr.* No. 10, and *Arch. d. Pharm.*, March.

SOLUBILITY OF PILLS AND PILL COATINGS.

The following is a table of relative solubilities of different kinds of ready-made pills in the United States market, etc., including cachets de pain, illustrating a paper contributed to the *American Journal of Pharmacy* by Mr. J. P. Remington.

PIL. QUINIÆ SULPH., TWO GRAINS.

Varieties.	In one fluidounce of water at 80°, shaken every three minutes.	In one fluidounce of water at 98°, shaken every three minutes.	In one fluidounce of water slightly acidified, shaken every 3 minutes.	In one fluidounce of water at 98°, acidulated, and containing a trace of pepsin; shaken
Plain, uncoated pill (excipient glycerin).	Completely disintegrated in 1 hour.	Completely disintegrated in 10 minutes.	Completely disintegrated in 3 minutes.	Completely dissolved in 10 minutes.
Sugar-coated pill.	Tastes bitter in 15 minutes; disintegrated in 3 hours.	Tastes bitter in 8 minutes; in 6 hours deep ridges appeared on surface.	Sugar off in 5 minutes; disintegrated in 25 minutes.	Bitter in 3 minutes; dissolved in half an hour.
Compressed or lenticular.	But slightly affected in 30 minutes; in 1 hour not one-fourth dissolved.	Hardly affected; not dissolved in 3 hours.	Sharp edges gone in 10 minutes; in 30 minutes half gone; in 40 minutes dissolved.	Dissolved in half an hour.
Gelatin-coated.	Coating swelled partially in 1 hour; quinine not all dissolved in 18 hours.	Gelatin affected in 20 minutes; pill retains its shape for 24 hours.	Not affected in 5 minutes, nor in 30 minutes; slightly bitter in 57 minutes; gelatin swelled up in 6 hours.	Bitter in 20 minutes; disintegrated in 1 hour.
Quinine enclosed in a wafer or cachet de pain.	Quinine completely shaken out in a few moments.	Quinine completely shaken out in a few moments.	Quinine completely shaken out in a few moments.	Quinine completely shaken out in a few moments.

PIL. CATHARTIC. COMP., U. S. P.

Varieties.	In one fluidounce of water at 80°, shaken every three minutes.	In one fluidounce of water at 98°, shaken every three minutes.	In one fluidounce of water at 98°, with 10 drops diluted sulphuric acid, shaken every three minutes.	In one fl.-ounce of water at 98°, with 10 drops liq. potassæ, shaken every three minutes.
Plain, uncoated pill (excipient glycerin)	Disintegrated in one hour.	Disintegrated in one hour.	Not disintegrated in one hour and a half.	Gone in 15 minutes.
Sugar-coated pill.	Disintegrated in one hour and a-half.	Disintegrated in one hour and a half.	Water coloured in 10 minutes; nearly disintegrated in one hour.	Disintegrated in half an hour.
Compressed or lenticular.	Disintegrated in two hours.	Disintegrated in one hour and a half.	Slightly coloured; not disintegrated in one hour.	Disintegrated in quarter of an hour.
Gelatin-coated.	Swelled enormously, but intact for 12 hours.	Gelatin swollen, but water not coloured in two hours.	Swollen up in two hours; water not coloured.	Not disintegrated in two hours.
Quinine enclosed in a wafer or cachet de pain.	Powder shaken out in a few moments.	Powder shaken out in a few moments.	Powder shaken out in a few moments.	Powder shaken out in a few minutes.

The Pharmaceutical Journal.

SATURDAY, JUNE 10, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

NEW ISSUE OF THE PHARMACOPŒIA.

AT the recent annual meeting of the General Medical Council a report was brought forward by the Pharmacopœia Committee, in which it was stated that 4020 copies of the last reprint of the Pharmacopœia had been disposed of since its publication, and that 10,754 copies of the 'Additions' have also been sold. Altogether, 29,000 copies of the Pharmacopœia have been sold in less than ten years, and it appears that the sale continues without diminution, thus proving the value of the work and the estimation in which it is held.

As regards the future, the Committee directed attention to the fact that the stock of the Pharmacopœia on hand amounts to some 900 copies, and that since the present average sale of the work exceeds 1000 copies annually it will be necessary to provide for a fresh issue of the work within the next twelve months. The Committee therefore recommended that the Council should authorize the Executive Committee to take the necessary steps to provide for a reissue of 5000 copies with the Additions.

In the discussion that followed the reading of the report Sir DOMINIC CORRIGAN suggested that in any future issue of the Pharmacopœia more precise information should be given as to the solubility of various substances.

Mr. MACNAMARA expressed the opinion that in publishing a further issue some authority should be given to the Committee to correct any manifest errors, but Dr. WOOD was disinclined to give any power to change the Pharmacopœia according to the mere will of the Committee. He thought it better that the subject of alterations should be considered by the Committee and reported upon to the Council, with a view to a more general inquiry into the desirability of adopting in a new edition of the Pharmacopœia any suggested amendment.

Finally, Professor ROLLESTON proposed that the Committee should be entrusted with the preparing of any such corrections as may be fairly considered editorial and that with the concurrence of the Executive Committee it should also be empowered to make such further corrections as may seem to be urgently desirable. This resolution was agreed to, as well as the report of the Committee, and Dr. QUAIN, Dr. PITMAN, Dr. HALDANE, Dr. SMITH, and Mr. MACNAMARA were appointed members of the Committee for the ensuing year.

THE PROPOSED TRADE CONFERENCE.

THE letter which appears in our correspondence column from Messrs. SOUTHALL BROTHERS and BARCLAY, in reference to the proposed Conference at Birmingham, will sufficiently indicate to those who consider that step desirable that it is time they announced their intention of being present and taking part in the proceedings. For such a Conference to have any practical value it is obviously essential that it should be fully representative of the trade generally, and although the towns named as having undertaken to send delegates to represent them are precisely those we should have expected to be energetically active in this matter, they represent only such a small section of the trade that no useful result can be expected from the Conference unless there be a similar determination in the case of many other towns to take an active part in it.

THE CONSPIRACY TO MURDER.

THE reports in the daily papers of the case decided at the Central Criminal Court last week, in which a medical student and a married lady were indicted for conspiring to murder the latter, will have rendered it unnecessary that we should sacrifice the considerable space that would be required for an intelligible account of the trial. It will be sufficient to state that WILLIAM VANCE was sentenced to eighteen and Mrs. SNEE to six months imprisonment.

Still we cannot refrain from pointing out that the case illustrates the fact that it is not right to assume, as is generally done, that when evidence is not forthcoming as to how poisons have been obtained, some chemist and druggist is to blame for withholding it. We do not suggest that a WILLIAM VANCE is to be met with every day, but the ingenuity that made such a collection of poisons as that found at Mrs. SNEE'S house was probably exercised in more ways than one. The poisons included,—laudanum, 4 ounces; opium powder, half ounce; solid opium, 2 drachms; morphia, 6¼ grains; strychnine, 46 grains; dilute prussic acid, 1 ounce; dilute prussic acid, unlabelled, 6 drachms; corrosive sublimate, 2 drachms 23 grains; tincture of belladonna, 2 ounces. Empty ounce bottle, labelled "Liquid Chloral Hydrate."

PHARMACY IN CONNECTION WITH THE PHILADELPHIA EXHIBITION.

IT will be in the memory of our readers that the American Pharmaceutical Association decided to meet in Philadelphia this year, during the continuance of the International Exhibition, at present open in that city. The date of meeting is now fixed for the 12th of September. Meanwhile we learn from the *American Journal of Pharmacy* that the Committees of Arrangement appointed by the National Association and the Philadelphia College of Pharmacy are actively at work in completing the arrangements shadowed forth in the circular of invitation received by the Council of the Pharmaceutical Society in this country, and we are assured that "pharmacists, druggists, and chemists, from whatever part of the globe they may hail, will be welcome." An officer, speaking English, French, and German, is now daily present, from 9 a.m to 6 p.m., in the college buildings, North Tenth Street, Philadelphia, which are open for the convenience of visitors, for the special purpose of giving information and assisting strangers in their endeavours to spend most profitably the time at their disposal during their visit.

The *Tribune* announces that although the Judges of the Exhibition have not all yet been appointed, those for Group III., Chemistry and Pharmacy, including the apparatus, are C. A. Joy (New York); F. A. Genth (Pennsylvania); J. L. Smith (Kentucky); C. F. Chandler (Pennsylvania); W. Odling, F.R.S. (Great Britain); and M. Kuhlman (France).

THE EFFECT OF COLD UPON MILK AND ITS PRODUCTS.

The *Annales de Chimie et de Physique* for April contains a paper giving an account of some experiments made by M. Eugene Tisserand, Inspector-General of Agriculture, to determine the influence of cold upon milk and substances derived from it. From these experiments he has drawn some general conclusions which have an important bearing upon the methods employed for the conversion of milk into butter and cheese. Neither are they without interest with respect to the composition, at different times of the year, of milk standing in pans, from which portions are at intervals ladled off for the purpose of sale.

Upon the freshly drawn milk of a cow being submitted for twenty-four or thirty-six hours to different temperatures between zero and 36° C., M. Tisserand observed that whilst the rising of the cream was more rapid in proportion as the temperature approached zero, the volume of cream and yield of butter were larger and of better quality from milk that had been exposed to a low temperature than from milk which had not.

AN UNSUCCESSFUL RECLAMATION.

A decision of the French Court of Cassation, which had reference to some unusual pleading, is quoted by the *Répertoire de Pharmacie* as illustrating the strictness with which that court construes the pharmacy law of France. The wife of a pharmacien had received from her parents, as a marriage portion, the business of a pharmacy, and it had been stipulated in the marriage contract that the husband and wife should hold their property separately. A creditor of the husband wishing to seize the stock of the pharmacy for debt, the wife claimed it as being her own private property. A law suit followed and the creditor pleaded with success that the claim of the wife could not be received, on the ground that the law interdicts any person not possessing the diploma of a pharmacien from opening, owning, or carrying on a pharmacy.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, June 7, 1876.

Present.—Messrs. Atherton, Atkins, Betty, Bottle, Brown, Cracknell, Frazer, Greenish, Hampson, Hanbury, Hills, Mackay, Owen, Robbins, Sandford, Savage, Schacht, Shaw and Williams.

Mr. Thomas Hyde Hills having been voted to the chair, the minutes of the previous meeting were read and confirmed.

Election of President.

The first business was the election of President for the ensuing year, and a ballot having been taken,

Mr. John Williams

was unanimously elected, and thereupon took the chair.

Mr. Hills in handing over the keys of office thanked the Council for the kind support it had given him during his term of office.

Mr. Williams said he deeply felt the honour which had been conferred upon him. He was quite aware of his many deficiencies, but he must trust to the indulgence of the Council and to its assistance in helping him to carry on the duties of the office. He felt that he ought not to take the chair without saying a word respecting the retiring President, for he felt how difficult it would be for him to carry out as he should wish the duties of the office after the example set by Mr. Hills. Mr. Hills had been so good a president in every way that he felt it was impossible for him to equal him in efficiency. He would, however, endeavour to imitate him to the best of his ability, and he was sure all the members would agree with him in returning thanks to Mr. Hills for his past services.

Election of Vice-President.

On a ballot being taken,

Mr. William Dawson Savage

was elected Vice-President for the ensuing year. He briefly returned thanks for the honour, bearing testimony to the admirable manner in which Mr. Bottle had fulfilled the duties, and stating that he could only promise to do his best to follow in Mr. Bottle's steps, trusting to the indulgence of the Council.

Election of Treasurer.

Mr. Sandford said the Council seemed so much of one mind that morning, that he thought it might dispense with the formality of a ballot in the case of the Treasurer and elect Mr. Cornelius Hanbury by acclamation.

The motion was carried unanimously.

Mr. Hanbury thanked the Council for the honour done him, and said he accepted the office with considerable diffidence, because his many engagements prevented his attending the meetings of Committees with that regularity which he felt was desirable on the part of a Treasurer. He would, however, if it were the wish of the Council, undertake to do his best and any shortcomings must be attributed to circumstances and not to lack of interest in the Society.

Appointment of Secretary and Assistant-Secretary.

Elias Bremridge was re-appointed Secretary and Registrar and Richard Bremridge Assistant-Secretary and Deputy Registrar for the ensuing year.

Elections.

Before the elections were proceeded with,

Mr. Betty said he had promised to bring before the Council the case of a member in London who had not paid his subscription by May 1st, and was consequently liable to a fine of half a guinea. There were certain exceptional circumstances in the case which the Council would no doubt take for granted on his statement, but he felt the real question was whether the question of circumstances could be gone into at all, or whether the bye-laws must not be carried out under all conditions.

Mr. Mackay said if the case mentioned by Mr. Betty were gone into he had also one to bring forward of a gentleman in New York, who had sent him his subscription authorizing him to pay it if the fines were not imposed.

The Secretary said a notice had appeared in the Journal, from January until the end of April, setting forth *in extenso* the clause of the bye-laws relating to the payment of subscriptions. In addition to that three separate reminders were sent in April to each person whose subscriptions were unpaid.

After some conversation it appeared the unanimous opinion of the Council that the bye-laws must be adhered to.

Elections.

MEMBERS.

Pharmaceutical Chemists.

Herbert, John	Talgareg.
Walton, Edward Bridges	Richmond, Yorks.

Chemists and Druggists.

Griffith, Richard Cadwaladr	Port Dinorwic.
Linnell, Thomas Judkins	Brighton.
Wilkins, Henry	Cheltenham.

ASSOCIATES IN BUSINESS.

The following having passed their respective examinations, being in business on their own account, and having severally tendered the subscription for the current year, were elected "Associates in Business" of the Society:—

Minor.

Anthony, David	Cardiff.
Brooks, Charles	Wandsworth Road.
Francis, Charles	Peckham.
Jones, James	Carmarthen.
King, John William	Bolton.
Latham, Robert John	Howden.
Lea, Harry	Ellesmere.
Pasmore, Walter Frank	London.
Pendrigh, John Cuthbertson	Sanquhar.
Rowe, John	Fisherton, Salisbury.
Thomson, James Hood	Dunoon.
Wade, James Henry	Ramsey.

Modified.

Stevens, Felix	London.

ASSOCIATES.

The following having passed their respective examinations and having severally paid (as Apprentices or Students) or tendered the subscription for the current year were elected "Associates" of the Society.

Minor.

Adams, Herbert Richard	Shepherd's Bush.
Davies, Frank Henry	Portsmouth.
Eliott, Samuel	Liskeard.
Fox, Thomas Augustine	St. Helen's.
Johnson, Walter Edmund	London.
Thomas, John	Aberystwith.

Modified.

Hardcastle, Alfred Wright	Birmingham.
Negus, Samuel Thomas	Northampton.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary Examination and having severally tendered the subscription for the current year were elected "Apprentices or Students" of the Society:—

Bickle, Leonard Watkins	Birmingham.
Bowie, Robert Forbes	Forres.
Brisley, George	Margate.
Clarabut, Frank Stone	Folkestone.
Cobden, Alfred Walker	London.
Cullen, Harry Harker	Tewkesbury.
Davy, Henry	London.
Dyer, Edward Henry	Horncastle.
Haddock, James	Bedford, Leigh.
Hoyle, Richard Ashworth	Rawtenstall.
Jones, James Lewis	Bangor.
Keith, John	Forres.
Kershaw, Arthur Noble	Halifax.
Lunn, Alfred	Spalding.
Mackay, Henry	Edinburgh.
Mitchell, Wm. Kirkpatrick	Wigton.
Parker, William	Sessay
Pennington, George Edgar	Kendal.
Pottinger, Thomas	Dartford.
Watkins, George Albert	Spilsby.
Whyte, Wm. Henry Hyde	Southsea.

Several individuals were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Appointment of Committees.

The following Committees were appointed:—

General Purposes.—The whole of the Council; four to form a quorum, to meet as occasion may require.

Finance.—Messrs. Betty, Cracknell, Greenish, Owen and Robbins; to meet at three o'clock on the day preceding the meeting of the Council.

Library, Museum, and Laboratory.—Messrs. Betty, Bottle, Greenish, Hampson, Hanbury, Hills, Robbins and Sandford were proposed as the members of this Committee.

Mr. Schacht hoped he might be excused for again bringing forward the question of the desirability of this Committee meeting at the end of the month. It was very desirable that some country members should sit on this Committee, but it was impossible they could do so if the Committee met in the middle of the month. If it were necessary that a committee should meet in the middle of the month, let the House Committee do so.

Mr. Sandford said he had been a member of this Committee for many years, and he should be very glad to have the assistance of country members upon it, but if its meetings were postponed to the day before the Council meeting the work would never be got through. The Committee met at eleven o'clock and frequently did not separate until three or four. Now on the day before the Council meeting the Finance Committee met at three, the Benevolent Fund at four, the Parliamentary at five, and the General Purposes at six.

Mr. Schacht suggested that there might be an exchange.

Mr. Sandford said they could not make an exchange which would give this Committee all the time it wanted.

Mr. Hampson said he had served on the Committee and quite appreciated the difficulties which might arise from altering its time of meeting, but still he felt that it was very desirable to have one or two country members on it if possible.

Mr. Hills said the experiment had been tried once of having the Committee on the day following the meeting of the Council, but it was not continued long.

Mr. Owen remarked that this same question was discussed fully last year.

Mr. Greenish agreed with Mr. Sandford that this Committee was a most important one, and it had a great deal of work to do, but it seemed to him quite impossible for it to meet on the same day as the other Committees. This Committee had to consult with the professors, the librarian, and the curator, and to go through the house affairs; sometimes a little matter connected with the gas would occupy a couple of hours.

Mr. Schacht said that was the province of the House Committee.

Mr. Brown said the Council had discussed this question several times, and he thought the balance of evidence was against the possibility of the Committee meeting on the day before the Council. It was very desirable that there should be a Committee meeting in the middle of the month, but could there not be a second meeting on the day before the Council, when country members could attend and discuss what had been done more freely and fully than they could in Council?

Mr. Greenish thought this would not be practicable; the second meeting might undo what had been done at the first.

Mr. Robbins remarked that the General Purposes Committee did not meet frequently enough. It would be well if it met regularly every month before the Council meetings, and then any discussion of details not suitable for debate in Council might take place.

The President said that when the General Purposes Committee met at six or seven on the Tuesday evening, it was generally found that members were so fatigued with the business of previous Committees that very little was done.

Mr. Schacht said he fully comprehended all that had been urged with regard to the importance of this Committee, and that was what led him to bring the question forward. It showed that the Committee ought to be a more mixed one. The only objection seemed to be that there was a great deal of work to do, and he thought that would be got over by meeting at three o'clock on the Tuesday preceding the Council Meeting.

Mr. Atkins said he was present that day rather to learn the order of business than to express any opinion of his own, but it seemed to him very important that the work should be distributed, and the interest and exertions of the country members enlisted in the service as much as possible. At the same time he was satisfied there was no antagonism on the part of the country towards the town members, to whom they were indebted for doing so much of the work of the Society.

Mr. Hanbury thought the remarks which had fallen from Mr. Schacht and Mr. Atkins were well worthy attention, and he saw no reason why the Committees should not be more distinct, and why two should not sit at the same time. He should be glad to see more weight given to the decisions arrived at by the Committees, instead of their reports being discussed in Council in so much detail as they were sometimes. If Mr. Schacht's ideas were carried out he thought the time of the Council might be very largely saved.

Mr. Mackay said there was a great difficulty in the way of country members undertaking the duties of any Committees which met in the middle of the month, because it would be apparent to all that gentlemen living at a distance of 400 or 450 miles could not be expected to come up twice a month. As a rule the work was divided, and he did not think there was any country member who at all wished to shirk his fair portion of the burden. If arrangements were made by which two Committees could sit simultaneously on the Tuesday the whole work might be put in such a shape that it would come up for consideration the next day at the Council meeting. He cordially agreed with what Mr. Hanbury had said with regard to the character of some of the discussions upon the reports of Committees, the whole subject of a report being frequently re-opened and a long time spent in discussing what in committee was felt to have been concluded. When a Committee had carefully considered a subject and reported upon it he thought its decision, unless in very exceptional cases, should be deemed final.

Mr. Betty said there had been a number of suggestions offered, but they did not appear to lead to any practical result, as no amendment had been proposed.

Mr. Schacht then moved an amendment—

"That Messrs. Betty, Bottle, Hampson, Hills, Mackay, Sandford, and Schacht constitute the Library, Museum and Laboratory Committee and that the meetings of that Committee be appointed for 12 noon of the day preceding the meetings of Council."

Mr. Cracknell seconded the amendment. He thought it very desirable that some country members should serve on that Committee, and he thought it might be arranged if necessary that it should meet at eleven or twelve in the morning.

Mr. Owen submitted that the Finance Committee was already appointed to meet at the same time.

Mr. Schacht said that might be altered.

Mr. Owen asked if it were desirable that a whole month should elapse without the meeting of a Committee.

Mr. Brown said it was acknowledged to be desirable and always had been that this Committee should meet in the middle of the month, and devote a considerable portion of the day to the work which it had to do. Was it not possible, without disturbing the present arrangements, to add two or three country members to the Committee? And he thought it would to some extent meet the difficulty if travelling expenses were allowed to such members.

Mr. Mackay said he could not support Mr. Brown's suggestion; the question was one not so much of money as of time, and this was the practical difficulty. He should like Mr. Sandford to give the reasons rendering it imperative that this Committee should meet in the middle of the month.

Mr. Sandford said the great reason was that a vast amount of business came before the Committee which was almost Council business, and he knew no other Committee which could take it. The Finance Committee and the House Committee had each a special class of business to do, but the Library, Museum, and Laboratory Committee was so general that it took in almost every subject. Although they had so excellent a Secretary and Assistant Secretary the Council could not leave them without some Committee meeting in the middle of the month, and he was quite sure those gentlemen would regret very much being so left. If Mr. Schacht's time of three o'clock in the afternoon on the day before the Council were adopted the Committee would have to keep the Professors, the Librarian, and Curator waiting. As for two Committees sitting at the same time it had been tried over and over again. He should be very glad to see the names of country members added to the Committee, but it would be quite impracticable to alter the time of meeting. He hoped, therefore, that Mr. Schacht would not press the motion which had been discussed so many times. With regard to the suggestion of Mr. Brown it would be a serious matter in their present position to undertake an expenditure of that kind without very grave consideration.

Mr. Atkins hoped after this discussion, which had been very valuable to him, that Mr. Schacht would withdraw his amendment. At the same time he very much agreed with what Mr. Schacht had said, and Mr. Hanbury had endorsed, and he should be personally glad if he could see his way to the adoption of Mr. Brown's suggestion in some form or other so that country members might be added to the Committee. He was quite sure there was no jealousy between town and country members, but after all the important business of the Society must be conducted in committees where all questions, whether imperial or local, should be threshed out Although he was new to the working of this Society he could speak with experience as to the working of other committees, and for many years he had seen important municipal work divided among councilmen, and he knew from long experience that difficult and delicate questions were carefully exhausted in committee, and then brought up, and unless there was some very good ground the conclusions of the committees were at once promptly and cordially received. He felt so much the force of the abstract argument of Mr. Schacht that he should be sorry not to be able to vote with him, but on the other hand he felt that those who had a practical knowledge of the workings of the Society must to a large extent guide his decision.

Mr. Schacht could not consent to withdraw the amendment because it was with him a question of principle. Everything urged against his proposal strengthened his conviction that the Committee ought to be more popularly constituted, and that all interests in the Society ought to be represented on it. Mr. Sandford's gravest objection seemed to be that they ought to have a meeting in the middle of the month; but that might as well be made the meeting of the House Committee, which was constituted of the same persons and, therefore, it was clear that what they could do in one capacity they could do in the other, namely, strengthen the hands of the officials and attend to any questions which might arise. Mr. Brown's suggestion that things should remain as at present, but that the country members might attend and have their railway expenses paid scarcely met the case. Mr. Mackay was right in saying that it was not altogether a question of money, though they might not be impervious to the influence of an expense of perhaps £20 per annum. It would be a great fatigue to any gentleman living at a distance to come to London, attend the Committee, and get back again the same evening, and he might naturally ask to be excused such labour in addition to the two days required for his attendance at the ordinary Council meeting.

Mr. Mackay suggested to Mr. Sandford that the object aimed at could be accomplished by arranging for the General Purposes Committee or the House Committee to meet in the middle of the month.

Mr. Sandford did not think that would answer the purpose. The Council had discussed this question for the last four years and he really thought that the members were in a position to vote upon it.

The amendment was then put, when the voting was as follows:—

For: Messrs. Cracknell, Frazer, Hampson, Hanbury, Mackay and Schacht.

Against: Messrs. Atherton, Atkins, Bottle, Brown, Greenish, Hills, Owen, Robbins, Sandford, Shaw and Williams.

Messrs. Betty and Savage were present at the division but did not vote.

The amendment was therefore lost.

The original resolution was then put and carried.

Mr. Brown then moved—

> "That the Library, Museum, and Laboratory Committee be authorized to pay the railway expenses of any country members of Council (not exceeding three) whom they may consider desirable to be added to the number now elected."

Mr. Atkins seconded the motion, but on being put it was lost by a considerable majority.

House.—Messrs. Betty, Bottle, Greenish, Hampson, Hanbury, Hills, Robbins and Sandford. The Committee to meet as occasion may require.

Benevolent Fund.—Messrs. Atherton, Atkins, Betty, Bottle, Brown, Cracknell, Frazer, Greenish, Mackay, Owen, Rimmington, Robbins, Sandford, Schacht and Shaw. The Committee to meet as occasion may require at four o'clock on the day preceding the Council meeting.

Law and Parliamentary.—The whole of the Council. The Committee to meet at five o'clock on the evening previous to the Council meeting, or as occasion may require.

Evening Meetings.—The President, Vice President, the Editor and the Professors were appointed a Committee to make arrangements for the evening meetings during the ensuing session.

Appointment of Editor and Sub-Editor.

Dr. Paul was then reappointed Editor of the Society's Journal for the ensuing year, and Mr. Francis Passmore Sub-Editor.

Local Secretaries.*

The following gentlemen were elected Local Secretaries for the ensuing year.

Towns eligible.	Names of persons appointed.
Aberdare	Thomas, Watkin Jones.
Aberdeen	Davidson, Charles.
Abergele	Hannah, John.
Aberystwith	Wynne, Edward Price.
Abingdon	Smith, William.
Altrincham	
Andover	
Arbroath	Milne, Patrick.
Ashby-de-la-Zouch	Johnson, Samuel E.
Ashton-under-Lyne	Bostock, William.
Aylesbury	Turner, John.
Ayr	
Banbury	Linnet, Samuel S.
Banff	Ellis, Bartlet.
Bangor	Webster, Thomas.
Barnsley	Badger, Alfred.
Barnstaple	Goss, Samuel.
Barrow-in-Furness	Steel, Thomas.
Bath	Pooley, John Carpenter.
Beaumaris	
Bedford	Cuthbert, John M.
Belper	Ashton, John.
Berwick	Carr, William Graham.
Beverley	Hobson, Charles.
Bewdley	Newman, Robert.
Birkenhead	Nicholson, Henry.
Birmingham	Southall, William.
Blackburn	Pickup, Thomas Hartley.
Blackpool	Harrison, John.
Blandford	Bird, Matthew Mitchell.
Bodmin	Williams, Joel Drew.
Bolton	Dutton, George.
Boston	Pilley, Henry T.
Bournemouth	Duncan, Alexander.
Bradford (Yorkshire)	Rimmington, Felix W. E.
Brecon	Meredith, John.
Bridgnorth	Deighton, Thomas Milner.
Bridlington	Forge, Christopher.
Bridport	Tucker, Charles.
Brighton	Gwatkin, James Thomas.
Bristol	Stoddart, William W.
Buckingham	Sirett, George.
Burnley	Thomas, Richard.
Burslem	Blackshaw, Thomas.
Bury	
Bury St. Edmunds	Youngman, Edward.
Buxton	Barnett, Alexander.
Calne	
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Cross, William.
Cardigan	Jones, John Edwards.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, Richard M.
Carnarvon	Jones, John.
Chelmsford	Baker, Charles Patrick.
Cheltenham	Smith, Nathaniel.
Chester	Grindley, William.
Chesterfield	Greaves, Abraham.
Chichester	Long, William Elliott.
Chippenham	Coles, John Coles.
Christchurch	Green, John.
Cirencester	Mason, Joseph W.
Clitheroe	
Cockermouth	Bowerbank, Joseph.
Colchester	Shenstone, James B. B.
Congleton	Goode, Charles.

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* Local Secretaries are appointed in all towns in Great Britain which return a Member or Members to Parliament, and in such other Towns as contain not less than Three Members of the Society or Associates in Business.

Towns eligible.	Names of persons appointed.
Coventry	Wyley, John.
Crewe	McNeil, James Norton.
Cricklade	
Darlington	Robinson, Alfred Francis.
Deal	Green, John.
Denbigh	Edwards, William.
Derby	Frost, George.
Devizes	Portbury, George Henry.
Devonport	Codd, Francis.
Dewsbury	
Diss	Gostling, Thomas Preston
Doncaster	Dunhill, William W.
Dorchester	Evans, Alfred John
Dorking	Clift, Joseph.
Dover	Bottle, Alexander.
Droitwich	Taylor, Edmund.
Dudley	Hollier, Elliot.
Dumfries	Allan, William.
Dundee	Hardie, James.
Dunfermline	Seath, Alexander.
Durham	Sarsfield, William.
Eastbourne	Provost, James A.
Edinburgh	Mackay, John.
Elgin	Robertson, William.
Ely	Pate, Henry Thomas.
Evesham	Dingley, Richard Loxley.
Exeter	Delves, George.
Eye	Bishop, Robert.
Falkirk	Murdoch, David.
Falmouth	Newman, W. F.
Faversham	Lenfesty, William G.
Flint	Jones, Michael.
Folkestone	Goodliffe, George.
Frome	Harvey, William Brett.
Gainsborough	
Gateshead	Elliott, Robert.
Glasgow	Kinninmont, Alexander.
Gloucester	Meadows, Henry.
Gosport	Hunter, John.
Grantham	Cox, John.
Gravesend	Bulgin, William.
Greenock	Fraser, Charles.
Grimsby, Great	Palmer, Enoch.
Guernsey	Arnold, Adolphus.
Guildford	Martin, Edward W.
Haddington	Watt, James.
Halifax	Dyer, William.
Harrogate	Davis R. Hayton.
Hartlepool	Jackson, William G.
Harwich	Bevan, Charles F.
Hastings and St. Leonards	Jameson, William E.
Haverfordwest	Williams, William.
Hawick	
Helston	Troake, Marler H.
Hereford	Jennings, Reginald.
Hertford	Lines, George.
Heywood	Beckett, William.
Hitchin	Ranson, William.
Horncastle	Elsey, John.
Holywell	Gregory, Thomas.
Horsham	Williams, Philip.
Huddersfield	King, William.
Hull	Bell, Charles Bains.
Huntingdon	Provost, John Pullen.
Huntly	Prott, William.
Hyde	Wild, Joseph.
Hythe	Lemmon, Robert Alce.
Inverness	Galloway, George Ross.
Ipswich	Anness, Samuel Richard.
Jersey	Ereaut, John, jun.
Kendal	Severs, Joseph.
Kidderminster	Hewitt, George.
Kilmarnock	Borland, John.
King's Lynn	Atmore, George.
Kingston-on-Thames	Walmsley, Samuel.
Kirkcaldy	
Knaresborough	Sindall, John William.
Knutsford	Silvester, Henry Thomas.
Lancaster	Bagnall, Wm. Henry.
Launceston	Eyre, Jonathan Symes.
Leamington	Jones, Samuel Urwick.
Leeds	Reynolds, Richard.
Leek	Johnson, William.
Leicester	Cooper, Thomas.
Leighton Buzzard	Readman, William.
Leith	Finlayson, Thomas.
Leominster	Davis, David Frederick.
Lewes	Martin, Thomas.
Lichfield	Eaton, John.
Lincoln	Maltby, Joseph.
Liskeard	Young, Richard.
Liverpool	Abraham, John.
Longton	Prince, Arthur G.
Loughborough	Paget, John.
Louth	Hurst, John B.
Lowestoft	Sale, Thomas J.
Ludlow	Cocking, George.
Lyme Regis	Thornton, Edward.
Lymington	Allen, Adam U.
Macclesfield	Bates, William Isaac.
Macduff	Henry, James Hay.
Maidenhead	Walker, Robert.
Maidstone	
Maldon	Wallworth, David.
Malmesbury	Brown, Francis James.
Malton	Hardy, George.
Manchester, etc.	Wilkinson, William.
March	Davies, Peter Hughes.
Margate	Knight, Alfred.
Marlborough	
Marlow	Foottit, Charles Miller.
Merthyr Tydvil	Smyth, Walter.
Middlesborough	Robson, James Crosby.
Midhurst	
Montgomery	
Monmonth	
Montrose	Burrell, George.
Morpeth	
Neath	Hibbert, Walter.
Newark	March, William.
Newbury	Davis, Frank Pratt.
Newcastle-under-Lyme	Cartwright, William.
Newcastle-on-Tyne	Proctor, Barnard S.
Newport (I. of Wight)	Orchard, Herbert Joseph.
Newport (Mon.)	Pearman, Henry.
New Radnor	
Newtown	Owen, Edward.
Northallerton	Warrior, William.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	Atherton, John Henry.
Nuneaton	Iliffe, George.
Oldham	Hargreaves, H. Lister.
Oswestry	Saunders, George James.
Over Darwen	Hargreaves, Wm. Henry.
Oxford	Prior, George T.
Paisley	Hatrick, William.
Pembroke	John, David William.
Pembroke Dock	Andrews, Charles.
Penrith	Wilson, Joseph.
Penzance	Cornish, Henry Robert.
Perth	Dandie, David.
Peterborough	Heanley, Marshall.
Petersfield	Edgeler, William B.
Plymouth	Balkwill, Alfred P.
Pocklington	Cundall, Robert.
Pontefract	Bratley, William.
Poole	Penney, William.
Portsmouth, etc.	Rastrick, R. J.
Preston	Barnes, James.

Towns eligible.	Names of persons appointed.
Ramsgate	Morton, Henry.
Reading	Hayward, William G.
Redditch	Mousley, William.
Retford	Clater, Francis.
Richmond (Yorks)	Thompson, John Thomas.
Ripon	Judson, Thomas.
Rochdale	Taylor, Edward.
Rochester	Harris, Henry William.
Rotherham	Horsfield, John M.
Rothesay	Duncan, William.
Runcorn	Whittaker, William.
Rugby	Garratt, John C.
Ruthin	Bancroft, John James.
Ryde (Isle of Wight)	Pollard, Henry Hindes.
Rye	Plomley, James F.
St. Albans	Martin, Henry Gilham.
St. Andrews	Govan, Alexander.
St. Austell	Hern, William Henry.
St. Ives (Cornwall)	Young, Tonkin.
Salisbury	Atkins, Samuel Ralph.
Sandwich	Baker, Frank.
Scarborough	Whitfield, John.
Seacombe	Shaw, Ralph Horwood.
Selby	Colton, Thomas.
Shaftesbury	Powell, John.
Sheerness	Bray, John.
Sheffield	Wilson, Edward.
Shields, South	Mays, Robert, J. J.
Shipley	Dunn, Henry.
Shoreham	Barker, John.
Shrewsbury	Cross, William Gowen.
Slough	Griffith, Richard.
Southampton	Dawson, Oliver R.
Southport	Walker, William Henry.
Spalding	Shadford, Major.
Stafford	Averill, John.
Stalybridge	Brierley, Richard.
Stamford	Patterson, George.
Stirling	Duncanson, William.
Stockport	
Stockton-on-Tees	Brayshay, William B.
Stoke-on-Trent	Adams, Jonathan Henry.
Stourbridge	Bland, John Handel.
Stratford-on-Avon	Hawkes, Richard.
Stroud	Blake, William F.
Sudbury	Harding, James John.
Sunderland	Nicholson, John J.
Swansea	Brend, Thomas.
Tamworth	Allkins, Thomas Boulton.
Taunton	Prince, Henry.
Tavistock	Gill, William.
Teignmouth	Cornelius, Joseph.
Tewkesbury	Allis, Francis.
Thirsk	Thompson, John.
Tiverton	Havill, Paul.
Torquay	Smith, Edward.
Totnes	Keen, Benjamin.
Truro	Serpell, Samuel.
Tunbridge	Wibmer, Lewis Michael.
Tunbridge Wells	Howard, Richard.
Tynemouth	
Uttoxeter	Johnson, John Borwell.
Wakefield	Taylor, John.
Wallingford	Payne, Sidney.
Walsall	Highway, Henry.
Wareham	Randall, Thomas.
Warrington	Woods, Joseph Henry.
Warwick	Pratt, Henry.
Watford	Chater, Edward Mitchell.
Wednesbury	Gittoes, Samuel James.
Wellington	Langford, John Brown.
Wenlock	
Westbury	Taylor, Stephen.
West Bromwich	Laugher, William.
Weston-super-Mare	Rich, Thomas.
Weymouth	Groves, Thomas Bennett.
Whitby	Stevenson, John.
Whitehaven	Kitchin, Archibald.
Wick	Miller, Kenneth.
Wigan	Phillips, Jonathan.
Wigton	
Wilton	
Winchester	Hunt, Richard.
Windsor	Russell, Charles J. L.
Wolverhampton	Brevitt, William Yates.
Wokingham	Spencer, Thomas.
Woodbridge	Betts, John.
Woodstock	Griffits, John Alonza.
Worcester	Woods, William.
Worthing	Cortis, Charles.
Wrexham	Edisbury, James Fisher.
Wycombe	Furmston, Samuel C.
Yarmouth, Great	Poll, Wm. Sheppard.
York	Davison, Ralph.

ELECTION OF MEMBER OF COUNCIL.

The next business was the election of a member of Council to fill the vacancy caused by the resignation of Mr. Baynes. The vote was taken by ballot, and resulted in the election of—

MR. SAMUEL LLOYD STACEY, of 300, High Holborn

THE PAST PRESIDENT AND VICE-PRESIDENT.

MR. MACKAY said he desired to move—

> "That the Council authorize to be placed on the minutes some expression of its high sense of the able manner in which the duties of office had been performed for the last three years by the ex-President, Mr. Hills."

He was sure such a resolution would meet with the approval of them all as a record of the most efficient, liberal, and indefatigable manner in which Mr. Hills had fulfilled his term of office. The new President might well feel proud of his position, but he sympathized with him very much in following one who had rendered such pre-eminent services, extending over a period of three years. On looking over the books it would be found that Mr. Hills had been rarely absent from a committee, and never from any general meeting, though he knew that again and again he had put aside what to him were most important engagements in order that he might be in the chair of that Society. He suggested that this motion should be passed by acclamation.

This having been done,

MR. HILLS said he thanked the Council for its kindness, but he felt that he had only done his duty to the best of his ability. He appreciated the compliment, but as it would be something new in the report of their proceedings to make such an entry, he thought it would be better omitted.

MR. SAVAGE thought such an entry ought not to be allowed to go alone without also recording their sense of the able manner in which the ex-Vice-President had fulfilled his duties.

This also was carried by acclamation.

MR. BOTTLE said it had been pleasant to him during his three years of office to work with Mr. Hills, and he thought they might all feel that the Society had advanced considerably during the last three years under Mr. Hills' presidency. He had no doubt that it would still continue to advance, and that at the end of another three years they might have to record with similar satisfaction their appreciation of the manner in which the business was conducted by their successors.

LIBRARY, MUSEUM, AND LABORATORY.

The report of this Committee was comparatively brief. It included the Librarian's return for the previous month, showing an average attendance in the library of 28 during the day, and 8 in the evening; the circulation of books had been 139 in town, 44 in country to 29 places. The purchase of the following books was recommended:—'Bentham and Hooker's Genera Plantarum,' vol. 2.; Hofmann's 'Life Work of Liebig.'

A letter had been received from Professor Redwood suggesting that in future the fees for attendance at his lectures should be raised, and be as follows:—For one course, £3 3*s.*; session of two courses, £4 4*s.*; perpetual admission, £6 6*s.*

Professor Bentley had reported that he had 62 entries for his lectures.

Professor Attfield had reported that 117 students had entered since the commencement of the session, and that 61 were now working.

The Curator had reported the attendance in the museum as being on an average, 20 in the morning, 3 in the evening. Also the receipt of the following donations to the museum:—Specimen of Flowers of *Spilanthes oleracea*, from Messrs. Godfrey and Cooke. Specimens illustrating the late paper on myrrh, from Professor Dymock, Bombay. Specimen of Native Sulphur, from New Zealand.

Mr. BROWN said the letter of Professor Redwood raised an important question, but it ought to be discussed by the Committee, and a recommendation made, before the Council could discuss it.

Mr. ATKINS asked if the Committee desired the advice of the Council upon this question.

The PRESIDENT thought that was exactly the state of the case. The matter had come before the Committee twice, once verbally and now in writing.

Mr. BROWN said there was plenty of time; the best plan would be for the Committee to consider it and report.

Mr. SCHACHT suggested that if the matter were referred to the Committee it might be as well for it to consider the subject of lecture fees in general.

Mr. GREENISH said the fees for the botanical course were raised some time ago.

After some further discussion it was resolved unanimously.

> "That the report and recommendations of the Library, Museum and Laboratory Committee be received and adopted, and that the Committee be requested to report to the Council at the next meeting on the letter of Professor Redwood."

FINANCE.

The report of Messrs. Cracknell and Greenish, acting as a Finance Committee, recommending the payment of certain accounts was received and adopted.

THE INAUGURAL SESSIONAL ADDRESS.

Mr. HAMPSON proposed that Mr. Barnard S. Proctor, of Newcastle-upon-Tyne, should be invited to deliver the Inaugural Sessional Address in October next.

The motion was seconded by Mr. SHAW and carried, and the Secretary was instructed to communicate the wish of the Council to Mr. Proctor.

THE LATE MR. BREW.

The PRESIDENT took the opportunity of drawing the attention of the Council to the death of Mr. Brew, of Brighton, formerly a member of the Council. He was sure he expressed the feelings of all present in saying that they all regretted his loss, and he proposed that a resolution of sympathy with his widow and family should be passed by the Council.

Mr. SAVAGE, in seconding the resolution said he had known Mr. Brew many years. Mr. Brew had always been a strong advocate of the Society, and one of its best friends.

The resolution was carried unanimously.

THE CONVERSAZIONE.

Votes of thanks were then passed to the Lords of the Committee of Council on Education for their kindness in allowing the use of the South Kensington Museum for the Annual Conversazione, and to the members of the official staff of the museum for their services on the same occasion.

BENEVOLENT FUND.—ELECTION OF FOUR ANNUITANTS.

Mr. ROBBINS moved that four annuitants should be elected in October next. It might be thought that was going too fast, but it was expedient financially to do so, for more than £1000 subscriptions had been received during the year. This addition would increase the number to twenty-four, and if there were thirty annuitants on the list they would only cost £900 a year, for which there were ample funds.

Mr. BOTTLE, in seconding the motion, endorsed what Mr. Robbins had said. They had seen that the more liberally they dealt with the Benevolent Fund the more subscriptions came in. The question of going beyond the interest of invested capital in granting annuities had been fully discussed before, and the result of the decision then come to was quite satisfactory. He agreed with Mr. Robbins that the Society might go on, for some time to come at any rate, electing four annuitants every year, for although none had died during the past year, considering the age of some of the annuitants there must be a falling off before very long.

The resolution was carried unanimously.

Mr. SHAW said in December last he brought forward a resolution that it was desirable to relieve candidates from the anxiety, labour and expense in connection with canvassing. He then stated his reasons for proposing such a resolution, and he would not revert to them on this occasion, but he found there was a rule, that when the number of annuitants to be elected had been decided upon, the Registrar's duty was to intimate to the candidates that their names had been placed on the approved list. He begged now to propose that that rule be suspended in order that he might have an opportunity at a future time to reintroduce the resolution he had already referred to. His object was that the rule should be suspended until the list was completed, in order that the complete list should be placed before the subscribers, and they might know who were the candidates for election. He wished the Council to forbid canvassing altogether, which would be equally fair to all. If the Council did not think well to accede to the resolution he now proposed, he should bring forward a formal resolution next month or the month afterwards.

Mr. HAMPSON seconded the motion.

Mr. OWEN thought it would be unjust to the new candidates to adopt the suggestion, inasmuch as the four candidates not elected last year had already had the privilege and advantage of canvassing. Besides, additional votes had now been given to persons who subscribed half-a-crown, and if the chance were not given these poor people of asking their friends to interest themselves in their behalf, what was the use of giving votes at all? His experience was, that the more people were asked for their votes the more interest they took in the society which afforded relief. The very fact of being asked to help cases brought in additional subscribers. He spoke from very considerable experience in the matter, and protested against any such interference as was suggested.

Mr. HANBURY said he did not know whether this was the right time to bring the matter forward, but he entertained the same views as he did last year, that the canvassing system was a very bad one. When there was a fair statement published of the claims of all the different candidates it was exactly the same thing as if each candidate canvassed for himself; and all the expense might as well be saved.

Mr. BETTY said if the first step could be taken to day to put a stop to this system it would be a very good thing, and there would be no canvassing on any side. The accidental fact mentioned by Mr. Owen, that there were four candidates remaining from last year, could not be helped. That would be the same every year, and the Council would have to wait until the Greek kalends if it deferred any improvement on that account. That must not, therefore, be put against the change if it was for the public interest. He apprehended it was in the true furtherance of charity that this was brought forward, that the most dependent and the most defenceless should at least have as fair a chance of getting on the annuitant list as others who happened to have friends or some small means at the time to devote to charity electioneering purposes. He did not know whether Mr. Shaw's proposal would be carried that day, but he hoped at any rate his present suggestion, that further proceedings should stand over for a month, would be acceded to, so that he might have an opportunity of marshalling his facts and putting his case in such a way as to impress the Council and the public generally with the soundness of his views.

Mr. Robbins said this charity was not subjected to the same abuses that prevailed in others of which so much had been said by the charity commissioners. In nearly all of those charities there were a large number of candidates, of whom at least three fourths had not the slightest chance of ever getting elected, and those who did were only successful by dint of extraordinary efforts. In this case there was no necessity really for candidates to spend their money; only four were left over last year, and they would be almost sure to be elected this year.

Mr. Hanbury said this only showed that there was no use in canvassing.

Mr. Robbins said persons sometimes took an interest in a particular case, and it would be very hard if they were forbidden to ask their friends to support it.

Mr. Hampson said the suggested reform would not interfere with persons using their influence in an ordinary way at all. Mr. Shaw's desire was to do away with a great public abuse. He admired his courage in bringing this question forward again, and he hoped Mr. Shaw would persist in doing so until he succeeded.

The President thought the best way would be for the Secretary to send a very strong circular to the candidates, pointing out how undesirable the Council considered it for them to spend their money in cards and canvassing, as their cases would be fully stated in the Journal.

Mr. Shaw said that had been done already, and was of no use.

Mr. Sandford doubted whether the rule could be suspended on such short notice.

Mr. Owen said that where canvassing has been prohibited, in some societies the consequences had been disastrous.

The Vice-President felt some difficulty in the matter for although it was very desirable to save the money of these poor candidates, he did not see how they could be prevented spending it.

Mr. Hampson said the present system permitted the strongest to win the race, and prevented the weakest coming in at all. In the interest of true charity the Council ought to let Mr. Shaw have this opportunity, which at any rate could do no harm.

Mr. Greenish asked if there were any facts to prove the position just stated by Mr. Hampson.

Mr. Hampson said he could prove it if necessary, but he thought it was quite clear that if one person had no money to spend in canvassing he was worse off than another who could spend £10 or £20 in such a manner.

Mr. Owen asked what security there would be that the most deserving candidate should get supported.

Mr. Hampson said there was no absolute security, but it would put all the candidates on an equality and prohibit the use of canvassing cards.

Mr. Robbins said he was applied to one day by a lady whose name was placed on the list, to know whether she could canvass or not. His reply was that he could not advise her to canvass as the Council discouraged it, and the effect of his letter was quite sufficient to prevent her canvassing. He thought, therefore, that if a letter went from the Secretary to each candidate saying canvassing was discountenanced, it would have a good effect.

After some further conversation the resolution of Mr. Shaw was put and lost.

Mr. Shaw said he would introduce a resolution to the same effect as in December last at the next meeting.

Formation of a Trade Association.

The President said that petitions had been received from some towns in the provinces asking the Council to take up the question of forming a kind of trade protection society. It occurred to him that the proper course would be to refer the matter to the Parliamentary Committee.

Mr. Atkins thought that would be a very convenient course. He had received a similar printed form of petition from a gentleman he had not the pleasure of knowing, but who had written a very sensible letter accompanying it.

Mr. Hampson suggested that the petition should be read.

This having been done, the proposition of the President was agreed to, and the matter referred to the Parliamentary Committee for consideration and report.

Preliminary Examinations.

The Secretary said he had received a letter asking if the Council would accept a certificate from the Committee of Council on Education in lieu of the Preliminary examinations of the Society. In looking over the published synopsis of the examination he found that Latin was an optional subject. He suggested that the question should be referred to the Board of Examiners.

This was agreed to.

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

The seventh session of this Association was brought to a close on the evening of Friday, the 5th of May. Mr. Thomas Wills, of the Royal Naval College, discoursed to an unusually large audience on "The Relation of the Atmosphere to Plant Life."

We hope to be able to publish this paper in an early number.

MANCHESTER CHEMISTS AND DRUGGISTS' ASSOCIATION AND SCHOOL OF PHARMACY.

The Council of this Association met on Friday evening, June 2nd, to receive the report of the lecturer to the classes (Mr. Louis Siebold, F.C.S.), and to present the prizes which had been awarded at the conclusion of the session.

The President (Mr. W. Scott Brown), occupied the chair, and briefly addressed the students before calling on Mr. Siebold, who then read the following report:—

"Gentlemen,—The fourth annual session of the Manchester School of Pharmacy, commenced on October 1st, 1875, and terminated May 31st, 1876. Three courses of lectures were delivered during that period, viz., thirty-six lectures on pharmaceutical chemistry, on Fridays from 7·30 to 9 p.m.; twenty-seven lectures on materia medica and pharmacy, on Tuesday from 7·30 to 9 p.m.; and fifteen lectures on botany, on Tuesdays, from 9 to 10 p.m. Twenty-five students entered for the chemistry course, sixteen for materia medica and pharmacy, and eleven for botany, making a total of fifty-two entries. The students were assistants and apprentices engaged in business in Manchester, Salford, Hyde, Cheadle, Stockport, Ashton-under-Lyne, Bury, Rochdale, Heywood, Bolton, and Warrington. There were in all thirty-two students of whom six attended all the three courses, eight attended two courses, and eighteen one course only. The fees were thirty shillings for the chemistry course, twenty-five shillings for the courses on materia medica and pharmacy, two pounds ten shillings for the two courses together, and fifteen shillings for the botany course. The total amount of fees received was £62 10*s*., and this sum was further augmented by a grant of £25 from the Pharmaceutical Society. All the lectures were delivered at 225, Oxford Street, and were amply illustrated by experiments, specimens, and diagrams.

"Throughout the session the attendance was very good and regular, and the attention and interest manifested by the students were such as afforded me very great pleasure and gratification. The progress of the students was tested at regular intervals by *vivâ voce* examinations, the results of which fully confirmed the good opinion I had formed of the majority of those whom I had the pleasure of instructing. As in previous years, competitive examinations were held at the end of the session and prizes awarded to the successful competitors. Eleven candidates competed for the chemistry prizes, eight for the materia medica and pharmacy, and six for the botany prizes. The awards are as follows:—

"*Chemistry.*—1st prize to Mr. George Henry Mason. 2nd prize to Mr. William B. Mason.

"Very good papers were also delivered by Mr. C. Challenor, Mr. R. T. Slinger, and Mr. A. Richardson.

"*Materia Medica and Pharmacy.*—1st prize to Mr. William B. Mason. 2nd prize to Mr. Robert T. Slinger.

"The answers returned by Mr. C. E. Lister, and Mr. G. H. Mason merit high praise.

"*Botany.*—1st prize to Mr. George Henry Mason. 2nd prize to Mr. Robert T. Slinger.

"Never within my recollection was harder and more honest work done in one session, and never were prizes better deserved than by those whose names I have just announced. The competition for the materia medica prizes was especially a very keen one. Mr. W. B. Mason's paper is a most excellent one throughout, and those of Mr. Lister, Mr. G. H. Mason, and Mr. Slinger, were so nearly equal in merit, that a second examination became necessary in order to decide who had the greatest claim to the second prize. The success achieved during the past session encourages me in the hope that our Manchester School of Pharmacy will become a permanent institution, and that it will soon be in a position to extend its work to a much larger number of students."

EXAMINATION QUESTIONS.

Pharmaceutical Chemistry.

Time allowed: Two hours.

1. Describe and explain the official process for the preparation of subnitrate of bismuth.

3. Acid tartrate of sodium is recommended in preference to tartaric acid as a test for potassium. Show why it is preferable.

3. How much hydrate of sodium and how much anhydrous carbonate of sodium will be required to neutralize 20 c.c. of standard sulphuric acid containing half a molecular weight in grams of H_2SO_4 per litre?

4. State how chloride of barium is obtained from the native sulphate and explain the process by equations.

5. Some metals the sulphides of which are insoluble in water are not precipitated from the aqueous solutions of their salts by H_2S. Name some instances of this kind and show why H_2S fails to produce precipitates.

6. Give the principal tests for ferrous and ferric salts.

7. What change does calomel undergo when it is boiled with hydrochloric acid.

8. If you were supplied with acetate of potassium, carbonate of calcium and water, and required to produce caustic potash, how would you proceed?

9. How would you detect caustic soda as an impurity in the carbonate?

10. Give the formulæ for chloral hydrate and the so-called croton-chloral hydrate, and state how these substances are obtained.

Materia Medica and Pharmacy.

Time allowed: Two hours.

1. Briefly describe the principal kinds of opium.

2. An infusion of rhubarb turns brown on the addition of an alkali. Name the constituent which causes this reaction and mention some other drugs in which it occurs.

3. Give the B.P. process of assaying cinchona barks.

4. Recognize the ten specimens of drugs placed before you, and assign to each its botanical source, natural order, and habitat.

5. How would you ascertain the purity of a sample of grain musk?

6. Give the botanical sources and the distinguishing features of laurel-camphor, Borneo-camphor, and N-Gai camphor.

7. Name the chief constituents of bitter almonds and those of black mustard seeds along with their main properties.

8. Give tests for distinguishing the alkaloids of tobacco and conium.

9. How would you detect admixtures of fatty oils, oil of turpentine, and gurgun oil in a sample of copaiba?

10. Name antidotes for the following poisons and explain their action: opium, nux vomica, belladonna, antimony, mercury, lead.

11. Describe the leaves of belladonna, digitalis, and conium.

12. Give good processes for making emulsions of fatty oils with gum arabic and with liquor potassæ.

Botany.

Time allowed: Two hours.

1. Describe the structure of an endogenous stem.

2. Define the terms catkin, panicle, capitulum, and cyme, and give instances.

3. Mention and describe the chief forms of corollæ.

4. Give a definition and description of stomata.

5. Define the terms monandrous, monadelphous, monœcious and monogynous.

6. What is meant by naked ovules? Give an example.

7. How are septa formed in ovaries, and how are they distinguished from spurious dissepiments?

8. What is meant by axile, parietal, and free central placentæ.

9. Give definitions of a follicle, a capsule, a silique, an achenium, a pepo, and a cremocarp.

Mr. J. T. Slugg, in congratulating the successful candidates, hoped the unsuccessful ones would not be discouraged, but that all the students would continue in the pursuits of scientific truth. He remarked that the study of any branch of science presented two aspects. There was first of all the pure elevated pleasure which the mind received from the discovery of some new fact; and there was also the actual benefit conferred on mankind, by the addition made to the comforts, conveniences, and luxuries of life through the investigations and inventions of scientific explorers. Comparing the Manchester of to-day with the Manchester he first knew fifty years ago, he pointed to the inventions of gas, railways, and the electric telegraph as instances of the valuable gifts the world had received from science. He urged his hearers never to allow their minds to rest, and said that just as our bodily powers were strengthened by suitable training and exercise, so our mental powers could also be invigorated by the same means. He hoped the students would become so enamoured of some one science or other, that they would make its pursuit their recreation and their joy.

Mr. Siebold said it had probably been noticed that the prizes were of greater value than those presented at the end of former sessions. Their thanks were due to the President for this. On learning that the attendance in the various courses had been so good, the perseverance and industry of the students so great, and the competition for the prizes so keen, Mr. Brown had at once expressed his wish to add £5 worth of books to the £5 worth already given by the Council of the Association. This additional reward had been very gratifying to him, and would prove a very substantial encouragement to those who had won it by good honest work.

Mr. F. Baden-Benger said he had had an opportunity of seeing some of the papers written in competition for the prizes and he had been very much struck indeed by their excellence. It had been a source of most intense gratification to him to find the Manchester School again attended by such a number of industrious painstaking students, men who would most assuredly become bright ornaments to pharmacy some day. The result of this competition had shown what, as an examiner, he had often observed, that when a candidate was remarkably good in any one subject he was seldom very deficient in the others. Having overcome the inclination to self-indulgence, made up his mind to be thorough and not superficial, and once acquired the habit of careful and accurate observation, the pharmaceutical student had half won his battle, and would study one subject with almost as much success as another. He (the speaker) remembered with pride that a former prizeman in their school had carried off the highest honours in the school of the Pharmaceutical Society a year or two ago, and he believed some of those present would take an equally high position if they had the opportunity.

The President said he had added to the value of the prizes because he had found that real and earnest work had been done in the classes this session, and he was anxious to encourage such work, and to stimulate future students. He had been glad to find that young men had come from the surrounding towns to attend these classes, and thought the attendance ought to be even larger than it had been. He confidently believed that such a centre as Manchester ought to command almost as large a number of students as London itself, and he looked forward to the time when the Manchester School of Pharmacy would take a still higher position and be able to offer greater facilities than it had yet been able to provide. The Manchester Association had ever kept education in the forefront. Meetings of the members were held for social and friendly intercourse, and special lectures were given by various gentlemen during the winter, but the Association had from its very commencement in 1868, regarded the foundation of a school of pharmacy as its principal object, and though sometimes discouraged it had always been hopeful. Manchester was particularly fortunate in possessing so accomplished a pharmacist as Mr. Siebold; a man who could not only teach one of the subjects required, but all of them, and all equally well, and whose popularity amongst the students was so great.

Mr. G. H. Mason (one of the prizemen) said no one in Manchester was more indebted to the school than he, and he wished to take that opportunity of testifying to the kindness and courtesy which, in common with all his fellow students, he had received at the hands of Mr. Siebold. No amount of time or trouble seemed too much to bestow on his pupils, and his patience in answering questions and clearing up difficulties at the end of a lecture appeared inexhaustible. He (Mr. Mason) was very grateful to the President for the kind words with which he had accompanied the prizes. Those books would ever have for him, in addition to their intrinsic value, a sentimental value which would never diminish.

The meeting then terminated.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual meeting of this Association was held on the 2nd instant at the Great Western Hotel, Birmingham. Mr. Thomas Barclay presided. There was a numerous attendance of members and associates.

The annual report, copies of which had been already printed and circulated, was taken as read, and after a short discussion was adopted.

Report for 1875–6.

The report referred to the passing of the Irish Pharmacy Bill and the amendment of the Adulteration of Food and Drugs Act as among the most important events during the past year. The Council, viewing with uneasiness the terms of the Irish Pharmacy Bill, had called together a meeting to consider the steps proper to be taken. A petition against some of its clauses was presented by P. H. Muntz, Esq., M.P., and the Council had reason to believe that its prompt action materially assisted the Pharmaceutical Society in the removal of the objectionable clauses from the Bill. The attention of the Council had also been drawn to some other questions of importance to pharmacists; and a sub-committee was appointed to consider the patent medicine question, and draw up a memorial to the Government, praying it to consider the advisability of restricting the sale of patent medicines, which contain such poisons as are scheduled in the Pharmacy Act to registered chemists and druggists.

The report then went on to state that at a meeting held recently the Council had approved and accepted the offer of the President (on part of himself and firm) to ascertain the desirability of holding a trade conference at Birmingham, with the view to form a Defence Association to prevent unregistered men trading as chemists and druggists, to protect the interests of the trade from harassing legislation, or trivial or unjust prosecutions under the Adulteration Act, and to discuss and take action in all questions affecting the interests of chemists and druggists. The Council urged upon all members of the trade the necessity of supporting this movement.

The Council reported several additions of standard works to the library, and acknowledged the generosity of the donors of works. The increasing use which is being made of the library (chiefly by students) affords much satisfaction, and induces the Council to recommend the outlay of £5 in new standard books, so as to increase the value of the library as a place of reference. The Council is also able to report that the classes for pharmaceutical students are fairly attended, and that a good number of students are preparing for their examinations, and hopes at an early period to be able to announce a good number of successful candidates.

A circular has been issued giving particulars of the classes to be held during the coming session under Mr. Dewson, and the Council appeals to all principals to allow, as far as practicable, their apprentices and assistants the time necessary to prepare themselves for the inevitable examinations. The students' subscription of 1*s.* 6*d.* for membership of the Association entitles him to the free use of the library, cabinets of materia medica, and a grant of 10*s.* if he completes a session—attending regularly under Mr. Dewson—and also the opportunity of competing for prizes.

The soiree (notwithstanding the most serious drawback caused by the corporation requiring the Town Hall to be closed for extensive alterations, thus rendering it necessary to hold the soirée during the month of December) was very successful, and the Treasurer is able to report a surplus. The general exhibition was of great interest.

The Council expressed its regret that Mr. Barclay, after having held the post of President for two years, with much advantage to the Association, desired, from press of business, to be relieved from that office. The report concluded by urging upon chemists, assistants, and apprentices the necessity of combination for social, educational, and trade purposes.

The General Account and Balance Sheet showed that the receipts during the year, including £9 4*s.* 3*d.* balance from the soirée account, had amounted to £24 15*s.* 3*d.*, and the expenditure to £19 18*s.*, leaving a balance in the hands of the treasurer of £19 0*s.* 2*d.* against £14 2*s.* 11*d.* last year.

The Council for the ensuing year and the officers were then appointed, viz.:—President, Mr. William Jones; Vice-President, Mr. F. S. Morris; Treasurer, Mr. Joseph Lucas; Hon. Secretary, Mr. Henry Sanderson; the Council, consisting of sixteen members, was also duly elected. Mr. Barclay, having resigned the office of President, delivered the following address:—

"Gentlemen,—Having resigned the office of President I have now to fulfil the last responsibility which is required by the honourable position you placed me in at our last annual meeting.

"The report of the Council, which has just been adopted, makes mention of the proposal to hold a trade conference at Birmingham.

"It will doubtless be asked by some what results are expected from the conference; the answer may be given in a sentence—viz., a trade organization. We are at present without one. The Pharmaceutical Society does not profess to be such; it is essentially an educational and examining body, and it neither has funds nor appliances to do the work which a trade organization could accomplish. Some wish the Pharmaceutical Society to broaden its basis and make arrangements whereby it can cope with the work of a trades defence association.

"This may be the right course; the whole question, however, will come up for discussion at the conference. Let us look how we are situated at present in respect to one or two important matters. Take the practising as chemists and druggists by men who are not on the register; there are several such cases in Birmingham, I believe, at the present time. What is the course we now have to pursue? A chemist writes up to the registrar, giving information that a certain person is acting as chemist and druggist. The registrar, desirous of carrying out the law, replies, and asks the chemist to procure a pennyworth of oxalic acid, or paregoric, labelled with the name and address of the vendor, and having done so, to undertake that the person who purchased it shall be in readiness to attend the court to say where it was obtained. Now, as soon as this request is made by the registrar, the rule is that the chemist shrinks from the position, which is natural, as he would rather suffer great wrong than be branded before the public as a common informer; the result is, the case drops through, as the Pharmaceutical Society has no officer to undertake this work. It may be said that our own and other kindred chemists' associations should take up this matter; but if this could be readily done it would not meet the requirements of chemists generally, for there are comparatively few such associations in the country, and thus the greater part of the country districts would be unprovided for. There would again arise the disagreeable necessity for a local informer, and again different solicitors would have to be engaged in each town. This is a serious objection, for the Act being recent they do not understand it. It was only this week a question was put to me of great importance to the inquirer, but yet very simple as to the Act; the solicitor who was consulted, however, could not answer it. Now had we a central strong trade organization all these difficulties would vanish. There could be an officer appointed whose duty it would be to go from town to town and obtain private information for the Local Secretaries of the Pharmaceutical Society, honorary secretaries of chemists' associations, and others, so that official action might be taken by the solicitors to the association, who would necessarily be well up in the Act from their constant practice in it.

The necessity for having solicitors engaged in connection with such an association is also shown by the unfair working of the Adulteration Act. We are glad to assist in putting down adulteration in any form, for nothing could be conceived more degrading than for that a man should stoop to tamper with drugs upon which the life of his fellow creatures may depend, and we are proud of the fact that the Act was originated by one of our townsmen. Yet we all know that from various causes this Act has caused a vast amount of irritation, loss of reputation, and expense to honest traders. So far the borough analyst's investigation of the purity of drugs and chemicals as sold to the Birmingham public has only resulted in the milk of sulphur case, and the defendant in that case was not a chemist and druggist. Speaking of this vexed question we find one set of magistrates deciding one way, and in the next case which is tried elsewhere another totally different decision is given, illustrating the importance of having solicitors retained who are familiar with technical questions, so that chemists in small country places, (where country gentlemen act as magistrates), as well as those in large towns, could have the same measure of justice. There are many other questions which could be advantageously discussed at a conference. There is amongst others the subject of patent medicines mentioned in the report. The allusion in the report to the Irish Pharmacy Act reminds me of the differences which are not unfrequently arising between some members of the medical profession and chemists and druggists. The interests of the two are so intimately associated, and by degrees are becoming more and more so, that I am convinced it only requires forbearance and patience on both sides for a time and all difficulties will disappear. If we take a retrospective view we ascertain that it is not such a long time since all medical and surgical operations were conducted by the same person whether under the name of physician, priest, surgeon, barber, or old woman. We find, however, that in 1461 barber surgeons were incorporated, and in the reign of Henry VIII. the surgeons of this company, then but nineteen in number, were exempted by Parliament from ward and parish officesand from military service. There existed at that time the company of grocers, some of whom, besides supplying plums, sugar, spices, Venice treacle, Mithridate, etc., sold drugs. These miscellaneous dealers were employed to prepare the medicine of the barber surgeons, and we are told that they separated from the grocers and were incorporated by the charter from James I. as the company of apothecaries; the reason for separating them was that medicines might be better prepared and in opposition to divers persons who imposed unwholesome remedies on the people. Dr. Murett writing in 1669 says "the next thing to be treated of shall be the ways of apothecaries creeping into practice. Heretofore when they were members of the company of grocers and dispensed in place as well as in council they then were wholly subordinate to the physicians, only keeping in their shops and faithfully making the prescriptions they received from the physician. But in process of time physicians in acute cases, having taught them somewhat, sent them to visit their patients to give them the best account they could of the state of their health, and effect of their medicines. And of later years some physicians took them along with them in their visit, whereby they acquired a little smattering of diseases by which means they made people believe they had acquired some skill in the art, and afterwards began to venture a little at practice, and but until these ten years last past kept themselves within some bounds and limits. But since that time, have daily more and more encroached upon our profession." I read in another place that Dr. Murett proposed that all medical men should refuse to send their prescriptions (then called "bills") to the apothecaries and that this suggestion was acted upon by several. As may be imagined considerable jealousy existed between the physicians and apothecaries, and this was not confined to England but it appears in France it existed also; there the doctors succeeded in reducing the rebel apothecary to submission and obliged him to take the following oath:—

"'I swear and promise before God the Author and Creator of all things, one in spirit and divided into three persons eternally blessed, that I will observe strictly the following articles,—First, I swear and promise to live and die in the Christian Faith. Secondly, to love and honour my parents to the utmost; also to honour, respect and render service, not only to those medical doctors who have instructed me in the precepts of pharmacy, but also to my teachers and masters from whom I have learnt my trade. Thirdly, not to slander any of my ancient teachers or masters, whoever they may be; also, to do all I can for the honour, glory and majesty of physic. Fourthly, never to teach to ungrateful persons or fools the secrets and rarities of the trade; never to do anything rashly, without the advice of a physician, or from the sole desire of gain; never to give any medicine or purge to invalids afflicted with acute disease, without first consulting one of the faculty. Fifthly, never to examine women privately unless by great necessity, or to apply to them some necessary remedy; never to divulge the secrets confided to me. Sixthly, never to administer poisons, or recommend their administration, even to our greatest enemies; or to give drinks to produce abortion, without the advice of a physician: also to execute accurately their prescriptions, without adding or diminishing anything contained in them, that they may, in every respect, be prepared *secundum artem*. Seventhly, never to use any succedaneum or substitute without the advice of others wiser than myself; to disown and shun as a pestilence the scandalous and pernicious practices of quacks, empirics and alchymists, which exist to the great shame of the magistrates who tolerate them. Lastly, to give aid and assistance indiscriminately to all who employ me; and to keep no stale or bad drug in my shop. May God continue to bless me so long as I observe these things!'

"I am indebted to a paper read by the late Thomas Morson at one of the meetings of the Pharmaceutical Society for the copy of this oath. I find accounts given and charges made respecting the apothecaries of that period, which read in the light of the present day seem incredible. Dr. Murett, whom I have already quoted, says 'they were guilty of falsifying their medicines, and used medicines quite contrary to their prescriptions.' Physicians were employed in those days to inspect the shops and were called *Censors*. 'These Censors found Myrtle leaves shewed for Sena (*sic*), a binder for a purger—mushroom rubbed over with chalk for agaric—hemlock dropwort roots for pæony roots, privet by some, by others dog-berries for those of Spinæ Cervinæ. No purgers for a strong one—Sheep's lungs for Fox's, the bone of an Ox's heart for that of a Stag's heart' etc. etc. It appears that these gentlemen were not only charged with sophistication, but with obtaining extortionate prices. A writer in 1702 says, 'I have known an apothecary make £15 of a patient in 10 days time by rating the boluses 2*s.* 6*d.* a piece and other medicines proportionally; if a physician orders an electuary of four ounces the apothecary would divide it into 20 or 30 boluses at 1*s.* 6*d.* each and a quart apozem into four half pint phials, each charged 3*s.* or 3*s.* 6*d.*' Another physician writes, 'We may at times prescribe a drachm of treacle, worth two pence, to a poor neighbour out of charity; the apothecary makes him pay half a crown for a cordial bolus. There are some of us have retrieved some of our prescriptions, and the apothecaries bills upon them.'

"This physician writes 'You will perhaps be amazed when I tell you that when a physician hath without a fee prescribed something worth six pence, because it was made into twenty-four pills, there was so many shillings paid to the apothecary upon his bill for it.' I could go on with such illustrations, but these will suffice. In the year 1712 an Act was passed exempting apothecaries from serving the office of constable and scavenger, and other parish and ward offices, and from serving on juries. In 1819 a good authority states 'the physicians and surgeons are greatly out numbered by the apothecaries or dispensers of medicine who have in the course of years gradually become medical advisers, and have undertaken both the counsel and management of the sick, and the manipulation of remedies.' The *Times* newspaper wrote during the debate on the Medica Bill in 1856, 'As lawyers have a license over our property, and the clergy over our souls, Mr. Brady wished his profession to have an exclusive license over our bodies, so that no one out of the fraternity should have a right to administer a single dose or so much as feel a man's pulse.'

"I have not travelled over this ground to hold up the profession either to ridicule or blame, but that we may judge from the results of past experience and compare the condition of the various branches of the profession now with former times. We, as pharmaceutists, have no desire to copy the action of the old apothecaries; by our system of education every inducement is held out for men to cultivate the studies of chemistry, botany and pharmacy, and the student's ambition is to excel in those branches of the profession. Jacob Bell, and the other founders of the Pharmaceutical Society, deserve not only the thanks of pharmacists but of the profession and the public, for the work they did in the past to raise the practice of chemists and druggists into a profession. Had not this been so, the physician would have been compelled to rely on continental pharmacists for the numerous elegant remedies which are now prepared by English chemists; for it is quite evident that surgeons who combine the study of pharmacy with that of surgery, etc., naturally consider their ambition is to excel in the medical and surgical departments, and consequently place pharmacy second in importance; and although they keep posted up in the latest remedies, yet if the advancement of pharmaceutical chemistry was left to them, we should soon be distanced by other countries where the profession of the pharmacien is one of great honour and responsibility. No good is to be gained by opposing each other, as has been the case at Coventry. I would ask the Coventry practitioners to 'remember the rock from whence they were hewn,' as their example is not quite so good as their precept, for they may be reminded how their forefathers acted when simply apothecaries. I would also urge upon all chemists to abstain as far as practicable from prescribing. Every one knows, however, that it is quite impossible to give up counter-prescribing entirely. We find it practised even in continental countries, where the duty of the chemist is defined by the strictest code, and as we are every day travelling in the direction of making pharmacy our profession, so medical men are gradually leaving the practice of pharmacy, and devoting themselves to the study of medicine and surgery. The beneficial results which have already been arrived at in those places where surgeons have given up the dispensing of medicines, and chemists on the other hand have practically ceased from prescribing, will encourage others gradually to follow in their footsteps until it becomes general throughout the country, and I cannot think it will be long, looking at the great advance which has been made in the past few years, before the two professions will be totally distinct, and the one will become the handmaid of the other."

At the close of the address a lengthy discussion ensued upon it, especially that part referring to the conference. The chairman stated that before submitting to the trade in general the proposal to hold a conference, he had at a special council meeting of this Association brought the matter forward, and it received their entire assent; he, however, now wished to elicit a full expression of opinion from the general body of members. A resolution was then unanimously agreed to "That the proposal to hold a trade conference as suggested has our full approval." It was also unanimously resolved "That the council be instructed to appoint six gentlemen (with power to add to their number) to act as representatives at the conference."

The prizes of the Association for the test preliminary examination were then awarded, the first being a student's cabinet of materia medica specimens, to Mr. Adams; the second, Bentley's 'Botany,' to Mr. Tuckey.

In concluding the business of the evening it was unanimously resolved that a hearty vote of thanks be given to the retiring president, Mr. Thomas Barclay, to whose untiring and indefatigable exertions this Association owes much of its success; general regret being expressed that he found himself unable, from pressure of other duties, to again accept the office. A further vote of thanks to the council and officers of the past year brought the proceedings to a close.

BRIGHTON ASSOCIATION OF PHARMACY.

A meeting was held on Tuesday evening, May 30th, Mr. W. D. Savage, J.P., the President, occupying the chair, when the following resolution was passed, with reference to the trade conference proposed to be held at Birmingham:—

"The Brighton Association of Pharmacy having considered the proposition of Messrs. Southall, Brothers and Barclay, are of opinion that it is unnecessary to send a deputation from Brighton to Birmingham; at the same time they desire to express their sympathy with the object the firm have in view, of forming a trade defence association, believing as they do that such association would not retard but assist the operations of the Pharmaceutical Society."

A vote of condolence was also passed with the family of the late Mr. Brew, who had for many years been on the committee of the Association.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY

Professor Abel, F.R.S., President, in the chair. The ordinary business of the society being concluded, a paper "On Hemine Hematine and a Phosphorized Substance contained in Blood Corpuscles," by Dr. J. L. Thudichum and Mr. C. T. Kingzett, was read by the latter. Professor W. N. Hartley then made a communication "On the Natural Carbon Dioxide from various sources," being a continuation and extension of his former paper on the presence of liquid carbonic anhydride in the cavities of quartz and other minerals. Mr. Kingzett subsequently read a "Note on some Trials of Frankland and Armstrong's Combustion Process in Vacuo," by Dr. Thudichum and himself. Mr. T. Fairley gave a short account of three papers "On Peroxides," in which he described various reactions with hydrogen peroxide and also the preparation of sodium and uranium peroxides; "On Chromic and Perchromic Acids," and "On the Estimation of Nitrogen." The Secretary read a paper by Professor J. W. Mallett, "On Aluminum Nitride, and the Action of Aluminum on Sodium Carbonate at a High Temperature." The nitride forms small crystalline particles of a yellow colour. Lastly Mr. E. Neison gave a short account of 'A Process for the Estimation of Mercury." The meeting was then adjourned until Thursday June 15, for which numerous papers are announced:—"Chemical Studies," by Professor Dewar; "Researches on the Reduction of Nitric Acid, and on the Oxides of Nitrogen: Part 1. On the Gases evolved by the Action of Metals on Nitric Acid," by Dr. Armstrong and Mr. Ackworth; "The Composition and Formula of an Alkaloid from Jaborandi," by Mr. Kingzett; "The Simultaneous Action of Iodine and Aluminum on Ether and Compound Ethers," by Professor Gladstone and Mr. Tribe; "On Compounds of Antimony Pentachloride with Alcohols and Ethers," by W. Carleton Williams; "On the Volatility of Barium, Strontium and Calcium," by Professor Mallett; Note on "The Action of Potassium Pyrogallate on Nitric Oxide," by Dr. Russell and Mr. Lapraik.

Parliamentary and Law Proceedings.

Poisoning by a Liniment.

On Wednesday, Dr. Hardwicke, the Coroner for Central Middlesex, opened an inquiry at Paddington, into the death of Mrs. Elizabeth Browne, aged fifty-five, who was alleged to have died from poisoning. The evidence went to show that deceased had not been very well of late owing to the effects of a fall she had at Christmas last. During the whole of last week the deceased and her husband with some friends had been drinking freely. On Saturday last, as early as half past six o'clock in the morning, they recommenced drinking, and continued it until late in the afternoon, when Mrs. Browne was joined by a friend, a Mrs. Mortice. This person, it appears, so soon as she entered the house, went to deceased's bed room, and there found her on the bed in an insensible state. By her side, on the floor, she saw a cup which contained a small quantity of stuff similar to the contents of a bottle near at hand, and which was marked "poison." She at once fetched Mr. Browne, who had left the house but a short time before. A doctor was also called in. The medical evidence went to show that when deceased was first visited she was quite insensible, the pupils of her eyes were dilated, and there was every evidence of her having taken poison. The stomach pump was used, but deceased died in about half an hour. When the doctor first entered the house he was told by Mrs. Mortice that Mr. Browne had poisoned the deceased by giving her some lotion out of a bottle which was marked "posion," but when spoken to on the matter afterwards she denied the statement, and said she supposed that if she did say so it was under the excitement of the moment. There had been no *post-mortem* examination, but from the contents of the stomach it was clear she had died from poisoning by belladonna. The contents of the bottle marked "poison" had been examined, and found to be a mixture of belladonna, chloroform, opium, and soap liniment prepared for outward application. The police stated that they had made every possible inquiry, but were not in a position to throw any light on the subject. The Coroner then re-examined several of the witnesses, and observed that the circumstances of the case were not at all clear. After some deliberation the jury returned a verdict that the deceased died from belladonna poisoning, and added, that in their opinion it was her own act while in a state of intoxication. —*Times.*

Poisoning by Chloral Hydrate.

A coroner's jury, on Thursday, held an inquiry into the cause of the death of Lieutenant Harston, of the Challenger. The medical evidence showed that death was the result of poisoning, and a bottle which had contained chloral was found in deceased's cabin. The deceased, previous to taking the poison, addressed the following letter to a brother officer:—"I'm an awful bother; but don't send this letter to the governor unless I'm dead. Remember me to all the fellows. Telegraph up to my friends, and tell them not to come down." A verdict of "Suicide while in an unsound state of mind" was returned.

Poisoning by a Vermin Killer.

On Wednesday, May 31, an inquest was held in Walsall, by Mr. Fletcher, Borough Coroner, on the body of Amelia Brown, aged 14 years 11 months. It appeared from the evidence that the girl had left her mother's house the previousweek and that she died with symptoms of strychnia poisoning.

William Seedhouse, assistant to Mr. Hubbard, chemist, Stafford Street, was examined, and said he knew the deceased as a customer. She had been in the habit of coming occasionally to the shop. The last time he saw her at the shop was on the morning of the Monday she died. She purchased on that occasion a threepenny packet of Battle's vermin killer. He served her with it, and in reply to his question as to what she wanted it for she said it was for Mrs. Gough, who wished to destroy some mice. The powder was in paper, labelled "poison" on two different places. The word poison was printed in plain letters. He also told deceased that it was poison, He requested her to sign the book kept for the purpose. and she signed it with a cross, she being unable to write.

There was nothing whatever peculiar in the manner of the deceased, who appeared to be rather cheerful than otherwise. She was in the shop about three minutes.

The Coroner summed up, and said there could be no doubt that deceased had committed suicide, but it would be for the jury to say whether at the time deceased committed the crime she was in her right mind. If they thought she was, then they would return a verdict of *felo de se*, but he would leave it to them. The jury, after a lengthened consultation, returned a verdict of "*Felo de se.*"—*Walsall Observer.*

Conviction for Refusal to Sell.

At the Westminster Police Court, Edward Hunt, cheesemonger, of 200, Vauxhall Bridge Road, was, on Thursday, summoned, under the Adulteration of Food Act, for refusing to supply an article of food to Mr. Charles Joseph Hughes, one of the Sanitary Inspectors of the Board of Works for the Westminster district. Mr. Warrington Rogers prosecuted. It appeared from the evidence of Mr. Hughes that he went to the shop of the defendant and asked to be served with half a pound of butter. The defendant said, "What price?" The witness replied, "Sixteenpenny;" and the defendant served him. He paid for the butter, and told the defendant that he had purchased it for the purpose of analysis. The defendant snatched it away from him, and said that he could not afford to sell it at that price. Witness had previously purchased butter at the defendant's shop at the same price and found it genuine. The defendant said there was only a doubt on his part as to whether it was genuine or not, and he had since discovered that it was genuine. Mr. Arnold fined him £5.

Obituary.

THOMAS ARCHER DORVILLE BREW.

Another of the veterans of pharmacy has just passed away, and a large circle mourn the loss of a very valued friend.

Mr. Brew entered the business in the old days of pharmacy, when the Society and compulsory examinations were things thought of and hoped for, but still far in the future.

He was apprenticed to Mr. Preston, the founder of the firm of Preston and Sons (now Hodgkinson, Prestons and King), of Leadenhall Street, then a retail chemist in the Strand. A few years later he migrated to Brighton, where for the last forty-five years he has successfully carried on business. A man of enlarged mind and philanthropic views, he was associated with many good works in his adopted town, notably with the Lying-in Institution, a large and important charity in Brighton, of which he was for over thirty years the honorary secretary. One of the earliest members of the pharmaceutical body, he sat for some years on the Council, but of late he took no active part in the Society. He was also treasurer to the Brighton Chemists' Association.

A citizen of London, after having filled the offices of warden and master of the Worshipful Company of Carpenters, he was for many years a member of the court of that ancient guild, where his kind and urbane nature procured him universal respect and esteem.

His death took place on the 30th ult., at the residence of his son-in-law, in South Hampstead, after a comparatively short illness; and thus at the ripe age of seventy-four he passed peacefully away, in the full vigour of intellectual power, having succumbed to a painful internal disorder which unexpectedly declared itself.

Notice has been received of the death of the following:—

On the 26th of March, 1876, Mr. Hugh Griffith Hughes, Pharmaceutical Chemist, of Hokitika, New Zealand. Aged 35 years. Mr. Hughes was a Life Member of the Pharmaceutical Society.

On the 15th of May, 1876, Mr. Henry Cox, Chemist and Druggist, of Strutton Ground, Westminster. Aged 46 years.

On the the 29th of May, 1876, Mr. Cristopher Blades, Pharmaceutical Chemist, of Leek. Aged 64 years. Mr. Blades had been a Member of the Pharmaceutical Society, since 1842.

Correspondence.

⁂ *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Proposed Trade Conference.

Sir,—The proposal to hold a Trade Conference at Birmingham having been so favourably received we now intend to leave the whole of the arrangements in the hands of an influential preliminary committee, and will in next week's Journal publish a list of names of the gentlemen who have consented to act. Should any one desire to take part on this committee we will be glad to hear from them The committee will have the benefit of all the suggestions which have already been offered, and invite further communications.

To make the Conference a success it is necessary that all who take any interest in it should make a point of being present or of being represented.

Sheffield, Leeds, Halifax, Hull, Sunderland, and some other towns have undertaken to send delegates to represent them and with power to act on behalf of the chemists in those towns. It will, however, be impossible for anything practical to result from the Conference unless many other towns send special representatives.

Southall, Brothers and Barclay.

Birmingham, June 7, 1876.

Milk of Sulphur.

Sir,—I was much pleased to read your two leaders on this subject, because they so exactly represent my own views on the question, views which I have repeatedly and strongly urged in private, and now, with your permission will do so in public. I may say in starting that I feel strongly on the subject, because I regard it as an unjust attempt to do away with an old, well-tried, and most valuable preparation. Do not let me be misunderstood; I abhor adulteration of anything, or in any form, but the point here is not adulteration at all, but of two totally distinct and different preparations, differing in their chemical, physical, and therapeutical properties. The nonsense sometimes talked about the adulterant being plaster of Paris is so palpably absurd as to hardly even merit a passing comment, but if such were the case then at least there would be a semblance of reason in the argument of the objectors, for I take it no one would like to swallow what might form a solid concretion in his stomach. But it is not so; tons upon tons of milk of sulphur have been swallowed with absolutely no ill effects that I have ever heard or read of. As has been pointed out before, milk of sulphur is a very attractive looking preparation, which precipitated sulphur is not; the first mixes readily with water, which the second does not; the former is pleasant to take, which the latter is not; the former has a certain therapeutic action of its own, differing widely from that of the latter, and this action is certainly not a constipating one, and it is not difficult to guess how this action has been attributed to it; doubtless those who do so look upon the so called adulterant as plaster of Paris, which is quite free from the beautiful silky crystalline appearance so marked in milk of sulphur. Let any one take sulphur and plaster of Paris and try if he can to produce milk of sulphur. Failure of course would follow; no art can produce a substance the ingredients of which are blended like this; the two things are precipitated together in closest union, forming a thing *sui generis*. Why should objection be taken to giving sulphate of lime, when things far less soluble, such as phosphate of lime, subnitrate of bismuth, etc., are constantly prescribed? Again it must not be forgotten that it is only the retail sale which is in question, a prescription of course must be made up in its integrity whichever the prescriber may choose to order, and I, as well doubtless as others, have had prescriptions to dispense in which Lac Sulphuris, not Sulphur præcipitatum, has been ordered. And that is all I contend for, let it be a known and established fact that there are the two preparations, different alike in name and nature, and then people can have just which they like. No question of cost need arise, because the difference is too small to render that necessary. I still sell, and shall continue to do, the good old-fashioned remedy, with the following label:—

MILK OF SULPHUR.
(Lac Sulphuris Ph: Lond: 1721, not Precipitated Sulphur Ph: B.)

I nevertheless keep Sulphur præcipitatum P.B. for dispensing, and in case it is asked for, which judging from the following I should say is not very likely.

On two occasions that recur to my memory persons have brought in packets of precipitated sulphur, purchased from a first-class firm, and asked me whatever stuff they had got; would I let them have some such as they had had before? Of course I complied without comment, as such would have been unnecessary; people do not like, perhaps they are afraid, to go to such big houses and make a complaint, so that such firms are not in a position to form a correct judgment, or speak authoritatively on such a subject. Doubtless, other of your readers have had similar experiences.

Those who want sulphur pure and simple have the ordinary yellow sulphur, while others choose the milk of sulphur, the precipitated sulphur being quite left out in the cold as far as the public are concerned; indeed judging from the immense exertions made by its few advocates, they appear to think their case a bad one.

J. H. BALDOCK.

South Norwood, S.E.
June 3, 1876.

EXAMINATIONS AND ORDER OF MERIT.

Sir,—I am glad Mr. Proctor introduced this subject, my views coincide with his.

The evil of indifference may even extend to this subject, but now it has been so well introduced I hope that all who have an opinion will exert themselves to offer it.

I know two students working for the Minor who would be glad to have their names arranged in order of merit when they pass. One of these gentlemen tells me that students of other schools than the Square believe the examiners to have been favourable to the alphabetical arrangement, partly because others than Square men usually occupied the higher positions on the list, and principals of other schools were accustomed to advertise such circumstances. I may mention from experience that some students remain longer in the Square laboratory than they consider necessary to pass their examinations, not only because they enjoy the work, but also with the hope of obtaining a more respectable position on the list.

I venture to believe there are some students at the Square who would work for three or six more months in the laboratory under the old system than the new; but now they will say, "If I go up this month I shall probably pass, and if I go up in three months I shall see myself no higher on the list." Every man should get his due and know how his attainments were estimated by the official standard.

J. W. DRAPER.

59, Barnsbury Road, Islington,
May 5, 1876.

Sir,—I am decidedly opposed to granting "honours" or placing names in the order of merit in the Minor examination and consider the Board of Examiners have exercised a wise discretion in giving up the system, I hope for ever. It is only the old assistants' examination made compulsory, with the chemistry a little more precise, and the botany, perhaps, a little less so; and I cannot see what honour there is in passing it at all. If a man desire to take an honourable place among his brethren let him go on for the Major and become a Member of the Society and we will all honour him then.

Practically, the granting of "honours" in the Minor induces young men to go up ill prepared for the Major. Let us rest on our oars a bit till we see the effect of practical men certificating candidates for the Minor as having been engaged for three years at the dispensing counter before we dare to estimate a man's business capacity by his place on the examination list.

GEORGE MEE.

79, Grosvenor Road, Highbury.
June 3, 1876.

Sir,—I am somewhat surprised at the outcry which has been raised against the alphabetical arrangement of the names of those who have passed their respective examinations. As yet the arguments have only been against the new arrangement, but I think a little may also be said in favour of the same.

It would be interesting to know whether Mr. Proctor and others have generally found those young men who have taken a high position on the list to be the best assistants.

Again, let us suppose that A. has passed, and deservedly been placed at the top of the list,—agreeing with the wisest of men that "much study is a weariness to the flesh," he throws his books aside. B., who we will suppose has taken a less honourable position, continues his studies. In this case B. may become superior to A.

I maintain that even if it were possible to arrange the names truly in order of merit, after a lapse of six months that list would not necessarily represent respective qualifications any better than an alphabetical one.

Just a word about the examinations—in the Minor there are six subjects, and the examiners meet six times annually. Now if each examiner took a different subject at every meeting in the year, it would very much diminish the sameness of the questions, and I venture to predict would prove one of the severest wounds the monster "Cram" has yet received.

AUDI ALTERAM PARTEM.

J. B. Cousler.—Probably on the first Monday in July, Apply to the Secretary, 17, Bloomsbury Square.

W. F. Newman.—The following is, we are informed, the formula for Mr. Startin's Lotion:—

℞	Zinci Oxidi	ʒij
	P. Calam. Ppt.	ʒij
	P. Sulph. Præcip.	ʒj
	Glycerini	ʒiij
	Aquæ Rosæ ad	℥ij
	Hydrarg. Bisulph.	gr. i

M. Ft. Lotio. To be dabbed on the part affected night and morning.

G. C. Druce.—(1) *Carex acuta*; (2) *C. panicea*; (3) *C. muricata*; (4) *C. Paludosa*; (5) *Serrafalcus mollis*; (6) *Carex præcox.*

E. Jones.—The Trade Marks Registration Office is in Quality Court, Chancery Lane. Information as to the steps to be taken will be found on p. 547 of the present volume.

N. (Swansea).—The formula for Parrish's Syrup was reproduced from Parrish's Pharmacy *in extenso* in vol. i., p. 857 of the present series. It has also been a subject of criticism in several papers that have since appeared in this Journal.

"*Associate.*"—'Try How Crops Grow,' published by Macmillan.

A. C. Laslett.—*Claytonia perfoliata.*

"*Dispenser.*"—See notes on Salicylic Acid, before pp. 263 and 382.

NOTICE.—Considerable inconvenience and disappointment are frequently caused by neglect of the regulations as to correspondence, letters intended for the Editor being sent to the Publishers or the Secretary, and *vice versâ*. A compliance with the explicit instructions published weekly over the Editorial columns will prevent delay, and the consequent annoyance.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. E. Godfrey, Professor Dymock, Professor Fluckiger (Strassburg), Professor Dragendorff (Dorpat), Mr. Robinson, Mr. Reynolds, Mr. Thresh, Mr. Balmanno Squire, Mr. Smith (Kew), Minor Associate, Studens Pharm., G.

ERGOT OF RYE.*

BY PROFESSOR DRAGENDORFF.

In association with Herr Stud. Padwissotzky I have been engaged in the chemical examination of ergot, and I believe we have succeeded in isolating the active principle. Our experiments have also yielded to us in a pure condition the colouring matter occurring in ergot. Whilst I beg leave to lay before the Pharmaceutical Society specimens of the products we have obtained, and postpone a detailed description of them for a German journal, I would wish to submit to the Pharmaceutical Society the following notes respecting their more important properties.

(1) Coming specially under consideration as an active constituent of ergot is (*a*) a slimy substance which goes into solution upon extraction of the ergot with water, and which is again precipitated by 40 to 45 per cent. alcohol. It is colloidal; after being once dried it is with difficulty soluble in water, and it holds with the greatest energy ash constituents from which it might not have been freed. This substance has been named by us Scleromucin. It contains nitrogen, but gives no albuminoid reaction, nor any reaction of an alkaloidal or glucosidal body. Together with 8·26 per cent. of moisture and 26·8 per cent. of ash, it gave 29 per cent. of carbon, 6·44 per cent. of hydrogen, and 6·41 of nitrogen. We do not consider this substance is to be recommended for therapeutic use, as it is only partially soluble in water after becoming once dried.

In ergot there also occurs from 2 to 3 per cent. of a substance (*b*) similarly soluble in water, which is also soluble in cold 45 per cent. alcohol, and even in boiling 75 per cent. alcohol; this, on account of its weak acid properties, we have named Sclerotic Acid. It passes in association with other constituents of the ergot extract into the diffusate, when the extract is submitted to dialysis; but after its separation in a pure state it is, like scleromucin, colloidal. It is precipitated by 85 to 90 per cent. alcohol, together with lime, potash, soda, silica, and manganese; but after maceration with hydrochloric acid the greater part of the ash constituents can be separated by a fresh precipitation with absolute alcohol. The sample analysed by us had only 3 to 4 per cent. of ash, and contained 40 per cent. of carbon, 5·2 per cent. of hydrogen, 4·2 per cent. of nitrogen, and 50·6 per cent. of oxygen.

Sclerotic acid forms with lime a compound that is not decomposed by carbonic acid, and which, upon combustion, leaves 19 to 20 per cent. of calcium carbonate. Its reactions, both qualitative and quantitative, are similar to those of scleromucin. The subcutaneous injection of 0·02 to 0·04 gram brings frogs gradually into a state of perfect palsy, accompanied by a peculiar swelling, that may last six or seven days. In recommending our sclerotic acid most strongly for therapeutic use we believe we are justified in the presence of its easy solubility in water, and the fact that it occasions no kind of disturbance in the cellular tissue lying under the skin. Professor von Holst, the leader of the gynæcological clinic in this country, has used our sclerotic acid almost uninterruptedly for a year and a half (with the human subject subcutaneously 0·04 to 0·05 gram), and is thoroughly satisfied with its action.

The sclerotic acid also yields no reactions from which albuminoid, alkaloidal, or glucosidal properties could be inferred. It is tasteless and without smell, and can be prepared almost colourless and but slightly hygroscopic. For those who might wish to experiment upon the therapeutic action of sclerotic acid, it may be here stated that it is prepared according to our instructions at the chemical manufactory of Dr. Fr. Witte, Rostock, Mecklenburg, Germany.

(2) The red colouring matter which is utilized in the forensic chemical determination of ergot is, for the most part, deposited as a (lime) compound insoluble in water and alcohol. It is carried into solution by alcohol after treatment of the powdered ergot with an aqueous solution of tartaric acid; but loses in the subsequent purification a very considerable proportion which changes into a brown resinous substance. This colouring matter, of which unfortunately we have not hitherto been able to get a large quantity in a pure state, we have named Sclererythrin. It is insoluble in water; in dilute and strong alcohol, ether, and chloroform, and also in dilute aqueous solutions of caustic potash, ammonia, etc., it is easily soluble. Its solutions in alkalies are of a beautiful murexid colour. When these are decomposed by an acid and shaken with ether the sclererythrin is taken up by the ether. Alcoholic solution of sclererythrin gives with aluminum sulphate and with zinc chloride a splendid red mixture; with salts of calcium, barium, and many of the heavy metals it gives a blue precipitate. We suspect in sclererythrin a derivative from anthraquinone, standing in near relation to crysophanic acid and alizarine. The amount of this otherwise not quite inactive substance in the mature ergot is very small. It amounts in any case to only about one-tenth or one-twentieth of a part per thousand.

(3) With sclererythrin is obtained a small quantity of another colouring matter similar to it, which after being once isolated is not soluble in alcohol, ether, chloroform, or water; but it dissolves with a splendid violet colour in potash solution, and from this solution is again precipitated by acetic acid. By potash solution it can be extracted from ergot residue that has been exhausted with water, alcohol, and ether, in which it amounts at the most to one part in one thousand. Concentrated sulphuric acid dissolves it with a handsome blue violet colour, and on this account we have named it Scleroiodin. Its analysis gave 64·88 per cent. of carbon, 5·5 per cent. of hydrogen, 3·87 per cent. of nitrogen, and 25·50 per cent. of oxygen. This substance also is slightly active and similar to sclererythrin. Probably it represents a decomposition product of sclererythrin, originated by acid and ammonia, but which in any case is formed in the ergot.

(4) From the ergot powder treated with aqueous solution of tartaric acid, after the sclererythrin and a small portion of the scleroiodin have been extracted

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* The author having stated in a communication received from him in March, 1875, that he had succeeded in isolating the active principle of ergot, a request was made to him for further information. To this request he has responded by sending the above paper, which was intended to be read at an Evening Meeting of the Pharmaceutical Society, and was accompanied by specimens of the various bodies referred to. As, however, the next Evening Meeting available will not take place until November, it has been thought best to publish the paper at once. The specimens have been deposited in the Museum of the Pharmaceutical Society.

by alcohol, ether takes up a mass, which upon the evaporation of the ether is obtained partly as almost colourless needles and partly as citron-yellow tabular crystals and plates. The needle-shaped crystals, which we have named Sclerokrystallin, can be purified by recrystallization from chloroform. Sclerokrystallin is almost insoluble in water and alcohol and difficultly soluble in ether, but it is taken up by caustic ammonia and potash solutions. Its analysis gave 61·11 per cent. of carbon, 4·91 per cent. of hydrogen, and 56·98 per cent. of oxygen, from which probably the composition $C_{10}H_{10}O_4$ might be concluded.

The yellow crystalline substance we have named Scleroxanthin. It is a hydrated compound of sclerokrystallin, and probably its composition may be represented by the formula $2\,C_{10}H_{10}O_4 + 3\,H_2O$. Upon analysis it gave 13 to 14 per. cent. of water, and the anhydrous portion gave 61·29 per cent. of carbon and 4·76 of hydrogen. By heating with chloroform it can be converted into sclerokrystallin, which can also be brought back again to scleroxanthin. Both substances appear to be without effect upon frogs.

(5) In the preparation of the colouring matter we met with yet another yellow substance, amorphous, and soluble in fats and chloroform, but which, as we were not certain as to its purity, was not further examined.

(6) The same remark holds good for a brown resinous substance, which dissolved in fat and in alcohol. Like the substance indicated under (5) it appears not to act poisonously upon frogs.

(7) Wenzel's alkaloids. We have isolated ergotine and ecboline, but found them almost inactive upon frogs. We consider it not improbable that they are identical with each other. Obtained by Wenzel's method, moreover, they are not quite pure.

(8) Tanret's ergotinin was also prepared by us, but we have not been able to come to the conclusion that it represents a chemically distinct substance. We found in it admixtures of our sclererythrin, and other substances. To the sclererythrin we must attribute the reaction with sulphuric acid, described by Tanret, which we also have observed; and to it also, according to our opinion, Tanret's ergotinin owes its not very energetic action upon frogs.

The specimens forwarded by us represent:—

1. Sclererythrin;
2. Resinous Decomposition Product of Sclererythrin;
3. Scleroiodin;
4. Scleroxanthin;
5. Sclerokrystallin;
6. Sclerotic Acid;
7. Calcium Sclerotate;
8. Scleromucin.

ON AN IMPROVED SUBSTITUTE FOR THE UNGUENTUM PLUMBI SUBACETATIS COMPOSITUM.

BY BALMANNO SQUIRE, M.B. LOND.,

Surgeon to the British Hospital for Diseases of the Skin.

A short time since I described in this Journal, under the name of Glycerole of Subacetate of Lead, a preparation which for cutaneous therapeutics I have reason to think an improvement on the subacetatis plumbi liquor, namely, a preparation made in the same way as the "liquor," with this difference only that glycerine is used in the manufacture of it instead of water.

Since the publication of my views I have become indebted to my father, Mr. Peter Squire, for a very useful suggestion. He proposes that the glycerole I have described should be used in the preparation of the official ointment I am now referring to instead of the liquor plumbi directed in the British Pharmacopœia. He also recommends that instead of the white wax and almond oil of the Pharmacopœial preparation, "vaseline" should be employed. In this manner the ointment is doubly defended from undergoing decomposition.

The defects of the otherwise very valuable unguentum plumbi subacetatis compositum are thus pithily described in Mr. Peter Squire's 'Companion,'—"sweet at first, becomes rancid if exposed to the air." Now this preparation, if composed in accordance with his recent suggestion, will preserve its original colour, and generally its freshness, for I believe an indefinite time.

I have thought it right to communicate this most useful hint, as a pendant to my previous communication, because I look upon it as a means of extending very considerably in the treatment of cutaneous disease the uses and advantages of the glycerole of subacetate of lead.

It must of course be remembered that no preparation, however ingenious from a pharmaceutical point of view, can be of much avail if it should happen to present any therapeutical incompatibility. The Pharmacopœial ointment in question is of course designed to serve as a local sedative and mild astringent. If the vaseline should chance to alter this essential property of the ointment and render it at all irritant or stimulating, the vaseline would scarcely be an acceptable substitute for the bland excipients (wax and oil) that are now used.

However, I have made good trial of the proposed new ointment and find that it answers perfectly the indications that would be thought proper as demanding the use of the Pharmacopœial preparation. I may add to this that I had already for some time past made trial on a larger scale in hospital practice of pure vaseline as an application to the skin, and I have found it a perfectly bland and unirritating substance even in specially irritable conditions of the skin. I have reason to think it a blander and more neutral application to the skin than even the unguentum simplex of the Pharmacopœia.

The method above described of preparing the unguentum plumbi subacetatis compositum so as to enable it to keep without change, is a matter of interest not in this country only, since I find on reference to the 'Companion to the Pharmacopœia,' that the preparation is official not only in Great Britain but also in Belgium, France, Germany, and Russia.

NOTES ON INDIAN DRUGS.

BY W. DYMOCK.

Diospyri Fructus.—*Bombay name*, Timbooree.

This fruit grows abundantly in the neighbourhood of Bombay; it ripens in April upon the young wood of the previous year, and the blossoms appear at the same time upon the young wood just forming. The fruits vary much in size and in the number of seeds they contain. The largest are about 1½ inch in diameter, of the shape of a small apple, and of a yellow colour, marked with rusty fissured patches. The rind consists of two layers, an outer of epidermis composed of tesselated cells, with large granular nuclei of a darker colour than the rest of the cell. The rusty spots are formed by a deposit of colouring matter in the nuclei and cells. The inner layer of the rind is composed of wood cells; many large irregular shaped crystals are also seen. Within the fruit and surrounding the solitary seeds, which are crowded together in the centre, is a yellow pulp consisting chiefly of very large irregularly oblong cells, a 75th to 100th of an inch in length, and some granular and fibrous tissue forming a sort of mesh work. The pulp tested with iodine gives no indication of the presence of starch. Each seed is enclosed in a strong semitransparent elastic coat, which is a web of spindle-shaped cells with fine granular nuclei; the seeds are bean shaped, with a shining irregular surface of a dark brown colour; the endopleura penetrates into the albumen in narrow brown strips, as in the nutmeg, but does not reach the centre of the seed; the albumen is horny and translucent, of a steel grey colour; the margin of the seed is marked by a light coloured groove, except at the micropyle, which projects; the cotyledons are oblong and heart shaped at the base.

Diospyros fruit is intensely astringent until quite ripe when it suddenly becomes mawkish and sweet, without a trace of its former astringency. This is noticed in the 'Pharmacographia,' but not in the Indian Pharmacopœia, where unripe fruit should have been ordered.

In preparing the extract steel or iron implements should not be used, as they turn the juice black; the extract when finished has much the colour and consistence of shell lac. In Bombay the fruit is eaten by the poorer classes; but it is very lightly esteemed, so much so that the market people will tell a person who wishes to cheapen fruit that he had better go and buy Timbooree. The seeds are preserved by the country people and given as an astringent in diarrhœa. The testa is the astringent part, the albumen is almost tasteless. The leaves of the Diospyros are used for folding cigarettes. Although the ripe fruit is very sweet insects will not touch it.

Entada Pusætha. *Local Name of Plant*, Gardul.
Name of Drug (the seeds), Pilpapra.

The plant producing these seeds is a gigantic climbing shrub common in the Ghaut jungles, remarkable for its legumes, which are about three feet long and four or five inches wide opposite the seeds; the latter are more or less heart shaped, about two inches in diameter, with a shining brown testa, resembling that of the horse chestnut, but $\frac{1}{16}$th of an inch in thickness. It encloses two large cotyledons which adhere to it, and thus form a central cavity. The seed is white and insipid. When a thin section is cut and a drop of water placed upon it the water immediately becomes milky and the opacity of the section much diminished. Under the microscope this is seen to be caused by the escape of oil globules and granular matter from the cellular network of the section. A section of the testa forms a very pretty microscopic object, the structure of the hard enamel-like surface being peculiar.

I am not aware of the properties of this drug having been tested in European practice. Among natives, it has the reputation of being emetic. Dalzell and Gibson ('Bombay Flora,' part i., p. 84) say, "An infusion of the spongy fibres of the trunk is used with advantage for various affections of the skin in the Philippines, where it is called 'Gogo,' Adams; the seeds are eaten roasted in Soonda." From the latter part of this extract it would appear that the oil being expelled the seed becomes inert.

Rhus succedanea. The Galls
Kakrasinghee.

These galls come to Bombay from Northern India. They are generally single, but sometimes lobed, of a purse like form, and vary much in size. The average may be, length 1½ inch, breadth 1 inch, thickness ¼ inch. The external surface is of a pale greenish colour and has a fimbriated appearance. Near the neck or attached end may be seen the midrib of the leaf, from which the gall has been formed; it appears to be split in two; between the halves is a kind of mouth with smooth everted edges (the passage by which the aphides have escaped). On breaking open the gall which is brittle and about a 16th of an inch in thickness, the irregular rugose inner surface is seen; it is of a reddish colour and appears as if covered with particles of dust; this on microscopic examination proves to consist of the *débris* of the former inhabitants of the sac, viz. numerous eggshells beautifully white and transparent, broken portions of the insect, and a quantity of what appears to be excrementitious matter; sometimes the entire skeleton of an aphis may be seen.

This insect as obtained from the dry gall is of an oblong form and brown colour, rather more than a 16th of an inch in length, the whole body covered with short bristles, four long ones at the end of the abdomen, six legs, each armed with two claws, abdomen divided into eight segments, head armed with a proboscis containing an awl-shaped instrument, and provided with bristly feelers; the shell of the gall when fractured presents a crystalline appearance, a thin section shows it to consist of a cellular stroma, the greater part of the cells being entirely filled with a yellowish highly refractive substance.

Kakrasingee galls have a purely astringent taste and are probably an efficient substitute for common gall nuts.

Artemisia sp. *Bazar Name*, Kirmanee.—
Indian Worm Seed.

This drug appears to be almost the same as that known in Europe. Conf. 'Pharmacographia,' p. 347. It is imported from Affghanistan and Persia.

In these notes the vernacular names given are those in use among the local drug merchants, and such as should be used when ordering native drugs in this market.

Bombay.

(*To be continued.*

LOGWOOD INKS.*

BY E. U. VIEDT.

Logwood inks have been much employed for several years on account of their cheapness and the beauty of their tint; the greater part of the so-called copying inks are prepared at the present time from this colouring matter. Both the rasped logwood and the commercial extract are subject to falsifications; it is well, therefore, to make use of the whole logwood, and rasp or grind it as required; it is necessary, also, to consider the presence of an excess of moisture and of foreign substances, which may be used to adulterate it, as insoluble substances, cutch, etc.

The inks prepared from logwood are of four classes:—

Inks with logwood and chrome.
" " " " alum.
" " " " copper.
" " " " iron.

Runge, in 1848, discovered that a dilute solution of the colouring matter of logwood, to which had been added a small quantity of neutral chromate of potassium, produces a deep black liquid, which remains clear, does not deposit, and may be employed as an ink. Perfectly neutral litmus paper is not affected by it; it does not attack pens; it is very cheap, and so easily penetrates writing-paper that it cannot be removed by washing even with a sponge—in a word, it has all the properties of an excellent ink. On exposure to the air in the inkstand, it sometimes decomposes very rapidly, its colouring matter being deposited in the form of large black flakes, which leave a colourless liquid above them. This gelatinization is a great defect in this ink, particularly as one does not know the precise conditions which determine it. Different means have been proposed to prevent this action; the best seems to be that of the addition of carbonate of sodium recommended by Boettger.

The author has used an ink prepared in this manner for upwards of two years, and has not observed any decomposition; although this may be to a considerable extent due to the fact that the inkstand employed was one which allowed but little exposure to the air.

To prepare this ink take of—

Extract of Logwood	15 parts.
Water	1000 "
Crystallized Carbonate of Sodium .	4 "
Neutral Chromate of Potassium . .	1 "

Dissolve the extract of logwood in 900 parts of water, allow it to deposit, decant, heat to ebullition and add the carbonate of soda; lastly, add drop by drop, with constant stirring, a solution of the neutral chromate in 100 parts of water. The ink thus obtained has a fine bluish black colour; it flows well from the pen and dries readily. The chrome ink powder of Platzer and the acid ink of Poncelet are imitations of the original ink of Runge.

An ink obtained from a decoction of logwood and chrome-alum is not to be recommended; the characters written with it have little depth of colour, and are of a somewhat greyish shade.

Decoctions of logwood to which alum has been added give a reddish or violet colour, which darkens slowly, particularly with ink prepared from the wood and not the extract. Such inks prepared with alum alone are costly, because to obtain a sufficiently deep tint one is obliged to employ decoctions or solutions of the extract in a very concentrated condition. It is otherwise when a metallic salt is added along with the alum. Alum produces a reddish purple colour in decoctions of logwood, while metallic salts produce in the oxidized solution of the colouring matter a precipitate of a black or bluish black colour. These inks are analogous to the so-called alizarine inks; the ink is coloured by the tint produced by the alum. Under the influence of air there is produced between the metallic salts and the colouring matter a reaction which determines the formation of a bluish black precipitate. To prevent as much as possible this action of the air upon the ink before it is applied to the paper, there is added, as in the case of alizarine inks, a trace of sulphuric acid designed to dissolve the precipitate which may be produced. This acidity of the ink has several disadvantages; it attacks the pens used for writing with it unless they are either of gold, platinum, or gutta-percha. Sulphate of copper or sulphate of iron may be the metallic salt used in such inks—the former is preferable. One of the best formulas for this kind of ink is the following, given in proportions for a manufacturing scale:—20 kilogrammes of extract of logwood are dissolved in 200 litres of water and the solution clarified by subsidence and decantation. A yellowish brown liquid is thus obtained. In another vessel, 10 kilogrammes of ammonia-alum are dissolved in 20 litres of boiling water; the two solutions are mixed, there being also added 200 grammes of sulphuric acid, and finally $1\frac{1}{2}$ kilogramme of sulphate of copper. The ink should be exposed to the air for a few days to give a good colour, after which it should be stored in well-corked bottles.

Boettger gives the following formula:—30 grammes of extract of logwood are dissolved in 250 grammes of water; 8 grammes of crystallized carbonate of soda and 30 grammes of glycerine of density 1·25 are added; and lastly, 1 gramme of yellow chromate of potassium and 8 grammes of gum arabic reduced to a powder and dissolved in several grammes of water. This ink does not attack pens, does not mould, and is very black.

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* *Laboratory* from *Le Moniteur Scientifique.*

HOW LONG AFTER DEATH MAY PHOSPHORUS BE DETECTED IN THE BODY?

To decide this question a German chemist at Breslau, the expert in pharmacy of the Provincial Government Board has made some experiments. Four guinea pigs were poisoned, each by 0·023 gramme phosphorus; they died in a few hours and were buried in sandy loam soil, 0·5 metre deep. Exhumation of the first took place four weeks after. The putrefying organs, heart, liver, spleen, stomach, and all intestines tested by Mitscherlich's distilling method showed characteristic phosphorescence for nearly one hour. Through oxidation with nitric acid and determining the phosphoric acid by the amount of pyrophosphate of magnesia, 0·018 gramme was obtained, corresponding to 0·005 phosphorus. This amount of the poison in the oxidized state of PO_5 allowed the inference, on the strength of former experiments, published in the *Zeitschrift für analytische Chemie*, 1872, that still 0·0075—0·010 phosphorus was left, so that of the whole quantity of 0·023 gramme 0·013—0·0155 was in an oxidized state after four weeks. The second animal was exhumed after eight weeks, in a highly putrescent state; its entrails showed the phosphorescent appearance with distillation for only thirty-five minutes; quantitative analysis gave 0·011 pyrophosphate of magnesia, or nearly 0·003 phosphorus. This corresponds to a remaining quantity of 0·0045 to 0·006 gramme of poison not oxidized. The third guinea pig, taken from the earth after twelve weeks, being too foul to have the intestines taken out, was put altogether into the apparatus, but no phosphorescence appeared, and neither PO_3 nor PO_5 could be shown in the distilled material; no phosphorus in an unoxidized state was therefore present after twelve weeks. To find out whether the lower form of oxidation took place, Dussard-Blondlot's method was followed, and PO_3 distinctly proved to be present, so that a sure detection of phosphorus poisoning was possible. The fourth animal was exhumed after fifteen weeks. The body was less putrid than that of the others, the smell less, the tissues drier, in fact rotting. As had been done with the other animals, Scheerer's method of testing by papers soaked in nitrate of silver and acetate of lead solutions, was first practised; and again, as in all the other three cases, the silver paper became blackened, the lead paper remained white, so that not in any of the four animals, in spite of quick putrefaction, could *sulphuretted hydrogen* have been formed. Phosphorus itself could not be detected by Mitscherlich's method, as in the third case, neither could the characteristic emerald green flame be obtained by Blondlot's method, and therefore the presence of the poison in a lower state of oxidation than PO_5 could not be proved. It appears from this that 0·023 gramme phosphorus had been completely oxidized within fifteen weeks after death. Though the presence of PO_3 could still be shown in the guinea pig, after twelve weeks, it seems doubtful if this would be the case in the human subject after vomiting has taken place, and where no haired skin, as in animals, shuts off the oxygen of the atmosphere more effectually, as the writer in the *Vierteljahrsschrift für gerichtliche Medicin*, January, 1876, justly remarks.

THE EXAMINATION OF POTASSIUM IODIDE.

BY M. LEPAGE.

The method proposed by the author* is based on the fact that whilst potassium iodide is soluble in 92° alcohol in the proportion of only 1 in 12 or 13, potassium carbonate, iodate, sulphate, chloride and bromide, as well as sodium chloride, are almost insoluble in alcohol of that strength.

50 or 60 grams of perfectly dry iodide are reduced to powder, and from this 4 grams are taken and powdered finely. This is put into a flask with 55 grams of 92° alcohol, and left in contact twenty-four hours with frequent shaking. If in this first treatment all the iodide disappears, it may be concluded that it is free from contamination with the salts above mentioned. If not the residue is treated two or three times with 8 grams of fresh alcohol each time, to remove all trace of iodide, and can then be weighed or examined as to its nature.

For the latter purpose it is distilled in 15 or 20 grams of distilled water. If the solution contains carbonate or sulphate, or both, barium chloride produces an immediate precipitate, which is dissolved with slight effervescence if carbonate, and remains undissolved if sulphate. If any alkalinity of the solution be neutralized with a few drops of dilute sulphuric acid, and then sulphurous acid added cautiously, iodate present produces a yellow colour, then a brown turbidity, due to iodine and iodic acid set free. Carbon bisulphide takes up the iodine and deposits it with a beautiful violet red colour. Chlorine water added gradually after neutralizing any carbonate sets free bromine present, colouring the solution yellow. The bromine can be separated by ether or carbon bisulphide. In the absence of bromine, silver nitrate will indicate chloride by a white curdy precipitate, soluble in ammonia and sodium hyposulphite, insoluble in nitric acid.

RELATION BETWEEN THE LIMIT OF THE POWERS OF THE MICROSCOPE AND THE ULTIMATE MOLECULES OF MATTER.†

BY H. C. SORBY, F.R.S.

The subject which I have selected for my address is the relation between the limit of the powers of the microscope and the ultimate molecules of organic and inorganic matter. I think I may at all events claim for this question sufficient novelty. Until the last few years the subject could scarcely have been attempted, and even now so many necessary facts are imperfectly known that nothing more can be done than to fill the gaps with plausible assumptions. This necessarily imparts more or less of a speculative character to some of my remarks; but it appears to me that in his annual address the president of a society cannot do better than endeavour to point out the general bearings of what is already known on some great question, even if for no other object than to prove the need of further inquiry.

Though fully impressed with the imperfect state of our knowledge, yet, even now, the facts are sufficiently definite to indicate, if not to prove, the existence of as wide a world of structure beyond the limit of the power of the microscope, as what has been revealed to us by it is beyond the powers of the unassisted eye.

I propose to divide my subject into three heads—

1. The limits of the power of the microscope.
2. The size of the ultimate molecules of organic and inorganic matter.
3. Conclusions to be drawn from the general facts.

In considering the limits of the power of the microscope, I shall assume that the instrument itself is perfect, and that the invisibility of the objects examined is in no way dependent on the want of the necessary characters. The point to which I particularly wish to direct attention is the limit of visibility depending on the constitution of light, beyond which light itself is of too coarse a nature to allow of our seeing objects distinctly defined. This question has been treated of in an admirable manner by Helmholtz in the jubilee volume of 'Poggendorff's Annalen' (1874, p. 573). The conclusion to which he arrives is that the limit depends on the confusion in the image due to the bright interference fringes overlapping the dark outlines of the object. This limit varies directly as the wave-length of the light, and inversely as the sine of half the angle of the aperture of the object-glass when illuminated by means of a condenser of equal aperture. According to this principle the limit for dry object glasses of 60° aperture is, roughly speaking, about equal to the wave-length of the light, and for the largest possible aperture equal to half the wave-length. In the case of immersion object glasses of the same aperture, the limit is about three-quarters of that for dry.

On comparing this theory with the results of observation, the agreement is very striking. It indicates exactly the same law for the increased defining powers of lenses of large aperture, as has been determined by experiment, and gives for the theoretical limit of distinct visibility $\frac{1}{80000}$th part of an inch, which is exactly the same as the mean of the experimental determination of a number of the most skilful microscopists. It also shows why, in the case of lines at equal intervals—like Nobert's bands or the markings on Diatomaceæ—it is possible so to manage the illumination that the dark fringes of interference may coincide with the true lines of structure, and give rise to good definition, even beyond the normal limit, and also agrees with the fact that lines less than $\frac{1}{100000}$th of an inch apart can be *photographed*, though *seen* with extreme difficulty, if indeed truly resolved, except under very peculiar and exceptional conditions; since the waves of light at the blue end of the spectrum, which are concerned in photography, are short enough to give good definition of lines so near together that the interference fringes due to the longer waves at the red end would give an indistinct image. Taking everything into consideration, the agreement between observation and the theory is so close as to make it extremely probable, and to justify the conclusion that the normal limit of distinct visibility with the most perfect microscope is half of the wave-length of the light. If so, we must conclude that, even with the very best lenses, except under special conditions, light itself is of too coarse a nature to enable us to define objects less than $\frac{1}{80000}$th or $\frac{1}{100000}$th of an inch apart, according as a dry or an immersion lens is used.

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* *Journal de Pharm. et de Chimie*, xxiii., 261.

† Abstract of Anniversary Address as President of the Royal Microscopical Society. From the *Quarterly Journal of Microscopical Science*, for April.

The limit of $\frac{1}{80000}$ of an inch deduced on Helmholtz's principle from the physical characters of light agrees admirably with the estimate formed independently by various great authorities on the microscope. The mean of the estimate thus formed by Quekett, Moss, De la Rue, and Carpenter, as quoted by Stodder, is in fact exactly the same ($\frac{1}{80000}$ of an inch), so that we cannot, I think, be far from the truth, if we take that as the base on which to build further conclusions. With an immersion object-glass of very large aperture it might be possible to define an interval of somewhat less than $\frac{1}{100000}$ of an inch, but probably the above-named determinations were made with dry lenses. At all events, since the limit of visibility as determined by the use of the best modern microscopes agrees so completely with what appears to be the limit due to the physical constitution of light, we must, I think, conclude that our instruments do now enable us to see intervals so small in relation to the wave-length of light, that we can scarcely hope for improvement *as far as the mere visibility of minute objec's is concerned*, whatever may remain to be done to improve their performances in other respects.

2. *The size of the Ultimate Atoms of Matter.*

Having then come to the conclusion that the limit of distinct and unequivocal definition is somewhere about from $\frac{1}{80000}$ to $\frac{1}{100000}$ of an inch, it appears to me very desirable to consider what relation such a magnitude bears to the size of the ultimate atoms of organic and inorganic matter. From the very nature of the case the microscope altogether fails to throw any light on this question, and the only course as yet open to us is to draw the best conclusions we can from the various properties of gases. This problem has been attacked by Stoney,* Thomson,† and Clerk-Maxwell,‡ who, from various data, and by various methods of reasoning, have endeavoured to determine the number of ultimate atoms in a given volume of any permanent and perfect gas. In order to avoid inconveniently long rows of figures, I have reduced all their results to the number of ultimate atoms contained in a space of $\frac{1}{1000}$ of an inch cube, that is to say, in $\frac{1}{1000000000}$ of a cubic inch, at 0° C. and a pressure of one atmosphere. These numbers are as follows:—

Stoney	1,901,000,000,000
Thomson	98,320,000,000,000
Clerk-Maxwell	311,000,000,000
Mean	50,260,000,000,000

As will be seen, there is a very great discrepancy between the numbers given by Thomson and Clerk-Maxwell. This is in part due to the fact that Thomson gives the greatest probable number, whilst Clerk-Maxwell has endeavoured to express the true number indicated by the phenomena of inter-diffusion of gases. The determinations do to a great extent depend on the measurements of length, and any differences are of course greatly increased when the number of atoms in a given volume is calculated, since that varies as the cube of the linear dimensions. Extracting the cube root of each of the above numbers, we obtain the number of atoms that would lie end to end in the space of $\frac{1}{1000}$th of an inch in length. It also appears desirable to give double weight to the determination by Clerk-Maxwell, since it is founded on the best data. We thus obtain as follows:—

Stoney	12,390	29,275
Thomson	46,160	
Clerk-Maxwell		6,770
Mean		18,022

Calculating from this mean, we may perhaps conclude that the number of atoms in a cubic $\frac{1}{1000}$th of an inch is about 6,000,000,000,000. As will be apparent from the wide difference in the determinations, this result can be looked upon in no other light than a very rough approximation; but still, when we bear in mind that Thomson's result is given as a limit, it must be admitted that the numbers belong sufficiently to one general order of magnitude to justify our looking upon the mean as a tolerably satisfactory ground on which to form some provisional conclusions.

Now, if the gas containing the above-named number of atoms consisted of two volumes of hydrogen to one volume of oxygen, when combined to form vapour of water there would be a condensation of volume from three to two, and on condensing into a liquid a further contraction to $\frac{1}{1234}$th of the bulk of the vapour. Each molecule of water would, however, consist of three atoms of gas, and hence in order to determine the number of molecules of liquid water in $\frac{1}{1000}$th of an inch cube, it is necessary to multiply the number in a gas by $\frac{3}{2} \times 1234 \times \frac{1}{3} = 617$. This gives for the number of molecules of water in $\frac{1}{1000}$th inch cube about 3,700,000,000,000,000. In this and all other cases I give round numbers, since any nearer approximation is impossible.

Though living organisms contain much water, yet far more complex substances enter into their composition. As an example of one of these we may take albumen. According to Lieberkühn its composition is expressed by the formula $C_{72}H_{112}N_{18}SO_{22}$. It therefore contains seventy-one times as many ultimate atoms as water, and its atomic weight is about eighty-two times that of water. In the condition of horn I find that its specific gravity is about 1·31. Calculating from these data, I conclude that when the various constituents combine they contract to $\frac{9}{10}$ths of the total volume, and not, as water, to $\frac{2}{3}$; and that the volume of a single molecule of albumen is about 55·6 that of a molecule of liquid water. If their form be similar, their diameter must therefore be 3·82 times that of a molecule of water. This would lead us to conclude that in a cube of $\frac{1}{1000}$th of an inch of horn there are about 65,000,000,000,000 molecules of albumen.

According, then, to these principles, there would be in the length of $\frac{1}{80000}$th of an inch of about 2000 molecules of water, or 500 of albumen; and hence, in order to see the ultimate constitution of organic bodies, it would be necessary to use a magnifying power of from 500 to 2000 times greater than those we now possess. These, however, for the reasons already given, would be of no use unless the waves of light were some $\frac{1}{2000}$th part of the length they are, and our eyes and instruments correspondingly perfect. It will thus be seen that even with our highest and best powers we are about as far from seeing the ultimate constitution of organic matter as the naked eye is from seeing the smallest objects which they now reveal to us. Nor does there appear to be much hope that we ever shall see the ultimate constituents, since light itself is manifestly of too coarse a nature, even if it were possible to still further develop our optical resources. As matters now stand we are about as far from a knowledge of the ultimate structure of organic bodies as we should be of the contents of a newspaper seen with the naked eye at a distance of a third of a mile, under which circumstances the letters of various sizes would correspond to the smaller and larger ultimate molecules. This being the case, we may feel persuaded that particles of organic matter, like the spores of many living organisms scarcely visible with the highest magnifying powers, and, if seen, quite undistinguishable from one another, might yet differ in an almost infinite number of structural characters, just as any number of different newspapers in various languages or with varying contents would look alike at the distance of a third of a mile.

3. *General Conclusions to be deduced from the above Facts.*

When we come to the application of these principles to the study of living matter, we are immediately led to feel how very little we know respecting some of the most important questions that could occupy our attention—questions which certainly never presented themselves to *me*, until I looked upon them from this point of view, and which perhaps have not occurred to any one before. As illustrations of the subject now under consideration I do not think I can select better than the facts bearing on the size and character of minute germs, and on Darwin's theory of ultimate organized gemmules, as described in Part ii., chapter xxvii., of his work on the variation of animals and plants under domestication. So far as I have been able to learn, he has nowhere given any opinion as to the probable *size* of such gemmules, nor discussed the probability of some of his speculations when examined from a *numerical* point of view, and in connection with the probable size of the *ultimate molecules* of organized matter. I therefore propose to do so; since, though not actually a microscopical question, it is most intimately connected with our studies, and as microscopists I think we have a good claim to investigate objects that are just beyond our magnifying powers.

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* *Philosophical Magazine*, 1868, vol. xxxvi., p. 132.

† *Nature*, March 31, 1870, vol. i., p. 551.

‡ *Ibid.*, August 11, 1873, vol. viii., p. 298.

For the sake of simplicity I will take into consideration only the albuminous constituents of animals, using the term albumen in a sort of generic sense, to include many compounds, which differ in many particulars, and yet have many in common. With slight modifications the same principles would apply in the case of other substances. Whatever be the special variety of this constituent, it is so associated with water in living tissues that in most, if not in all, cases they would cease to live if thoroughly dried. This is exemplified by the case of hair and horn, which must contain much water at the growing end, but are dead where hard and dry. In living tissues much of the water is no doubt present simply as a liquid mechanically mixed with the living particles, but it appears to me that we ought to look upon some portion as being in a state of *molecular combination*. So little attention has been directed to this kind of weak affinity, that its very existence is almost or quite ignored in many large and important chemical works, and yet probably many of the phenomena of life are manifested only by such compounds. Very much light is thrown on this question by the study of the spectra and other optical characters of coloured substances. These clearly prove that when dissolved in any liquid the optical properties of the solution depend in part on the nature of the solvent, and are by no means the same as they would be if minute particles of the solid substance were diffused in the liquid. These facts cannot, I think, be explained unless we conclude that the solvent is to some extent in the state of molecular combination with the substance dissolved. This molecular affinity is also in some cases manifested by a swelling up of a solid substance when placed in some liquids, even when perfect solution occurs to a very limited extent. Such a condition appears to be very characteristic of the living tissues of animals, and makes it sufficiently probable that the ultimate living particles are molecular compounds with water, and not molecules of free dry albuminous substances.

Unfortunately, nothing definite is known respecting this question, and all that can now be done by way of illustration is to make some sort of a probable supposition. Taking everything into consideration, it appears to me that, as a reasonable example, we may assume that living albuminous tissue contains one-half of its volume of water mechanically mixed, and one-fourth its volume of free albumen united molecularly with an equal volume of water. On this supposition the number of molecules in $\frac{1}{10000}$th of an inch cube would be about—

Albumen	17,000,000,000,000
Water in Molecular Combination	923,000,000,000,000
	940,000,000,000,000

Since, however, the form of minute living organisms more nearly approximates to spheres than to cubes, it will be more convenient to give the numbers in a sphere of $\frac{1}{1000}$th of an inch in diameter. For this there would be about as follows:—

Albumen	10,000,000,000,000
Water in Molecular Combination	490,000,000,000,000
	500,000,000,000,000

In the present state of our knowledge it is perhaps impossible to say whether or not the essential characters of living particles are due to the structural arrangement of the molecules of this combined water as well as of those of the albumen, and whether or not in considering the possible variations in structure the total number of molecules should be taken into account. The very small relative amount of dry matter in some living animals does, however, make it very probable that molecularly combined water really plays a part in their structure; and on the whole we may, I think, base our provisional calculations on the total number of molecules given above.

The Theory of Invisible Germs.

The relation between the size of the smallest object that can be seen, and that of the ultimate molecules of living matter, is manifestly a question of great importance in connection with the theory of germs. If the ultimate molecules were much larger than they appear to be, there would be serious objections to the theory; but, as far as we can judge, they are sufficiently small to make it possible for an almost endless variety of germs to exist, each having a distinct structural character, and yet each so small that there is no probability of our ever being able to see them, even as indefinite points. Thus, according to the principles described above, a sphere of organized matter one-tenth of the diameter of the smallest particle that could be clearly defined with our highest powers, might contain a million molecules of albumen and molecularly combined water. Variations in number, chemical character, and arrangement, would in such a case admit of an almost boundless variety of structural characters. The final velocity with which such extremely minute particles would subside in air must be so slow that they could penetrate into almost every place to which the atmosphere has access.

Darwin's Theory of Pangenesis.

Darwin's theory of pangenesis is an attempt to give something like a reasonable explanation of the phenomena of inheritance, and is not necessarily connected with the question of the evolution of new species. A full account of the theory will be found in his work on the variation of animals. At p. 374 of vol. ii., he says that "he assumes that cells before their conversion into completely passive or formed material, throw off minute granules or atoms, which circulate freely throughout the system, and when supplied with proper nutriment multiply by self-division, subsequently becoming developed into cells like those from which they were derived. These granules for the sake of distinctness may be called cell-gemmules, or, as the cellular theory is not fully established, simply gemmules. They are supposed to be transmitted from the parents to their offspring, and are generally developed in the generation which immediately succeeds, but are often transmitted in a dormant state during many generations, and are then developed. Their development is supposed to depend on their union with other partially developed cells or gemmules which precede them in the regular course of growth."

He nowhere gives any opinion as to the actual size of gemmules, or the number present in particular cases, but it appears to me interesting to consider how far the theory will hold good when examined from this more physical point of view.

For the sake of argument, I assume that gemmules on an average contain one million structural molecules of albumen and molecularly combined water. Variations in number, composition, and arrangement would then admit of an almost infinite variety of characters. On this supposition it would require a thousand gemmules to be massed together into a sphere, in order to form a speck just distinctly visible with our highest and best magnifying powers. By calculation I find that a single mammalian spermatozoon might contain so many of such gemmules that, if one were lost, destroyed, or fully developed in each second, they would not be completely exhausted until after the period of one month. Hence, since probably a number are concerned in producing perfect fertilization, we can readily understand why the influence of the male parent may be very marked, even after having been, as regards particular characters, apparently dormant for many years.

In a similar manner I calculate that the germinal vesicle of a mammalian ovum might contain enough gemmules for one to be destroyed, lost, or fully developed in each second, and yet the entire number not be exhausted until after a period of seventeen years, and the entire ovum might contain enough to last at the same rate for no less than 5600 years.

These calculations are made on the supposition that the entire mass is composed of gemmules. Of this there is little probability; but still, even if a considerable portion of the ovum consists of completely formed material and of mere nutritive matter, it might yet contain a sufficient number of gemmules to explain all the facts contemplated by the theory of pangenesis. The presence of any considerable amount of such passive matter in spermatozoa would, however, be a serious difficulty in the way of the theory, unless indeed very many spermatozoa are invariably concerned in producing fertilization.

Taking everything into consideration it does not appear to me that any serious objection can be raised against pangenesis when examined from a purely physical point of view, as far as relates to the inheritance of a very complex variety of characters by the first generation, though there would have been many serious difficulties to contend with if the ultimate atoms of matter had been very much larger than is indicated by the properties of gases.

When we come to apply similar reasonings to the second or following generations, we are compelled, along with Darwin, to conclude that gemmules have the power of producing other gemmules more or less closely resembling themselves, and of being collected together in the sexual elements, since otherwise the number that could be transmitted in a dormant state for several generations would be far too small to meet the requirements of the case.

Conclusion.

In my remarks I have made no endeavour to conceal our present ignorance of many very important questions connected with my subject. Want of the requisite data necessarily imparts a speculative character to many of my conclusions; but perhaps there is no more fruitful source of knowledge than to see and feel how little is accurately known, and how much remains to be learned.

EFFERVESCING PREPARATION OF SODIUM TARTRATE.*

BY HENRY T. HAYHURST, PH.G.

Within a few years past, an effervescing olution of sodium tartrate† has been slowly gaining confidence among physicians as an active cathartic and purge, superior to solution of magnesium citrate, among the people as a cooling beverage and agreeable cathartic, and among pharmacists as an elegant, permanent and profitable preparation. Its superiority over solution of magnesium citrate lies principally in the following qualities: It does not debilitate the bowels and leave them in a weakened condition It does not produce tenesmus, and therefore can be used with much less pain, as a purge, where hemorrhoids are present, than the magnesia solution. It is a permanent solution, and does not precipitate nor become cloudy, after a few days, as the magnesia solution frequently does. It is as palatable and pharmaceutically elegant as the magnesia solution, superior to it in medicinal value, and of much more profit to the pharmacist in manufacturing.

The formula which I have ascertained to give the most stable product and gratifying results is the following, viz.:—

Take of—

Sodium Carbonate	℥i ʒii
Acid Tartaric in crystals . . .	ʒvi
Oil of Lemon	gtt. iii
Simple Syrup	f℥iss
Pure Water	q. s. ft. f℥xii

The operation is as follows: reduce the sodium carbonate to powder, rub the oil of lemon intimately with it, and then add water sufficient to dissolve; to this solution add five drachms of the tartaric acid, and stir occasionally till the acid is dissolved. Filter this solution to remove any impurities which may be present, or any cloudiness resulting from the introduction of the oil of lemon. To this filtrate add the syrup, agitate thoroughly, then add one drachm of tartaric acid (the remaining amount), cork and tie immediately to preserve the carbonic acid gas; finally agitate the contents of the bottle occasionally till the acid is all dissolved, and keep in a cool place cork downwards.

The reasons for using the acid in crystals for producing the tartrate are these: The commercial powdered acid usually contains impurities, and sometimes adulterations, not present in the crystals; to powder them previously to adding to the alkaline solution would be an unnecessary occupation; finally the reaction is performed much slower and more regularly than where the powdered acid is used, an object, I think, greatly to be desired in processes evolving much carbonic acid gas. The last portion of the acid could be added by dissolving it first in the syrup and adding this solution, but in doing this the reaction is severe and instantaneous, so that much gas is often lost, while with the crystals the reaction is moderate, and sufficient time is given for inserting the cork, and for the gas to dissolve in the liquid.

Prepared in this manner, effervescing solution of sodium tartrate is a very agreeable beverage, and can be preserved unimpaired for almost any length of time, samples having been kept through the hot months uninjured.

I have found such a wide difference in samples of sodium carbonate, obtained from different establishments, in regard to purity, efflorescence and amount of water of crystallization, that I have purified and recrystallized this salt, much to my satisfaction, and it will fully repay pharmacists to adopt the following plan:—

Dissolve the large crystals of common sal soda in pure water, allow all the insoluble impurities to subside, filter this solution and evaporate at a moderate heat till a pellicle forms over the surface of the liquid, and set aside for two or three days to crystallize. A small proportion of mother liquor remains, which, if sufficiently pure, may be still further evaporated and crystallized, if desired. These crystals should now be dried on a linen strainer in a moderately warm air-chamber, much care being necessary in this operation, as the crystals effloresce readily in the atmosphere, and too much heat will easily liquefy the salt again. This process yields beautiful, clear, oblique-rhombic, prismatic crystals, which should be preserved in well-stopped jars. It may contain some sodium chloride and sulphate, which, however, if in minute quantity only, do not detract from its medicinal value.

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* From the *American Journal of Pharmacy*, May, 1876.

† See *Amerinca Journal of Pharmacy*, 1873, p. 289.

An effervescing granular salt of sodium tartrate may be formed by heating, on a sand-bath, anhydrous sodium carbonate and pure powdered tartaric acid, in the proportion of three parts of the alkali to four and a quarter of the acid. Care must be taken to do this in a vessel not affected, chemically, by tartaric acid, and to keep the chemicals well stirred and scraped up from the bottom, or they will become yellow and carbonized. This gives an agreeable, slightly acid salt, very soluble in water, which solution effervesces briskly, and forms a convenient and pleasant cathartic and cooling drink. This preparation keeps well and does not attract moisture, as do many effervescing granular salts.

For a cooling drink the solution may be taken in tablespoonful doses hourly, as a mild cathartic one half a bottleful, and for a brisk purge a whole bottleful. The granular salt may be taken in teaspoonful or tablespoonful doses, dissolved in sweetened water.

DOES VERATUM VIRIDE CONTAIN AN ALKALOID OTHER THAN JERVIA ?*

BY CHARLES BULLOCK.

While engaged on some experiments with jervia, the author's attention was directed to the circumstance that the portion of the alkaloid taken up by ether (veratroidia), when dissolved in acetic acid gave a copious precipitate on addition of a solution of nitrate of potassium. This reaction appeared to indicate that the greater part of this product was jervia, which, under some favouring conditions had dissolved in the ether. The author therefore undertook some experiments with a view of investigating the subject, as also to look more carefully for *veratria*, if any existed in the drug.

The result of these experiments, which are fully described in the original paper, are summarized by the author as follows:—

"We find jervia to be the only alkaloid in the root of veratrum viride. The so-called veratroidia is a mixture of jervia with a light-coloured resin; the larger the amount of this resin present, the greater will be the proportion of jervia taken up by ether. In the first experiment we had eight grains dissolving in ether out of thirty; in the second, where the resin was more completely removed by caustic soda, eighty grains yielded but two grains to ether.

"The reaction of the alkaloid with sulphuric acid, hitherto considered to indicate the presence of veratria, is due to a resin which is taken up by ether, and which adheres with great persistence to the alkaloid, dissolving and precipitating with it.

"The interesting question arises, to what are we to attribute the marked difference in the physiological effects shown by experiments made with jervia and "veratroidia?" It must be attributed to the resin—either *per se* or as modifying the effects of jervia. The subject is worthy of further investigation.

"To obtain jervia entirely white, the nitrate is decomposed by digesting it with a solution of caustic soda, washing, redissolving in acetic acid, precipitating by soda, dissolving in hot alcohol, evaporating and crystallizing. It crystallizes in white prismatic crystals resembling sulphate of morphia. These crystals fuse at 380° to 385° F., and are insoluble in ether. From acetic solution caustic alkalies, including ammonia, precipitate jervia completely;—the precipitate is insoluble in an excess of these precipitants."

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* From the *American Journal of Pharmacy*, April, 1876.

THE DETERMINATION OF THE MELTING-POINTS OF BUTTER AND OTHER FATS.*

BY T. REDWOOD, PH.D.

The apparatus in the form best suited for general use consists of a basin, two small beakers and a thermometer. I use an enamelled iron basin, about six inches in diameter and three and a half inches deep. In this I place a beaker four and a half inches deep and three inches in diameter, and within this beaker is placed another much smaller one, supported by its projecting rim on a disc of tin-plate or copper, the outer edge of which rests on the mouth of the larger beaker. Some mercury is put into the smaller beaker to a depth of about an inch, and cold water into the larger beaker so that its surface shall be half an inch or an inch higher than that of the mercury. A small drop of the fat, which has been previously melted and heated to several degrees above its melting point, but has been allowed to cool again to near its setting point, is put on to the surface of the cold mercury. This is best done by means of a thin glass rod, about one-eighth of an inch in diameter, the end of which has been rounded off in the blowpipe flame. It is important that the drop should be very small, and its temperature when placed on the mercury not much above its melting point, for if it be too hot it will spread over the surface of the mercury, which is not desirable. If the rounded end of the rod be slightly dipped into the melted fat and then brought to the surface of the mercury, a small hemispherical particle will attach itself there and speedily congeal, becoming more or less opaque in doing so. The weight of one of these hemispherical masses, which should not be more than the eighth of an inch in diameter, will be from $\frac{1}{50}$ to $\frac{1}{10}$ of a grain. Having placed the drop of fat on to the mercury, the bulb of a thermometer with sufficiently minute graduations is introduced into the mercury, and hot water poured into the basin. The heat is thus communicated to the contents of the small beaker slowly through the water in the larger beaker, and the rise of temperature in the mercury may be easily regulated and should take place at the rate of about one degree per minute. The mercury by virtue of its comparatively good conducting power, acquires a uniform temperature throughout, which is indicated by the thermometer and at the same time communicated to the fat. The fat, when the temperature approaches its melting point, becomes partially transparent, and if the stem or elongated bulb of the thermometer be now brought up against it, the moment fusion takes place the liquid fat will run into the channel formed by the repulsion of the mercury and the outside of the thermometer tube.† This process presents the following advantages:—

1. The heat-conducting power of the mercury, on which the fat is placed, ensures the equalization of the temperature as indicated by the thermometer and at the same time communicated to the fat.

2. The direct contact of the fat with the mercury, without the intervention of a bad conducting medium, such as glass, ensures a more immediate and correct indication of the temperature at which liquefaction takes place than would otherwise occur.

3. The minuteness of the quantity of fat operated upon reduces to a minimum the time occupied in its melting, and thus facilitates the determination with exactness of its melting point.

4. The time occupied in preparing small tubes and charging them with the fat is saved, and several experi-

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* Read before the Society of Public Analysts, at Burlington House, May 3rd, 1876. Reprinted from the *Analyst*.

† Two samples of what I believe to have been genuine fresh butter, tested by this process, after having been purified by solution in ether, gave respectively 80·5° and 81·5° F. as their lowest, and 83·5° and 84·5° as their highest melting points.

ments in succession may be easily and rapidly made with the same apparatus.

In the discussion which followed the reading of this paper, Dr. Dupré inquired whether the author had made any accurate experiments on the influence of previous fusion on the melting point of butter fat, or as to the time which should be allowed to pass between the fusion of the fat and the taking of the melting point, as he, Dr. Dupré, had found the melting point vary as much as 10° F. and even more from the correct point, when taken immediately after a previous fusion.

Mr. Wigner pointed out that the old plan of coating the bulb of the thermometer with the fat to be tested and slowly heating in a water-bath seemed to give results as accurate as any other process. He then made a few remarks on the relation between the temperature at which the specific gravity bubbles rise in melted fats and the actual densities of the fats.

In reply, Dr. Redwood said, he did not attach much importance to the melting point of butter as a characteristic by which to judge of its genuineness or otherwise, but he adopted what he found to be the most convenient and accurate method of making the determination. He did not find that there was any marked difference in the results obtained by his process as compared with those obtained by melting the fat in thin capillary tubes, but there was a material difference as compared with the sinking of glass bulbs by Mr. Angell's method. What he had observed and found it important to pay particular attention to was, that in butter, as well as other fats, such as tallows, there were at least two melting points dependent upon the way in which the fat had been previously subjected to the action of hent, and they may differ in butter, to the extent of 3° or 4° F., the lower melting point being that of the fat after it has been heated to several degrees above its first melting point, and the higher melting point being that of fat which has been previously melted at the lowest possible temperature, and then immediately allowed to congeal.

THE BITTER CONSTITUENTS OF SOLANUM DULCAMARA.*

BY E. GEISSLER.

The author reviews the results obtained by Pfaff and Desfosses, Winckler and Hassell, Biltz and Wittstein, and reproduces the experiments of the latter, together with Kromayer's classification of vegetable bitters. Wittstein extracted from the stalks of *Solanum Dulcamara* a body which he considered to be an alkaloid, $C_{65}H_{50}NO_{29}$, his method being infusion in distilled water; neutralization with marble powder of the liquid thus obtained; evaporation, and treatment with alcohol; precipitation of the liquid obtained on evaporation of this extract and aqueous solution with tannin and ammonia; and treatment of the precipitate with lead oxide and alcohol, whereby the substance in question was dissolved out and finally obtained as a resinous mass. The author operated in much the same way—except that he did not neutralize the aqueous extract with marble—and finally obtained a resinous product, yielding on combustion nearly the same numbers as those obtained by Wittstein; but on repeating the experiments, products were obtained containing less nitrogen; finally it was found that Wittstein's crude product consists of a mixture of two substances separable by ammonia, which precipitates an amorphous mass, whilst the filtrate contains a non-nitrogenous substance, $C_{22}H_{34}O_{10}$, to which the author applies the term dulcamarin. This is isolated by precipitation with lead acetate, and treatment with sulphuretted hydrogen and alcohol; it forms a slightly yellow stable inodorous powder, having a strong bitter taste, with sweet after-taste. It dissolves in 5 parts of hot and in 8·5 parts of cold alcohol, at 90 per cent.; in 30 parts of cold and in 25 of hot water. Its lead compound appears to be $C_{22}H_{32}O_{10}.Pb5H_2O$, of which $2H_2O$ are lost at 160°. It is soluble in acetic ether and acetic acid, but insoluble in ether, chloroform, benzene, carbon disulphide, and petroleum essence; with sulphuric acid it gives a yellowish-red coloration, becoming cherry-red on standing a short time, and afterwards fading; with ammoniacal silver and with gold solutions, reduction ensues; tannin and platinic chloride do not precipitate it. Yeast and emulsin do not split it up; but when heated with sulphuric acid diluted with 10 parts of water it undergoes the reaction—

$$C_{22}H_{34}O_{10}+2H_2O=C_{16}H_{26}O_6+C_6H_{12}O_6,$$

forming glucose and a new body, dulcamaretin. This latter separates as a tarry product, and is purified by solution in alcohol and precipitation by water; finally, it forms a black-brown amorphous resinous body, destitute of odour and taste, insoluble in water, ether, chloroform, carbon disulphide, and amylic alcohol; it forms a lead compound, $C_{16}H_{24}PbO_6$, as a precipitate on adding lead acetate to the alcoholic solution of the substance. The sugar was identified by analysis, and by the barium compound, $C_{12}H_{22}BaO_{12}.H_2O$.

Only 0·38 to 0·40 per cent. of dulcamarin is obtainable from the stalks; this yields 62—64 per cent. of dulcamaretin and 36—38 per cent. of sugar.

The amorphous precipitate thrown down by ammonia resembles solanine in its action with nitric acid and phosphomolybdic acid, but differs from it in being insoluble in amylic alcohol, and in its behaviour with platinic chloride, sulphuric acid, and tannin, and in not forming solanidine and sugar on boiling with hydrochloric acid.

MEMORIAL TO THE COUNCIL.

The following is a copy of the form of the Memorial presented to the Council at its last meeting, and referred to on p. 993:—

"*To the Council of the Pharmaceutical Society of Great Britain.*

"Gentlemen.—We, the undersigned Chemists and Druggists of desire to urge upon your notice the universally acknowledged want of a Trade Association of some sort, and to ask that suggestions as to forming such Association should emanate from you as representatives of the Pharmaceutical Society.

"We do this for the following reasons:—

"1st.—The Pharmaceutical Society is the natural head of the body of chemists and druggists of Great Britain, and we consider it its *duty* to take the foremost place in any movement affecting our welfare as a class.

"2nd.—The Pharmaceutical Society, having local secretaries in all large towns, has a better opportunity of laying the matter before the trade than any self-appointed committee can have; and its staff being in good working order, much time and labour would be thereby saved.

"3rd.—Any trade association—not started by your help and having no connection with the Pharmaceutical Society—cannot but be, in our opinion, highly antagonistic to it, and, moreover, calculated to do it much harm; but if, on the contrary, such association were the result of your efforts, it would tend to greatly increase the prestige of the Society, and go far towards dissipating the very great indifference which is now shown to its efforts—of which indifference Mr. Atkins and others have lately made public mention.

"We desire to express our deep sense of the very arduous honorary work which you have always so willingly undertaken for us, and to add that we do not wish any of the duties of the proposed association to fall upon your shoulders; we merely ask you to do all in your power to form such an association, so that it may rise with the sanction and under the protection of the Pharmaceutical Society.

"Finally, we promise, in the event of your promoting such an association, to become subscribing members of it."

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* *Archiv der Pharm.*; from the *Journal of the Chemical Society.*

The Pharmaceutical Journal.

SATURDAY, JUNE 17, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

SALE OF METHYLATED SPIRIT.

ONE of the most frequently reiterated inquiries that come to us from time to time is in reference to the conditions under which quinine wine can be sold, and in some instances it is evident that the writers are not sufficiently acquainted with the state of the law relative to the sale of this article. It appears also, from a communication just received from the Hull Chemists' Association, that many chemists and druggists throughout the country are in the same position in regard to the sale of methylated spirit. This state of things has been found to prevail to such an extent that the Council of the Hull Association has issued a circular to the members of that body, calling attention to the clauses of the Act of Parliament respecting the sale of methylated spirit, and pointing out the serious penalty incurred by retailers of methylated spirit in the event of their not taking out a licence.

As this is a matter that may not in all cases be sufficiently appreciated it may be useful if we place before our readers the substance of the provisions of the Act of 1861. In the first place it provides that every person who sells methylated spirit must have an excise licence to do so, granted under the authority of the Act, and upon payment of an annual duty of ten shillings; it also provides that every person who sells methylated spirit without such licence shall forfeit the sum of fifty pounds over and above all other penalties to which he may have become liable under any other Act or Acts in force.

There are certain exceptions attached to these provisions but they relate only to persons who have licences in other ways, viz. distillers, rectifiers of spirits, and persons duly authorized or specially licensed to make methylated spirit and these exceptions do not in any way affect retailers of the article. The conditions under which methylated spirit can be sold by such licensed persons are that they shall not sell more than one gallon at a time for the use of one person or keep more than fifty gallons in stock. Licensed dealers are also required to conform to certain excise regulations as to the storage and registration of the spirit and the inspection of their premises by the excise officers.

The subsequent Act of 1866, contains provisions of a still more stringent character in regard to the uses to which methylated spirit may be applied, and these are especially of a nature to call for the careful consideration of chemists and druggists. Thus, for instance, this Act, provides that no person shall use methylated spirit or any derivative thereof in the manufacture or composition or preparation of any article whatsoever, capable of being used either wholly or partially as a beverage or internally as a medicine. The penalty for infringement of the Act in this respect is one hundred pounds, and the forfeiture of the article in which the spirit has been improperly used, together with the vessels or packets containing it.

The General Order of the Board of Inland Revenue issued in August, 1866, states, moreover, that the use of methylated spirit or any derivative thereof in the manufacture or preparation of tinctures, medicated spirits, hyponitrous ether, or other pharmaceutical preparations, or in the manufacture or preparation of any other article or substance capable of being used as a beverage or internally as a medicine, is now illegal, and the sale or possession of such articles by any person is also illegal.

On a previous occasion* we called attention to the risk incurred by the common practice of adding less than the prescribed proportion of gum resin to the methylated spirit sold under the designation of "Finish," and we showed that many persons might be innocently rendered liable to serious penalties by having in their possession spirit that does not conform to the definition of "finish." It is probable that this liability still exists in many instances, and therefore we refer to the article in which it was shown how this deficiency of gum might be detected.

We understand that the excise authorities are now actively engaged upon the inquiry whether methylated spirit and "finish" is being sold or used in contravention of the law, and that being the case we think it desirable to call attention to the matter. We may also add that the Calendar of the Society contains ample extracts from the several Acts relating to methylated spirit.

INCORRECT DISPENSING.

THE *Pall Mall Gazette* of the 12th inst. reports that at the Chesterfield Police Court a chemist and druggist of New Whittington was fined £2 10s. and costs, under the Sale of Food and Drugs Act, for having improperly dispensed a prescription. According to the account given by our contemporary the prescription ordered iodide of potassium, and it is stated that the fine was inflicted for having put into the medicine double the quantity ordered in the prescription.

We have endeavoured to obtain some further information as to this case, but have not as yet succeeded in doing so.

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* See *Pharm. Journ.*, June 24, 1871.

GLYCERINE ASSOCIATED WITH CINCHONA AND SALTS OF IRON.

In a paper read before the Société de Médecine pratique, M. A. Catillon, a pharmacien, has recently urged the advantages of prescribing glycerine for internal administration associated with preparations of cinchona and salts of iron. Irrespective of certain therapeutic advantages he thinks might attend such a mixture he noticed that glycerine prevents the reaction of the cinchona upon the iron and thus does away with the incompatibility of these two useful medicinal agents. This property glycerine possesses to such a degree as to allow of the association of cinchona with iodide of iron. If syrup of iodide of iron be added to cinchona wine a turbidity is produced, and after some days a blackish powder is deposited containing the iron in the state of tannate. If the usual liquids be replaced by glycerine the reaction does not take place and the two incompatibles remain mixed without the limpidity or the proper colour of the cinchona being altered.

Another advantage urged by M. Catillon, in favour of the use of glycerine in cinchona preparations is that its solvent action in respect to cinchona is equal to that of alcohol, permitting it to take up all the active principles. Thus it dissolves entirely the alcoholic extract which contains them all and also the complex substance known as cinchona resin which contains a notable proportion of them. According to Souberian this resin includes, in combination with the derivatives of cinchotannic acid, known altogether as insoluble cinchona red, a proportion of alkaloids sufficient to represent one-fourth of its weight of sulphate of quinine.

MR. SIMON'S SUCCESSOR.

In answer to a question put in the House of Commons, Mr. Sclater-Booth has announced that Dr. Seaton has been appointed Medical Officer to the Local Government Board. It was also stated that it is not intended to fill up the post of Medical Officer to the Privy Council, which has also become vacant by the resignation of Mr. Simon. Any advice which the Privy Council may require upon medical questions will be obtained from the Medical Department of the Local Government Board.

ETHER TIPPLING IN IRELAND.

Attention has again been called in the Registrar General's returns to the prevalence of ether tippling in some parts of Ireland. A registrar in the north-east of Ireland this year reports that ether is used as a stimulant to a very injurious extent in localities adjoining the Maghera district, and that it is sold in large quantities in all the cabin grocery establishments scattered through that part of the country.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting of the above Association will be held at 17, Bloomsbury Square, on Friday evening, June 23rd, when a paper will be read by Mr. E. Richardson, on "The Production of Anilin and its Derivatives."

Proceedings of Scientific Societies.

PARIS SOCIÉTÉ DE PHARMACIE.

A meeting of this Society was held on Wednesday May 3, under the presidency of M. Coulier.

Alkaloid from the Walnut.

M. Tanret presented a note upon "juglandine," a new alkaloid obtained from the leaves of the walnut. M. Tanret exhausts the dry leaves with alcohol, precipitates with ammoniacal acetate of lead, acidulates and distils. Ammonia in excess is added to the residue, and it is then shaken with chloroform. After purification the alkaloid is obtained in long crystalline needles, which blacken and alter rapidly in the air. M. Tanret hopes to obtain a larger proportion of this alkaloid by operating upon fresh leaves of the walnut.

A paper, of which the following is an abstract, was read on—

A Method of Producing Crystals of Sulphide of Mercury by the Wet Way.

BY C. MEHU.

Sulphide of mercury is not dissolved by strong solution of caustic soda even when boiling, but the least addition of sulphur or an alkaline sulphide renders the ley capable of dissolving a sensible proportion of the sulphide of mercury. Neither is it dissolved by boiling concentrated solution of monosulphide of sodium, free caustic alkali being necessary for its solution in alkaline sulphides. But the mercuric sulphide is not soluble in boiling concentrated solution of neutral sulphite or hyposulphite of soda either with or without excess of caustic soda.

The proportions of alkaline monosulphide and caustic soda capable of dissolving the greatest quantity of mercuric sulphide are one equivalent of each of the former two to one half equivalent of the latter; or—

Crystallized Monosulphide of Sodium . .	2 parts
Soapmaker's Ley (sp. gr. 1·33) . . .	2 „
Powdered Sulphide of Mercury (red or black)	1 „

These proportions give an orange coloured solution, that passes freely through filtering paper. Diluted with water this liquor deposits black amorphous sulphide of mercury; this, however, can be prevented by the employment of sufficient caustic soda or potash. A solution of a mineral or organic acid, or sulphydric acid, added to the liquor also causes an immediate deposit of black amorphous mercuric sulphide. The mineral and organic acids saturate the free alkali and break up the alkaline sulphide. Sulphydric acid coverts the free alkali into alkaline sulphide, and the mercuric sulphide is deposited in the absence of the free alkali necessary to keep it in solution. Alkaline bicarbonates act in the same way as free carbonic acid.

To obtain crystals of sulphide of mercury, the author leaves the mercurial sulpho-alkaline liquor exposed to the air in a vessel simply covered with filtering paper. The carbonic acid of the atmosphere slowly saturates the caustic alkali and sets free sulphuretted hydrogen from the alkaline sulphide. Large colourless and often perfectly formed crystals are formed, that float in the liquor and may be easily recognized as crystallized carbonate of soda. When dried over sulphuric acid these crystals retain alkaline sulphide and about 5 per cent. of sulphide of mercury. After exposure to the air several months they turn brown in proportion as the mercuric sulphide separates in red or brown or sometimes greyish crystals, which are larger and more regular in form in proportion as the original crystals are slowly formed and voluminous. The crystalline crust that forms on the surface of the liquor need not be removed, as it retards the absorption by the liquor of carbonic acid from the atmophere. The presence of polysulphide in the alkaline monosulphide should be avoided, as it gives rise to greyish crystals of mercuric sulphide that are not so transparent or well formed.

The crystals of sulphide of mercury obtained by the wet way possess the chemical properties of precipitated sulphur and of sublimed cinnabar. Seen under the microscope they have the general form of the hexagonal prism. Many of them are opaque or nearly so, others have a hyacinth red colour equal to that of antimony glass seen by transmitted light. These artificial crystals have therefore the known form of small crystals of cinnabar sometimes met with in nature. At present the author is not aware whether they possess the rotatory power noticed by Des Cloizeaux in the natural crystals.

The occasional formation on the surface of the liquor, during the slow crystallization, of a thin nearly transparent layer, having a magnificent green colour, the author attributes, for reasons given, to the presence of iron in the sodium sulphide used.

SOCIETY OF ARTS.

The Cultivation of Caoutchouc-yielding Trees in British India.*

BY CLEMENTS R. MARKHAM, C.B., F.R.S.

The necessity for cultivating any vegetable product, for which there is a great and increasing demand, is sufficiently obvious in itself, and has been proved in several instances. When such a demand arises, permanent reliance cannot be placed on the supplies to be obtained from trees growing in a wild state. Under such circumstances there is reckless destruction without an attempt at reproduction and, literally, the supply becomes more precarious exactly in proportion as the demand increases.

The conversion of such products from a wild to a cultivated state is, therefore, one of the most important operations in connection with the advancement of commerce.

One such operation, which was undertaken just seventeen years ago this very day, has been completely successful. On the 5th of April, 1859, I submitted my scheme for the collection of plants and seeds of the various species of the febrifuge chinchona plants in South America, and their introduction into India. At that time chinchona plants were uncultivated, the bark was collected in the South American forests, and the trees were rapidly disappearing over wide areas, owing to reckless felling. Now there are extensive chinchona plantations, yielding larger percentages of febrifuge alkaloids than the trees ever did in their wild state, and extending over the Nilgiri hills, the lower slopes of the Sikkim Himalaya, and the higher ridges of Ceylon. From these plantations, some belonging to Government, others to private companies, about 140,000 lbs. of bark are annually imported into this country, and the yield is rapidly increasing. The results of the measure are very satisfactory. The permanent supply of an indispensable medicine has been secured, it has been brought within the reach of millions who formerly could never procure it, thousands of lives will be saved, and the material wealth of India and Ceylon will be increased by the addition of a valuable product to their list of exports.

I had the honour of reading a paper before the Society of Arts, on the subject of chinchona cultivation in India, on the 25th of March, 1863, at a time when the undertaking had just been fairly launched. Now we see it crowned with complete success; and we may derive, from the excellent results of the enterprise undertaken to convert the chinchona trees from a wild to a cultivated state, the conclusions that, under like circumstances, the necessity for a similar measure will exist, and that, by benefiting from former experience, equally successful results may be secured.

There is another vegetable product which is in the same position as the chinchona bark; the demand rapidly increasing, while the only source of supply is from trees growing wild in the forests. In 1870, I came to the conclusion that it was necessary to do for the india-rubber or caoutchouc-yielding tree, what had already been done, with such happy results, for the chinchona trees. The area of yield of caoutchouc is far more extensive than that of febrifuge bark. While the trees yielding quinine and the febrifuge alkaloids only grow wild on the slopes of the Andes, and all belong to one genus, the caoutchouc-yielding trees are of several genera, and are found in the forests of India, the Eastern Archipelago, Africa, Madagascar, Mexico, and Nicaragua, as well as in South America. But the same danger threatens the one product as had threatened the other. Owing to the enormous demand for caoutchouc, the most reckless felling is now going on in all the tropical forests which yield this valuable product. The time has come when plantations must be formed of caoutchouc-yielding trees, in order to prevent their eventual destruction, and to provide for a permanent supply.

The increase in the demand for india-rubber is very remarkable, and the enormous number of uses to which this product is now put renders the consideration of measures for its cultivation, and for securing the permanency of an adequate supply, a question of great moment. In 1830 only 464 cwts. of india-rubber were imported into this country. In 1840 the quantity had increased to 6640 cwts.; and in 1846 the duty on india-rubber of 1*s.* per cwt. was repealed. In 1857 the quantity had further increased to 22,000 cwts.; and in 1874 there were 129,163 cwts. imported into this country, worth £1,326,605. Caoutchouc is now used for an infinite number of purposes. Wherever steam-power is employed, either on shore or afloat, it is impossible to do without india-rubber. It is required as packing for the piston-rods and glands of the engines, valves for the pumps, washers for making joints, belting for driving the shafting, hose and tubing for conveying steam and water, buffer springs for railway carriages, and many other such purposes too numerous to mention. When it is considered that every steam vessel afloat, every railway train, and every factory on shore employing steam power, must of necessity use india-rubber, it is hardly possible to overrate the importance of securing a permanent supply, in connection with the industry of the world.

For purposes connected with telegraphy this product is also now extensively used. It is employed as the insulating material for submarine, subterranean, and aerial cables. In the hard form of ebonite it is employed for insulators to carry the iron wire along the posts, as well as for battery cells, for the electro-magnetic coils, and in many parts of telegraphic instruments in place of the more expensive article, ivory. India-rubber is also used for waterproof clothing, carriage aprons, fishing stockings, diving dresses, water and air beds and cushions, door mats, ground sheets in camping out, and tubing. India-rubber elastic thread is largely used in the form of webbing, by the Leicester, Derby, and Nottingham manufacturers. India-rubber is necessary, too, for life-saving apparatus, for surgical instruments and appliances, and for hose, gas-tubing, and innumerable domestic purposes, including door-springs, and, just now, a great many rings for the rinking skates. Ebonite—which is the form of india-rubber vulcanized hard by the addition of extra sulphur, so that it can be turned in a lathe and made into articles of any form or shape—is used very extensively for combs, photographic baths and trays, syringes, taps and tubing for aquaria, and in chemical works.

Such being the infinity of purposes which give rise to the demand, it will easily be understood how bravely the work of destruction is being carried on. In British India there is an indigenous caoutchouc-yielding tree, which should be brought under cultivation on the spot. But there are other kinds in other parts of the world, and it became necessary, in the first place, to ascertain whether they are superior to the caoutchouc in British India; for, if so, their introduction would needs be an essential part of any scheme for initiating the cultivation.

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* Paper read before the Chemical Section of the Society of Arts. Reprinted from the Journal of the Society.

The caoutchouc yielding trees grow in a zone on each side of the equator, encircling the globe, but by far the richest and best source of supply is in South America. It was M. de la Condamine, the leader of the expedition to measure an arc of the meridian near Quito, who first gave an accurate description of caoutchouc, and of the tree from which it is procured. The tree is the *Siphonia* or *Hevea*, which grows in all parts of the basin of the Amazon, and yields the Brazilian caoutchouc. This is the best and most abundant and is known as Pará india-rubber. The *Hevea* is a euphorbiaceous tree.

On the western side of the equatorial region of South America, in Ecuador and Columbia, on the isthmus of Panama, Central America, and Mexico, the india-rubber tree belongs to the *Castilloa* genus, so named after Don Juan del Castello, a Spanish botanist, who died in Mexico in 1793. The native name of the tree in Mexico is *ule*. The *Castilloas* belong to the family of *Artocarpaceæ*, of which the bread fruit and jack tree, and the *angelli* of India are members. It is worthy of note that the *Artocarpaceæ* are closely allied to the *Moraceæ*, the fig tribe, to which the caoutchouc trees of India belong. The *Heveas* and *Castilloas* are the india-rubber trees of the New World.

In India the *Ficus elastica*, a tree so named by Dr. Roxburgh, in 1810, which yields caoutchouc, is found in the forests which border the valley of the Brahmaputra, in the province of Assam. The family of *Apocynaceæ* includes the other caoutchouc-yielding trees of Asia and the eastern islands—the *Charannesia* of British Burma, the *Urceola* of Borneo, and the *Vahea* of Madagascar, as well as the *Landolphias*, which produce the caoutchouc of Africa.

In commencing caoutchouc cultivation in India, it was in the first place necessary to take stock of all existing knowledge on the subject, and in the second place to ascertain whether any of the other kinds were intrinsically superior to the *Ficus elastica*, because if this proved to be the case, their cultivation in India would also be desirable.

With these objects in view, the duty of making the necessary researches and investigations were entrusted to Mr. J. Collins, formerly curator of the Museum of the Pharmaceutical Society, who drew up a very able and exhaustive report on the subject in 1872. The conclusions then arrived at were that the establishment of plantations of *Ficus elastica* should at once be undertaken in Assam; but that the caoutchouc from the *Heveas* and *Castilloas* of South America was superior to that of the *Ficus*, and that consequently those trees, as well as the *Vahea* of Madagascar, should be introduced into British India.

The first step, therefore, was to commence the cultivation of the native Indian caoutchouc tree, which is found in the forests along the northern and eastern boundaries of Assam, as well as in the low valleys of the Naga and Jynteah hills to the south. The *Ficus elastica*, like the banyan and other trees of the same genus, has aerial roots, and is of an epiphytical habit. When wild in the forests it often commences its growth in the fork of another tree, which it eventually overshadows and destroys. It grows to a great size, and one tree planted at Tezpur in Assam, 32 years ago, is 112 feet high, the diameter of the crown measures 140 feet, the circumference of the central mass of aerial roots surrounding the stem is 70 feet, and it has over a hundred aerial roots, the largest of which measures six feet in girth. The forests containing *Ficus elastica* are excessively moist in the rainy season, and they remain moist all through the dry season with a temperature of about 98° in the shade. The trees thrive best under conditions of excessive moisture and great heat, but with good drainage.

Hitherto the caoutchouc has been collected in Assam by men of the wild tribes, who cut every part of the tree they can get at, and allow the milk to flow into holes made in the ground. The collectors are encouraged to obtain the largest possible quantity during the shortest possible time, without any regard to future supplies. This has led to the most outrageous wholesale destruction of these valuable trees, by felling them so as to render the operation of tapping more convenient. Messrs. Martin and Richie, who had a lease of the caoutchouc yield at Tezpur, are said to have given it up before their time expired, because the supply had diminished so much that their business was no longer remunerative.

So that no improvement of the yield can be expected from private enterprise, except at the risk of exhausting the remaining sources of supply; and it is consequently necessary to place the collection of caoutchouc in Assam under the control of public officers who have an interest in the protection and improvement of the forests; and to commence the formation of plantations of *Ficus elastica* on a large scale, and in accordance with a well considered plan. Dr. Brandis, Inspector-General of Forests in India, strongly urged the necessity of these measures in 1872; and good progress has since been made, under the superintendence of Mr. Gustav Mann, the Conservator of Forests in Assam.

The first attempts, which were started in July, 1873, in the Darjiling Terai, and in the Goalpara district of Assam, were failures, but in July, 1874, Mr. Gustav Mann took charge of the experiment with very satisfactory results. Two plantations were formed, one on the right bank of the river Kulsi, in the Kamrúp district of Assam, which is eventually to consist of 100 acres; and the other at Charduar, at the foot of the Himalaya, eighteen miles north of Tezpur, in the Durrung district of Assam, which now covers 180, and is eventually to cover 400 acres. In 1875 there were 1790 live cuttings at the Kulsi, and 16,401 at the Charduar plantation. The first attempt failed owing to the seedlings and cuttings having been placed under shade, where the drip of the trees caused excessive wet about the roots. No artificial shade is now given, and the young trees are healthy and vigorous. Experiments are in course of trial, to plant the *Ficus elastica* in strongly made baskets placed in the forks of trees, and on grass lands, as well as in the regularly prepared beds. The trees may be tapped at the age of 25 years. After 50 years they will yield 40 lbs. of caoutchouc every third year, worth £3 4*s.* At present the quantity of caoutchouc annually exported from India is 16,000 cwts., valued at about £110,000, or £6 14*s.* 9*d.* per cwt. Of this quantity 12,000 cwt. goes to England and the rest to the United States.* Besides extending the cultivation of the trees, the officers in charge of the plantations will carefully investigate all such questions as the most favourable time of the year for tapping, and the best methods of collecting and preparing the caoutchouc. The experimental cultivation of *Ficus elastica* has thus been satisfactorily commenced in India, and, under the able superintendence of Mr. Gustav Mann, there can be no doubt of its success.

Another caoutchouc-yielding plant belonging to the *Apocynaceæ*, has recently been discovered in British Burma, and reported upon by Mr. Strettell of the Forest Department. It is the *Charannesia esculenta*, one of those creepers which it has hitherto been the object of foresters to extirpate, as injuring the growth of the teak trees. Some of these creepers, growing near Rangoon, have a girth of 18 inches round the stem,

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* Caoutchouc exported from British India during the last six years:—

1870— 6,584	cwts.,	valued at	
1871— 9,006	,,	,,	
1872—15,638	,,	,,	
1873—21,571	,,	,,	
1874—16,837	,,	,,	£117,775
1875—15,893	,,	,,	£108,618

while the crown covers an area of 200 square feet, at a supposed age of five years. It may be propagated either from seeds or cuttings; and instructions for its cultivation have recently been published in the *Indian Agriculturist.* The estimated result of cultivating trees, thirty feet apart over an area of 400 acres, or in all 19,200 creepers, is that there will be an annual yield of 19,200 *viss*,* which, at 200 Rs. per 100 *viss*, will give 38,400 Rs. a year. After the first year, the cost of cultivation will be very slight, and the profits will begin to come in after seven years.

As regards the cultivation of indigenous kinds of caoutchouc-yielding trees in British India, it will thus be seen that the initiatory steps have already been taken. The second, and not the least important part of the undertaking, is the introduction of plants yielding a better kind of caoutchouc from other parts of the world, but especially from South America.

The most valuable trees, and those which now yield by far the largest quantity of india-rubber, are the *Heveas* of the Amazon valley, called Pará, from the port of shipment. We learn from Keller, that, during the last few years, both the quantity and the value of india-rubber exported from Pará has been steadily increasing. In 1874, England received 56,580 cwts. of Brazilian caoutchouc, worth £720,000; the average price being 2*s.* 10*d.* to 3*s.* a lb. Next to the Pará rubber in value and yield, comes that obtained from the *Castilloa* trees, which grow over a much wider area of South and Central America. The quantity of *ule*, or *Castilloa* caoutchouc, imported into England in 1874, was 24,286 cwts., worth £287,413, at 2*s.* a lb. Thus out of the whole import of 129,163 cwts. 70,866 come from South America.

The remaining 38,755 cwts. is divided among British India, Borneo (1*s.* 9*d.* a lb.), Africa (1*s.* 5*d.* a lb.), and Madagascar (2*s.* 3*d.* a lb.)† But the South American source of supply is, beyond comparison, the most important, and the cultivation of *Castilloa* and *Hevea* trees into India is a most important part of the undertaking.

Several reasons led me to the decision that a collection of the *Castilloa* seeds should first be obtained. As the *Castilloas* grow over a much more extensive area than the *Hereas*, where there is a greater variety of soil and climate, it is more certain that suitable sites for their cultivation will readily be found in India and Burma. They belong, too, to the *Artocarpaceæ*, which are so well represented in India, especially on the Malabar and Travancore coasts, by the jack trees and the *angelli*, of which wood all the canoes are built.

The *Castilloa* trees flourish in all the equatorial forests on the west coast of South America, and in 1873 the quantity of india-rubber exported from Guayaquil was 10,690 cwts., worth £42,760. The trees also abound all over the Isthmus of Darien, where they are being destroyed most recklessly, in Central America, and in the southern states of Mexico. In Ecuador the india-rubber is called *heve*, in Mexico and Central America the Aztec word, *ule*, is used.

The trees, which are the giants of equatorial American forests, belong to two species, the *Castilloa elastica*, and that which Mr. Collins has named *C. Markhamiana.* They thrive in dense, steaming, and warm forests, and are particularly abundant in the valley of the San Juan de Nicaragua, where it rains for nine months in the year. In Nicaragua the yield is said, by Mr. Collins, to be about 10,000 cwts., giving employment to 600 *huleros*, or collectors. From Carthagena, Guayaquil, Panama, and Vera Cruz are exported supplies of *ule* india-rubber, the greater part of which goes to the United States; but it has been seen that as many as 24,286 cwts. arrive in this country.

The collection of *Castilloa* plants for introduction into India was a very difficult service, for the trees grow in wild and unhealthy forests, with no means of transit, and no facilities of any kind. In Mr. Robert Cross we have a man who has all the requisite qualifications for undertaking it. He is an excellent gardener, possessed of great energy and determination, combined with great judgment, is well acquainted with the language, and has had great experience in South American travelling. I first employed him in 1859, to assist Mr. Spruce in the collection of chinchona plants of the red-bark species in the forests of Ecuador. In 1862, I again employed him to go to Ecuador, and he made an invaluable collection of crown-bark chinchona plants in the forests of Loxa. I have since twice engaged his services to obtain plants of the chinchona species in the forests of New Granada, in which he succeeded, after encountering most formidable difficulties. In conveying the plants in a healthy state from their almost inaccessible native forests to this country, he has invariably been successful. No better man could have been found to execute the difficult task of obtaining a supply of *Castilloa* plants, and conveying them in a healthy state from their native forests to the gardens at Kew.

Mr. Robert Cross left England on the 2nd of May, 1875, and reached Panama on the 26th of the same month, my instructions to him being to endeavour to make the collection on the isthmus. He found that great destruction was going on among the *ule* trees in all parts of the Darien isthmus, as the native collectors cut down the trees in order to tap them more easily, as is the case in the Assam forests. After collecting all the information that could be procured in Panama, Mr. Cross determined to select the forests on the banks of one of the large tributaries of the river Chagres as the base of his operations.

He ascended the Chagres river in a canoe, and then made a journey on foot through the dense forest into the heart of the *ule* district. He found the *Castilloa* saplings growing on the banks of streams, with their roots often running down to the edge of the water. They abound in rich soil along the base of the hills, and are also met with on the summits of ridges; everywhere, except in swampy ground. The trees, which proved to be of the species named by Mr. Collins *Castilloa Markhamiana*, are from 160 to 180 feet high, with a diameter of five feet and a yield of 100 lbs. of india-rubber, The wood is spongy and soft, and decays rapidly when bruised or injured. Many of the leaves measure 14 inches in length, and 7 inches in breadth. The temperature of the forests ranges from 75° to 88° Fahr., and they are excessively damp. The range of the *Castilloas* is so wide that, in some places, the trees must flourish in climates which at one time of the year are dry. It is probable, however, that the species with the best and largest yield of caoutchouc flourish best in a hot and very damp and steaming atmosphere, like that of the forests of the isthmus.

Mr. Cross collected six hundred plants, and also drew a quantity of milk in order to prepare a specimen of the rubber. The sample he brought home has been examined and reported upon, and it is pronounced to have much less impurity than is usual for this kind of rubber, and thus proved Mr. Cross's plants to be of the best species. He left the isthmus with the plants on the 6th of September, 1875, on board the mail steamer 'Shannon,' but on the morning of the 8th, when going thirteen knots an hour, the vessel ran on the Pedro reef of rocks, off the coast of Jamaica, and her bows were immovably fixed upon them, while the stern continued to bump heavily for many hours. The rest of the passengers left the ship in boats, but Mr. Cross stuck manfully by his plants and was eventually taken on board H.M.S. 'Dryad.' He came home in the mail steamer 'Nile,' reaching Southampton on the 2nd of October. Considering all the extraordinary difficulties of the undertaking, it reflects great credit on Mr. Cross that he should, for a

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* A *viss* is about $3\frac{1}{2}$ lbs.

† Imports of caoutchouc into England, in 1874, from

South America	70,866 cwts.
India	9,341 ,,
Borneo, etc.	7,101 ,,
Africa	6,380 ,,
Madagascar	5,984 ,,

fifth time, have been completely successful, and thus have performed an important public service with ability and success. There are now one hundred and thirty-four of Mr. Cross's *Castilloa* plants in a most flourishing condition at Kew Gardens, and in the course of the spring a good supply of *Castilloas* will be forwarded to India, where they will form the nucleus of a series of extensive plantations.

Thus the introduction of one out of the two valuable South America species has been provided for.

It remains to take measures for obtaining plants of the most valuable kind of all, from the valley of the Amazon—the *Hevea* yielding the famous Pará india-rubber of commerce.

(*To be continued.*)

Parliamentary and Law Proceedings.

POISONED BY A WRONG MEDICINE.

On Thursday, the 1st inst., an inquest was held at Stalybridge, on the body of Harriett Hall, two years and three months old, who had died under the following circumstances :—

Mr. Eli Crossley Sutcliffe, deposed that he was a surgeon practising in Stalybridge. The previous Saturday night he was called in to see the deceased, and found her suffering from bronchitis and whooping cough. He prescribed some medicine for her, which was fetched from his surgery on Saturday evening. On Monday morning some more medicine was sent for, but he omitted to make it up. In the afternoon, between two and three o'clock, a little girl came and asked him for what he thought was "Noll's" medicine. There was then a bottle of medicine on the table made up for Mrs. Noll. It contained four drachms of laudanum, but no other poisonous substance. He thought this was the bottle asked for by the girl, and gave it to her and she took it away. About a quarter to six o'clock the same evening the mother of the deceased came to his surgery and said, "Have you not sent the wrong medicine to Hall's ?" He replied that he had made no medicine up for Hall. She then showed him the bottle here produced, and he at once saw a mistake had occurred. He went at once to see the child, and found her suffering from the effects of laudanum. He told the mother to keep the child awake with strong coffee, and to take her into the open air.—The Coroner : Did you apprehend any danger ? Witness : Yes, I thought the child was in a very serious state. They called on me in the evening to tell me how the child was. I sent some medicine. I saw her again the next morning. I thought she was better. The immediate effects of the laudanum appeared to have gone off, but she was very weak. That was at about eleven o'clock. I saw her again at about half-past seven in the evening. She was then suffering from convulsions, and was beyond hope of recovery. The next morning I heard that she was dead. —The Coroner : What quantity of laudanum would there be in two teaspoonfuls of the wrong medicine ? Witness : About ten drops. The proper dose for the patient for whom it was intended would be a tablespoonful, which would contain about twenty drops of laudanum. —The Coroner : And ten drops of laudanum would be sufficient to cause the death of any child of the deceased's age ?—Witness : Yes; she died from the effects of the laudanum, consequent on the condition of her health before. One unfortunate thing was that the child only ought to have had one teaspoonful of medicine supposing the right sort had been given to her.—The Coroner : There are no directions on the bottle. Witness : Only, "Mixture as before." I had given a bottle of medicine to them for the child, with directions that one spoonful should be given. —A Juror : Would the laudanum have injured a child in its usual health ? Witness : Yes.—Another Juror : If they had given only a teaspoonful to the child would that have been sufficient to cause death ? Witness : It might not have.

In reply to the coroner, Mrs. Bentley said, the reason she gave the child two teaspoonfuls of the wrong medicine was that prior to Mr. Sutcliffe sending them medicine Dr. Hopwood had prescribed some and ordered two teaspoonfuls. It was that bottle she found when she was in a difficulty as to how much to give the child, when Mr. Sutcliffe's bottle said "The same as before."

The jury thought that a satisfactory explanation under the circumstances, and they returned a verdict of "Accidentally poisoned by an overdose of laudanum administered by mistake."—*Stalybridge Standard.*

POISONING BY CARBOLIC ACID.

The *Liverpool Post* says that on Sunday morning Mr. Thomas Stead, fifty-seven years of age, managing director of the Liver Akali Works (Limited), Lightbody Street, was accidentally poisoned. He had been from home for about three weeks for the benefit of his health, and he returned on Saturday evening. During his absence a bottle of carbolic acid had been purchased for cleansing purposes, and it was placed on the mantelpiece in Mr. Stead's bedroom. He had been taking a mixture for a cough, and by mistake his wife gave him some of the carbolic acid. Dr. Pritchard and another medical gentleman were at once called in, but their efforts were of no avail. Mr. Stead died in about ten minutes after the arrival of the doctors, and in less than an hour after he had taken the poison.

At the inquest held on Tuesday evidence to the above effect was given ; also that Mrs. Stead's mental condition had for some time been very weak, but that recently she had been considered better. She, however, could give no orders nor superintend any matters connected with the house, in which she took no interest. At present she could not realize the exact state of affairs, and was quite unfit to give evidence in reference to the matter. There was not the slightest reason to suppose that Mrs. Stead had given her husband the poison wilfully ; she was in the habit occasionally of giving him his medicine.

There was no doubt that it was a case of pure misadventure, and that neither the deceased nor his wife were aware of the existence of the carbolic acid which was administered in mistake for his medicine. A verdict of "Accidental death" was accordingly recorded.

Reviews.

A MANUAL OF QUALITATIVE CHEMICAL ANALYSIS. By WILLIAM DITTMAR, Professor of Chemistry in Anderson's University, Glasgow. Edinburgh : Edmonston and Douglas. 1876.

We may at once say that we have perused this book with great pleasure. The interest which the author knows so well how to excite grows as one turns from page to page, and we were in no small degree amazed to find how much useful and for the most part very precise information he has been able to accumulate on so limited a number of pages. The reader is assisted very materially by the clear and precise manner in which the numerous analytical facts and methods are set before him. The resources of the printer have been freely drawn upon, and the type is sufficiently varied to make clear what should be looked upon as matter of importance, and what not, without offending or fatiguing the eye. The author has allowed himself to be betrayed into certain innovations of diction which jar upon the ear, such as, "in the heat," "in the cold," an experiment *au blanc*, etc. Or when he speaks of a solution containing "potentially" such or such metals, but consisting "substantially of a complex of metals," or on p. 20, "that whenever, the quantity of" R'A potentially present (call it (1+n) Q) exceeds the quantity Q, which supposing to be actually formed, would bring the liquid into the condition of a solution, saturated with R'A, a part of the excess in Q will, in general, separate out." We fear that the analytical student of average stupidity—to use the phraseology of a certain Science Directory— will have a right to complain that he is taken at too great a disadvantage.

It would not be fair to quarrel with our author about his making free with chemical terminology. In these days when innovations in formulæ are played with as if fanciful graphic representations could make up for more substantial triumphs, our able author should certainly be allowed also to have his "little fling." The student must, however, be puzzled to know why a certain substance should be called prussic acid, hydrocyanic acid, and cyanhydric acid. If he were engaged in geological studies he might possibly think that the various terms implied different chemical strata or formations. He will be equally puzzled when he turns, for instance, to the reactions for phosphorus and its compounds. He will there find one kind of formula used when an inorganic phosphorus compound has to be represented symbolically, and another when organic phosphites and phosphates of methyl, ethyl, etc., have to be expressed; thus :—

$$\begin{array}{ll}
\mathrm{(POH)\ (OH)_2} & \mathrm{PO\ OH_3} \\
\mathrm{(POR')\ (OH)_2} & \mathrm{PO\ (OR')\ (OH)_2} \\
\mathrm{(POR')\ (OR')\ OH} & \mathrm{PO\ (OR')_2\ OH}
\end{array}$$

whilst, when he turns to the corresponding mineral compounds, he meets with the formulæ :—

$$\begin{array}{l}
\mathrm{P_2O_5,\ 3H_2O = 2PH_3O_4}\text{(Orthophosphoric Acid)} \\
\mathrm{P_2O_5,\ 2H_2O = P_2O_7H_4}\text{(pyrophosphoric ,,) and} \\
\mathrm{P_2O_5,\ H_2O = 2PO_3H}\text{ (metaphosphoric ,,)}
\end{array}$$

Where remains the author's "hydrogen salt of an acid," in the first series of the formulæ, and what becomes of his salt "residue" PO_4, or rather $\frac{1}{3}PO_4$ in $POHO_3$? We can imagine that the student will also be considerably perplexed on meeting with such formulæ as $C_3H_5Ca\frac{1}{2}O_3 + \frac{5}{2}H_2O$ for calcium lactate, or $C_6H_5Ba\frac{3}{2}O_7 + \frac{7}{4}H_2O$ for barium citrate, having been taught, as no doubt he would, that an atom is the smallest quantity of matter which can enter into, or exist, in a state of chemical combination; and why, we would ask, is the formula for magnesium formate written $(CHO_2)_2Mg$, and not $CHMg\frac{1}{2}O_2$? If a variety of formulæ has deliberately been adopted, then we can only suspect that the author has considerably added to the labours of the teacher, who is told in the preface that "this book is intended for the use of students, who, after they have mastered the first rudiments of chemistry, enter a laboratory to work *under the direction of a teacher*, while at the same time they *continue their study of theoretical chemistry*."

The task of mastering qualitative analysis is already formidable enough not to be still further encumbered by perplexing theoretical considerations.

The main question, viz., how to further a student's endeavours to master the multitude of analytical facts, appears to us capable of being solved rather by enabling him to choose as speedily as possible from among the many reactions for one and the same body, those which are substantially the best, and not at first to insist upon a knowledge of all those which are "potentially" applicable. A good broad outline sketch may be preferable to a finished picture, as the lights and shades can always be filled in.

The chemical changes involved in qualitative analysis are so few—four or at the utmost five—that the task of mastering them might well appear at first sight to be among the easiest imaginable.

The greater number of chemical reactions result from a change by double decomposition, and their value depends upon the more or less perfect insolubility of the new body (the precipitate) produced. We are pleased to notice that the author treats of the solubility of precipitates for the most part in a very exhaustive manner. Once let the analyst grasp this broad distinction between precipitates and precipitates, and the influence which different solvents exert upon them, and he will speedily be able to devise his own methods, if need should arise, and will have learned to work existing methods all the more intelligently.

There remains one blemish which we should not do our duty as reviewer if we were not to notice. In his anxiety to simplify as much as possible the intricacies of chemical analysis, the author has been betrayed into the besetting sin of many writers on analytical chemistry, viz., to smooth over things. Turning at random to p. 128 we meet with such terms as "presumably present," if they "should" make their appearance; on p. 110 the author recommends beginners "provisionally" to adopt a certain method of analysis. On p. 114 he speaks of a filtrate as "supposing it to contain tolerable quantities of zinc;" of nickel and cobalt as "seemingly absent;" "supposing" alumina, iron, and possibly phosphates or oxalates of Ba Sr, Ca, Mg to be present. On p. 108 we read "supposing" from a given solution of metallic salts, say for fixing ideas, nitrates, etc.

This reminds us of the delightful way which examinees sometimes have of getting over their difficulties in answering a question by assuming or substituting another question which they *can* answer. We hold that it is preferable to teach a beginner even less perfect methods, but a method which covers the "possible" ground, rather than leaving him in doubt and uncertainty what method should be adopted under "presumable" circumstances, not to speak of the serious drawback of having to multiply methods in a most bewildering manner.

Let him master one system of methods applicable to every substance he may encounter in an elementary course of analysis, and he must be a student of more than average stupidity if he cannot devise or modify methods to meet the case of a *given* number of substances only, known to be present.

We highly commend the author on the care and precision which is visible on every page of his book, and can conscientiously recommend it to the advanced student who is not afraid of grappling with difficulties. He will be amply repaid for any labour he may bestow upon a thorough study of this book.

HISTORIA FILICUM. An Exposition of the Nature, Number, and Organography of Ferns. By JOHN SMITH, A.L.S. London: Macmillan and Co. 1875.

This book, the latest emanation from the pen of one who has made ferns a special study of a long life, would scarcely come within the scope of our notice were it not for the sections devoted to an enumeration of the properties and uses of ferns; we therefore pass over the bulk of the book which is a consideration of the tribes, genera, species and geographical distribution of these interesting plants, interesting, certainly, on account of their general as well as their microscopical beauties, but of very little interest in an economic point of view, for in fact there are but few natural families, more especially of the extent of the Filices, that are so poor in acknowledged economic or medicinal products. Only one fern in fact out of the large number of species described can be said to have any acknowledged medicinal properties, namely, the *Aspidium* or *Lastræa Filix-mas*, and this has a place amongst existing materia medica, the rhizome being used as an anthelmintic. Mr. Smith rightly refers to this as the most celebrated of all the ferns known to the ancients for their medicinal virtues, the secret of which for use in *tænia* was purchased for 18,000 francs by Louis XVI. It would seem from a query by the author on the same page that a fern called "Filix Mas" has lately come into repute in Australia and Tasmania as a cure in snake bites, for he asks "What fern is this?" Perhaps some of our readers may be able to throw a light on this subject. Another species of *Lastræa*, *L. athamantica*, a native of Natal where it is called "Unkomo-komo" is used in the colony as a vermifuge and is said to have been very efficacious in expelling tape worm. Under the name of Calahula several ferns seem to be used in South America for various complaints, thus the fleshy caudex of *Phlebodium aureum* is said to be purgative, *Campyloneuron Phyllitidis*, *Goniophlebium attenuatum*, *Pleuridium crassifolium* and *Polystichum coriaceum* are reputed as being useful in syphilis, gout, rheumatism, etc., and the former for outward application in wounds and contusions. The Maiden Hair *Adiantum Capillus Veneris* is a well known plant on account of the syrup called *Capillaire* being prepared from it. The old writers attributed very valuable medicinal properties to this plant, but like most other ferns its reputation is a thing of the past. Another species, *A. pedatum*, however, is used in North America.

With reference to the use of ferns as food plants Mr. Smith mentions the fact of starch being found in quantity in the rhizomes of the common brake, so that in some parts of Europe it is used for mixing with meal to make bread white; in the Canary Islands it is mixed with barley meal to make gruel. In 1857 a writer in Hooker's 'Journal of Botany,' recommended the young fronds as a green vegetable to be cooked and eaten as asparagus, giving his own experience as follows:—

"I took it exclusively as a dinner vegetable for more than a month, no objection arising except that the last week or two I thought it was slightly astringent. It tastes like asparagus and is very cooling and suitable for salt provisions."

Though, as we have said, so few of the ferns are of any acknowledged use, it is not unlikely that with more attention paid to their capabilities they might be turned to some account.

BOOKS, PAMPHLETS, ETC., RECEIVED.

Air and its Relations to Life. By Walter Noel Hartley, F.C.S. Second Edition. London: Longmans, Green and Co. 1876.

Jahresbericht uber die Fortschritte der Chemie und verwandter Theile anderer Wissenschaften. Für 1874. Zweites Heft. Giessen: J. Ricker. 1876.

Notes and Queries.

[512] FURNITURE CREAM.—In answer to the query of "Jabez" I beg to send the following:—

Take of—

Yellow Wax	1 pound
Yellow Soap	2 ounces
Spirits of Turpentine	2 pints
Boiling Water	2 pints

Melt the wax and soap over a slow fire, add the turpentine, and lastly, stir in the water gently until it is quite cold.

Stigma, *Southampton.*

PICRAMATES AS A TEST FOR ACIDS AND ALKALIES.—M. Frébault states (*Journ. Pharm. et Chim.* xxiii. 263) that the potassium, sodium, ammonium and calcium picramates (dinitramidophenates) are very delicate reagents for acids and alkalies. The salts are of a beautiful red colour, which by the weakest acid is changed to a yellowish green, the red being restored by an alkali. Ammonium picramate may be prepared by treating an alcoholic solution of picric acid with excess of ammonium sulphydrate. From this the calcium salt which is more permanent can be prepared. Unstarched paper dipped in the solution and dried forms excellent test paper.

SOLUBILITY OF SALICYLIC ACID. — At the Therapeutical Society, M. Chassan, a pharmacien, stated that he has found the addition of citrate of ammonia to greatly increase the solubility of this acid, either in alcohol or in water. Thus, while 40 or 50 parts of rum are required to dissolve 2 of the acid, if 1 part of the citrate of ammonia be added, only 8 parts of rum are required to dissolve the 2 parts. If from 2½ to 3 parts of the citrate be added, 120 parts of water will dissolve 2 parts of the acid; while without this addition 1000 parts of water would have been required. M. Chassan proposes the following formula:—

Salicylic Acid	4 parts
Citrate of Ammonia	2 „
Rum	30 „
Distilled Water	164 „

or this—

Salicylic Acid	1 part
Citrate of Ammonia	2 parts
Syrup	30 „
Distilled Water	120 „

—*Medical Times and Gazette* from *Gazette Hebd.*, April 21.

STAINING WOOD.—A fine stain can be imparted to furniture made of beech or pine in a very simple manner. Dissolve three ounces permanganate of potash and three ounces sulphate of magnesia in two quarts of hot water. Apply this to the surface of the wood with a brush, and repeat if necessary. The manganese salt is decomposed in contact with the fibre of the wood, and a fine, permanent stain is produced. If the objects are small, a more dilute bath can be prepared, and the wood immersed in it for one or five minutes, until it is thoroughly stained.—*Laboratory.*

MASTIC FOR FASTENING INDIA-RUBBER ON METALS.—A mastic for fastening india-rubber on metals may be obtained by steeping gum-lac, in the form of pulverized scales, in ten times its weight of concentrated ammonia. A transparent mass is thus formed, which, at the end of three or four weeks, becomes fluid without the use of warm water. This substance, applied on india-rubber, becomes hard, and completely impervious to liquids and gases.—*Laboratory*, from *Moniteur Industriel Belge.*

ANTISTERNUTATORY POWDER (FERRIER).—In a letter to the *British Medical Journal* respecting this preparation (see before, p. 939), Dr. A. G. Burnes recommends as an improvement the use of the light sub-carbonate of bismuth instead of the heavy trisnitrate, and the omission of the powdered acacia, a little starch being used if thought necessary. Dr. Burnes considers the powdered acacia decidedly objectionable, as it forms a hard incrustation upon the mucous membrane of the nose difficult to get rid of and liable to cause irritation.

Obituary.

Notice has been received of the death of the following:—

On the 26th of May, 1876, of heart disease, at his residence, 36, Botanic Avenue, Belfast, Mr. Edward Parsons, Pharmaceutical Chemist, formerly of Wellington, Somersetshire. Aged 69 years. Mr. Parsons had been a member of the Pharmaceutical Society since 1842.

On the 26th of May 1876, Mr. Richard Whitehead, Chemist and Druggist, of Bury, Lancashire. Aged 35 years.

On the 30th of May 1876, Mr. Thomas Hopkins, Chemist and Druggist, of Yoxall, Burton-on-Trent. Aged 55 years.

On the 1st of June, 1876, Mr. Edward Lockstone, Chemist and Druggist, of Castle Mill Street, Bristol. Aged 63 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE EXAMINATION PASS LISTS.

Sir,—In common with Mr. Proctor and other correspondents, I do not know the ulterior motives, which (apart from the published ones), have prompted the Pharmaceutical Council to abolish the classification system, a system which, with some modifications, could not but be acceptable, both to students as an incentive to do their work thoroughly and well, but also as a great convenience to employers, at once enabling them to have an approximate idea of the mental calibre of the man they might wish to engage, apart from his own or his friends' interested statements.

That the abolished system of classification, however, was a cause of grave dissatisfaction to many earnest, hard-working students, there can be no manner of doubt, chiefly from three causes, viz.:—

1st. The difference (either fancied or real), in the students' mind, between many of the examiners, and the peculiar idiosyncrasies of each, all being equally courteous and gentlemanly, but one section being apparently more bland and lenient, whilst the other was considered to be searching and severe, in their manner of sifting the abilities of candidates. Now as the appraisement of these abilities was entirely based on an oral system of question and answer between the examiner and candidate, it is at once evident that the student passing through the lenient section of examiners, and getting, say, 80 per cent. of marks, would be placed above his less fortunate, but mayhap, abler fellow-student, who could only manage to get 60 per cent. from the more searching series of examiners.

2nd. The appraisement of each candidate's abilities was not based on the same series of questions orally given by each examiner, but when the candidates often came (as most candidates do) to discuss the questions they had each received, it was frequently elicited that many had been severely questioned over a great range of study, whilst others had been treated exactly the reverse.

3rd. The difference of temperament in the candidates, some being nervous and flurried before the examiner, whilst others would be calm and composed.

Now it is obvious that a system of classification based on the above could not possibly be precise or correct, and from this standpoint its abolition is a reform.

A system to be competitive and precise should be based on the same series of question being given to each candidate to answer, such series to cover the whole ground in each subject, and each candidate being allowed to answer all or any in a given time, according as he felt himself capable.

This arrangement would doubtless necessitate a double system of examinations, but any extra trouble and expense it might incur to the Society would be not only amply repaid by the encouragement given to the "promise and potency of the Pharmaceutical Society to be," but also to the extra convenience which such a system would give to members and employers generally.

MINOR ASSOCIATE.

June 5, 1876.

SULPH. PRÆCIP. *v.* LAC SULPH.

Sir,—I regret the necessity of writing another line upon this already exhausted subject; but one remark in the letter of your correspondent, J. H. Baldock, of South Norwood, in last week's Journal demands notice.

Mr. Baldock, or any other chemist, is abundantly justified by competent authority to sell lac sulphuris if he choose to do so. I have, however, during the last twenty years, sold only the sulph. præcip. pur., and my numerous customers are perfectly satisfied, and never complain. They are, moreover, of a class who would have no delicacy of feeling in going to "a big house to make a complaint." But how your correspondent can justify his conduct in making no comment when a pure article was brought to him for his opinion as to "whatever stuff they had got?" is to me inconceivable. The only proper course would have been to have given a frank explanation, the absence of which explanation, coupled with the fact of supplying "such as they had had before," was open to the construction that the article upon which inquiry was made was, as designated by the person who made the inquiry, "worthless stuff."

Let us hope for purer pharmaceutical ethics than this.

T. P. GOSTLING.

Diss, Norfolk, June 13, 1876.

A NOTE ON THE SPECTROSCOPIC EXAMINATION OF FIXED OILS.

Sir,—If Mr. Gilmour will consult the *English Mechanic* of April, 1873, he will find that he has been anticipated. Some little attention was attracted to the subject at the time and a more or less complete notice appeared in every important newspaper, in the *Athenæum* and a reprint in the *Oil Trades Review*, which latter journal offered a substantial money grant towards continuing the researches on the line laid down. The author of the original notice also received from private sources many liberal offers of grants towards the same ends and finally wrote to the trade journal placing his notes at the disposal of any one who would take up the subject which he was then from many reasons unable to carry on.

Since the publication of the *Mechanic* notice, I have devoted considerable time and thought to the subject with the main result of confirming my opinion that the simple methods of examining the oils pursued by the author of the original notice and Mr. Gilmour are entirely devoid of all chances of practical use, but that the use of the spectroscope with the aid of the selective action of various solvents may prove of essential service. My work in this direction has been delayed by the necessity that has arisen for more complete micrometric appliances in connection with the low dispersive power that can alone be applied in the investigation. My remarks on this branch of the subject will probably be forwarded for publication at an early date. I had intended reserving them for the next Conference.

I forward you some tracings which will show that Mr. Gilmour's work differs sufficiently from mine to prove his freedom from plagiarism; they are at his or any one's disposal and include some unpublished ones.

HENRY POCKLINGTON.

Leeds, June 11, 1876.

HOW POISONS ARE OBTAINED.

Sir,—A customer of mine required from me an ounce (not more or less) of Scheele's Acid for internal use, he being accustomed to take it for over action of the heart. He was willing to abide by the regulations as to the sale of poisons, and while anxious myself to retain him as a customer I hesitated to incur the responsibility of the sale; I therefore obtained his consent for a delay of a day or two. In the meantime I wrote our worthy secretary, Mr. E. Bremridge, and a much respected and well-known chemist in Fleet Street. The former, whilst acknowledging the legality of the sale, said that some responsibility would rest on me; the latter, without hesitation, recommended my refusing the sale of such a dangerous drug.

With all the courtesy I could muster I therefore refused to supply my customer.

He remarked that he had been a customer of mine for some years but in future his favours would go elsewhere.

A few days afterwards he called to inform me he had procured the acid from a London firm with some other drugs.

I make no comment, but simply remark, Does the paltry price obtained for our drugs repay the anxiety and worry it entails?

EDWIN BALCH.

Ramsgate, June 23, 1876.

PROPOSED TRADE CONFERENCE.

Sir,—I wish to address a few words to those members who send scolding letters to the Society accusing them of not fighting our battles.

Messrs. Southall, of Birmingham, have now started a movement which ought to result in the immediate formation of the sort of organization which we have long wanted.

But I have good reason to believe that the whole thing will, in a few weeks, have fallen flat and lifeless through the unaccountable apathy of our brethren. I have seen our local secretary to-day, and find that everyone is waiting for some one else to move. Every man of them should now put on his hat and go to the local secretary of his district and offer to convene a meeting; this meeting must at once send its verdict to Messrs. Southall and Co., of Birmingham, or the subject will drop, and it may be years before the proposition will again assume a tangible shape.

Those gentlemen who have been in business ten years will recollect my name in connection with a "Trade Protection Society" which I then promoted and obtained (at great expense) a number of members for. I then received swarms of promises, to be performed as "soon as I could start." But start I never could, because everyone would wait for someone else to move. Now, in the name of common sense, pray do not allow this to happen again.

It is because I thus failed that I am so anxious that Messrs. Southall should succeed. There seems to be something in the drug trade which soothes its members to sleep, leaving them only an occasional lucid interval to grumble.

Let me implore these gentlemen to move now and grumble afterwards.

HENRY BARNABY.

Rochester, Kent.

IN RE DR. FARQUHARSON'S ADVICE.

Sir,—What constitutes an overdose of strychnine is not a difficult question to answer. It may be answered in one word, and that word is "idiosyncrasy." The dose varies from 1-60th to gr. 1½. (A. T. Thompson says, "I have given as much as a grain, and even a grain and a-half, without any obvious effect!")

I recollect when I was a pupil at Portsea the case of a man taking 2¼ grs. instead of 2-16th in six hours through my fellow pupil misinterpreting the tenour of a prescription, which was written thus:—

℞ Strychninæ,
Pil. Rhei. Co., ℈j. Mft. pil. xvj.
Sumat, j. omnia tertia hora.

The prescriber omitted to state the quantity of strychnine, but intended one grain in the sixteen pills. The dispenser added the symbol āā, and of course put 20 grains in the pills. The patient got a good "puckering," and by it was cured of a severe attack of paralysis!

On the other hand, there are numerous instances similar to the one quoted by you last week, where minimum doses have produced poisonous results.

I think, and have expressed myself on several occasions to the effect, that many of the doses of the B. P. might be beneficially lowered.

Concentration has, however, a great deal to answer for.

H. E. GODFREY.

45, *Curzon Street.*

THE SALE OF CHEMICALS BY OILMEN, ETC.

Sir,—The following may not be uninteresting to some of your readers:—

On Monday, May 29, a maker of aerated waters, when purchasing of me some crystallized tartaric acid for making lemonade, told me that about six weeks ago he purchased at an oil shop in Islington half a pound of crystallized tartaric acid at 2*s.* per lb. (at the same time he was offered powdered tartaric acid at 1*s.* 4*d.* per lb.); because he did not like the dark colour and general appearance of what he had purchased he did not use it, and told me he did not think it was tartaric acid. I told him to bring it to me and I would tell him if it was; he brought it and I tested it; I picked out two kinds of crystals, and found them to be nitrate of potassium and acid oxalate of potassium, and by dipping an edge of each crystal into a solution of bicarbonate of soda to see which caused effervescence and which did not, selected rather more than 1¼ oz. nitrate of potassium, and the remainder of the half-pound was the acid oxalate.

I applied several confirmatory reactions, and have retained some of the oxalate. Such occurrences as these should be generally known, as by their publication the public may learn to purchase chemicals of chemists and not endanger life or health by purchasing such goods of unqualified persons.

JAMES WILLIAM DRAPER.

59, *Barnsbury Road, Islington.*

THE BUOTT FUND.

Sir,—I shall esteem it a favour if you will kindly permit me to acknowledge the following subscriptions to the Buott Fund in addition to those already published in your Journal. The Fund is now closed and the sum obtained is £89 14*s.* 6*d.* I have duly placed the money in Mr. Buott's hands. I now beg to thank all those who have generously contributed to the fund.

R. HAMPSON.

	£	s.	d.		£	s.	d.
Mr. Alfred Bishop ...	1	1	0	Mr. Lloyd Rayner ...	0	10	0
Messrs. Barclay and Sons	2	2	0	,, W. G. Gedge... ...	1	1	0
Mr. Thos. Clarkson ...	0	10	6	,, B. W. Lacey	1	1	0
,, Lloyd	1	0	0	,, J. T. Davenport ...	2	2	0
Messrs. Battley & Watts	2	2	0	,, W. B. Alexander...	1	1	0
,, Maw, Son and Thompson...	5	5	0	Professor Attfield ...	1	1	0
Mr. J. T. Long	0	5	0	Mr. Fairs	2	2	0
,, Allen Smith	0	5	0	,, Alfred Fennings ...	2	2	0
Messrs. Kay Brothers	1	1	0	,, R. S. Pott	0	10	0
Mr. W. R. Jones	1	1	0	,, J. Hocken	0	5	0
,, Robert Gibson ...	2	2	0	,, Peter Squire	2	2	0
,, Edward Richardson	0	5	0	Messrs. D. Judson and Sons	2	2	0
,, Alfred W. Smith ...	0	5	0	Mr. E. Griffith Hughes	0	10	0
,, Richard Reynolds	1	1	0	,, C. A. Johnstone ...	0	10	6
,, John Edisbury ...	1	1	0	,, Wm. Matthews ...	1	1	0
,, Richard Parkinson	0	10	0	,, R. Brodie	0	5	0
,, J. N. Austey... ...	0	5	0	,, E. P. Hornby ...	1	1	0
J. W. T....	0	2	6	,, Wm. Pike	0	5	0
F. P.	0	5	0	,, Thos. Ball	0	10	0
W. P. C.	0	2	6	,, Alexander Bottle...	1	1	0
Mr. Henry Faulkner ...	0	2	6	Messrs. Savory and Moore	2	2	0
,, Thos. D'Aubney ...	1	1	0	Mr. H. C. Baildon ...	1	1	0
,, Thos. Berry	0	5	0	,, H Barnaby	1	1	0
Messrs. Hinkey and Beardsall	1	1	0	,, L. Bridgeman ...	0	5	0
Messrs. Goodall Backhouse and Co.	1	1	0	,, J. T. Williams ...	0	10	0
W. B.	0	5	0	,, W. How...	1	0	0
Mr. Fredk. Barron ...	2	2	6	Messrs. J. P. Bury and Co.	0	5	0
,, Bray	0	5	0	Mr. W. S. Barton ...	0	10	6
,, W. A. Breary ...	0	5	0	,, J. Jones...	0	5	0
,, John Broad	0	10	6	,, John Collishaw ...	0	10	6
,, J. L. Newbigin ...	0	10	0	,, Jabez Waterhouse	1	1	0
,, John Abrahams ...	1	1	0	,, R. G. Stourbridge	0	3	0
,, Joseph Atkinson...	0	10	6	,, E. G. Carrington...	0	5	0
,, Albert J. J. Weeks	1	1	0	,, J. F. C. Wakefield	0	5	0
,, J. T. Slugg	1	1	0	,, H. Staffell	0	10	0
				,, Ed. Hammerton ...	0	10	0

[*⁎* We have also been requested to express Mr. Buott's grateful acknowledgments to the gentlemen who have so kindly contributed to the Fund.—ED. PH. J.]

Studens Pharm.—The action you speak of is due to the well known oxidizing effect of permanganate of potash on the glycerine, and the heat is that of chemical action between the two.

An Assistant.—It is not possible to make a good mixture with your formula. The quinine is held in solution by the spirit in the ammoniated tincture, but on dilution with water it is separated when there is not sufficient alcohol in the mixture.

G.—(1) *Aira præcox*; (2) *Holcus mollis*; (3) *Poa trivialis*; (4) *Senefalcus mollis*; (5 and 6) *Festuca ovina*; (7) *Trifolium minus.*

G. C. Druce.—(1) *Poa trivialis*; (2) *Carex extensa*; (3) *Carex sylvatica*; (4) Send better specimen with mature fruit; (5) *Carax glauca*; (6) *Aira præcox.*

G. E. Jones.—(1) *Carex paniculata*; (2) *C. lævigata*; (3) *C. divulsa*; (4) *C. arenaria*; (5) *C. stellulata*; (6) *Festuca ovina.*

"*Inquirer.*"—*Red:* Digest powdered cochineal in a weak solution of ammonia or sal. ammoniac, and dilute with water. *Blue*: Cupri sulph., 8 oz.; aquæ, to 1 gall.; dissolve and add liq. ammon. fort. q.s., and water to 2 galls. Several other recipes have already appeared in this Journal.

W. H. J.—Salt of sorrel, 1 oz.; sal. ammoniac, 3 oz.; distilled vinegar, 1 quart. Dissolve. (Cooley.)

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. J. Shaw, Mr. Abraham, Mr. Wills, Mr. Barclay.

CONTRIBUTIONS TOWARDS THE HISTORY OF SOME DRUGS.*

BY PROFESSOR FLUCKIGER.

In writing our 'Pharmacographia,' my late friend Hanbury and myself have endeavoured to trace the history of each substance as far back as possible, and to ascertain the date of the introduction into pharmacy of drugs—especially of those furnished by foreign countries. Many curious facts are connected with the way of their propagation throughout Europe, both in early and in the middle ages. As to England I am entitled to suppose that there are existing but an extremely limited number of sources of valuable information about the subject under notice which had escaped the careful investigation of my lamented friend. As to the continent, there is in the library of the British Museum an interesting volume marked $\frac{777.c}{5}$ (Pharmacopœia), and entitled '*Valor sive taxatio omnium materierum medicarum . . . quae in officinâ pharmaceutica Swinphordianâ venundantur,*' printed at Giessen, 1614. This is the tariff of drugs and compound medicines which were to be met with in the pharmaceutical shop of Schweinfurt on the Main, then one of the numerous free cities of the old German Empire. The establishment (Apotheke) was not a private business, but remained from A.D. 1412 until the year 1803 the property of the commonwealth of that imperial town, and was managed—under the superintendence of the physicians—by an apothecary appointed by the magistrate. The tariff was therefore settled by this authority. The same may be said with regard to many other German towns, a fact which no doubt depends upon a good deal of public interest already devoted in those early times to pharmaceutical matters. Thus the volume alluded to contains not only the "tax" of Schweinfurt, but also those of Bremen (1644), of Basel (1647), of Rostock (1659), of Quedlinburg (1665), and Frankfurt (1669). Daniel Hanbury at once appreciated the usefulness of these documents, which we subsequently made free use of, as may be seen from several pages of the 'Pharmacographia,' (77, 177, 234).

It was evident that similar medicine tariffs must have been in vigour throughout the numberless states, so very different in size, which were formerly termed the German Empire; and not only tariffs, but most of them had their own pharmacopœia and medico-pharmaceutical laws. Since my late friend first drew my attention to the said volume in the British Museum, I have succeeded in perusing—for the same purposes—somewhat more than one hundred of similar lists or tariffs of German towns, ranging from the year 1558 down to the middle of the last century. They are scattered in various public libraries throughout Germany, but I learn from A. N. von Scheerer's 'Literatura Pharmacopœarum,' Leipzig, 1822, p. 232, that there are about forty more of the same periods which I have not yet been able to consult. No other country, as far as I know, can boast of such a number of similar documents, which I think must be considered as an evidence of a somewhat advanced state of the pharmacy in those ages, although the fact may partly be explained by the extreme, and we may say absurd, self-government then prevailing among the Germans. In 1872 at last the way has been cleared for ever by the 'Pharmacopœa Germanica.'

In abstracting the said tariffs I have met with a good deal of information which may some day prove useful to any author engaged in the history of pharmacy. I have therefore communicated my notes to the *Archiv der Pharmacie*, volumes 204 and 205 (1875 and 1876), from which they are reprinted under the title 'Documente zur Geschichte der Pharmacie,' Halle, 1876, 96 pages. A few pages from this pamphlet may be permitted to be quoted in this place in order to show that they afford even some further elucidation to questions which had been treated with a certain amount of care in the 'Pharmacographia.' The sources from which the following facts have been borrowed are pointed out in the pamphlet:—

Balsamum Canadense is stated ('Pharmacographia,' p. 553) to have been noticed in England A.D. 1761, but in my 'Documente,' p. 92, it is found to have been sold at Strassburg as early as 1759 as a current article of the pharmacy of that country.

Balsamum Copaivæ.—Its history is somewhat exhaustively traced out in 'Pharmacographia,' p. 201, and also (p. 184) that of a certain white American balsam, the latter being derived from several species of *Myroxylon* and *Myrocarpus*. It would appear from some tariffs abstracted in the 'Documente,' pp. 47, 52, 65, 68 and 69, that in some cases *Balsamum Americanum, s. Indicum, s. Mexicanum album* was probably intended for copaiba—for instance, in the private tariff of an apothecary of the city of Görlitz, of the year 1629. But in the Pharmacopœa of Amsterdam, A.D. 1636, *editio sexto*, *Balsam. Copæyvæ* is distinctly enumerated. The authors of the 'Pharmacographia' had not been able to find it mentioned in English pharmacy previous to the year 1677.

Balsamum Peruvianum.—Perhaps *Balsamum Indicum*, of the tariffs of 1605 and 1607, quoted in the 'Documente,' pp. 35 and 36, may mean Peru balsam; it is, however, expressly termed *Balsamum Peruvianum* in the tax of Mainz (Mayence), A.D 1609, and what is more curious, the pods of the tree, *Fructus balsami indici*, are met with in the lists of Wittenberg in 1646, and of Nordhausen, 1657. These pods are still occasionally imported on account of the fragrant resinous contents of the large ducts around the seed. Their fragrance, which I am told is much appreciated by perfumers, is quite different from that of the balsam itself (see 'Pharmacographia,' p. 184). *Balsamum Indicum nigrum fluidum* is another name frequently applied to Peru balsam; *Balsamum Hispanicum* ('Documente,' pp. 45 and 49) may rather mean balsam of tolu. It is hardly possible to say what was *Balsamum Americanum s. Indicum verum*, p. 41.

Balsamum hispanicum siccum seu americanum resinosum in the tariff of Schweinfurt, 4th edition, 1644 ('Documente,' p. 49), as well as *Balsamum Indicum durum* of Ulm, in 1648 ('Documente,' p. 53), cannot be doubted to mean balsam of tolu. The product of *Myroxylon Pereiræ*, which is exclusively, prepared on the balsam coast of San Salvador, having been formerly carried to Callao, the chief port of Peru during the Spanish dominion, the name of Peru balsam was given to it. This may account for the appellation of *Balsamum hispanicum*, which appears to have been bestowed upon the balsam of tolu, inasmuch as it used to be immediately shipped for Spain—as it is still—from the ports of New Granada.

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* Abstracted from the author's 'Documente zur Geschichte der Pharmacie.' Halle, 1876, p. 96.

The earliest express mention of Balsam*us* toluta*num* I have met with in pharmaceutical tariffs occurs in that of the city of Frankfurt of 1669, quoted in the 'Documente,' p. 65. From what we stated in the 'Pharmacographia,' p. 177, it is probable that the drug was then likewise used in England, but there is no proof of the fact as far as I can see; I would be glad, however, to be corrected in this opinion.

Benzoin began to be introduced as a commercial article in the beginning of the sixteenth century ('Pharmacographia,' p. 362). It was abundantly obtainable in the middle of that century, for Hieronymus Cardanus states in his work, 'De la Subtilité,' French translation, 1556, p. 160, that "belzoi est de vile prix pour l'abondance." Benzoin, according to the custom of that period, was then submitted to destructive distillation, by which it yielded benzoic acid, which was first noticed by the famous French astrologer, Michel de Nostredame,* about the year 1556. This preparation appears to have quickly come into more general use; it occurs in the list of Görlitz (east of Dresden) of 1629, under the name of *Benzoi flores.*

Arnotto, the pulp of the fruit of *Bixa Orellana*, the well-known dye, occurs in tariffs of Wittenberg, 1646, Budissin, 1660, Leipzig, 1669, under the name of Orlian, which it still bears in German.

Cascarilla bark.—The Bahamas having been in the possession of the English from 1629 to 1641, the authors of the 'Pharmacographia' supposed it to have been first introduced in Europe by way of England, but no evidence at all has been found to prove the correctness of this suggestion. The said islands were occupied in 1641 by the Spaniards, and to them apparently is due the introduction of this bark. It bears a certain resemblance to quills of cinchona barks, and was, therefore, first noticed by the name of *China nova*, or cascarilla, which designations were no doubt of Spanish origin. It is said, however ('Documente,' p. 76), that it had first been mentioned in the pamphlet—"De machinis fumiductoriis," Hamburg, 1686, by J. A. Stisser, Professor in the University of Helmstedt, near Brunswick. I have not seen this pamphlet, nor that of V. G. Salat, of Valencia, Spain—"Unica quaestiuncula, in qua examinatur pulvis de Buarango vulgo *Cascarilla* in curatione tertianæ." Valentiæ, 1692. Both these pamphlets appear to be extremely rare, the first being not even quoted in Haller's 'Bibl. Botanica.' But in the list of Minden, 1691 ('Documente,' p. 74), I have found *China nova*, together with China de China—*i.e.*, true Cinchona. There can be no doubt that this refers to cascarilla, for in another tariff of 1694 ('Documente,' p. 74), published at Gotha, Cortex *Chinæ novæ seu Schacorillae* is quoted as well as in several other lists abstracted in the 'Documente.'

Catechu is said in the 'Pharmacographia' to have been unknown in Europe until the latter half of the seventeenth century; yet in the tariff of Wittenberg of 1646, *Catechu seu terra Japponica* is met with. It again occurs in several other tariffs of the same century, and is always quoted at very high prices. In 1666, at Magdeburg, catechu was much more costly than benzoin, balsam of Peru, camphor, opium, mastix, etc. ('Documents,' p. 64). Even in 1780 the wholesale price in London was £20 per cwt.; to-day the commodity fetches about 18*s.*!

The earliest mention of Cinchona bark—*China Chinæ*—is found in the tariffs of Leipzig and Frankfurt of the year 1669. In England it had begun to be known about 1655.

One of the most curious things is the occurrence of coals, *carbones petræ*, among the drugs of the tariff of the city of Freiberg in Saxony, A.D. 1680.

Cacao seeds and chocolate were to be found with German pharmaceutists as early as 1656 and 1683 ('Documente,' pp. 53 and 69), and *Coffee*—"Bon Coffi Grana"—in 1683 in the pharmaceutical office of the court of Dresden. It is much more striking to learn from the tariff of the city of Nordhausen, near Göttingen, that in 1657 tea—*Herba theæ*—was there a pharmaceutical article. It also occurs in the tariff of Liegnitz, in Silesia, in 1662, under its Chinese name, *Herba shak;* it then commanded a most extraordinary price—namely, fifteen florins a handful.

Gamboge.—I have afforded some new information about the history of that drug, as may be seen in the 'Documente,' pp. 41, 43, 44, 46, 48, etc. In the list of Frankfurt, of 1612, *Gutta gemou* (gamboge) is stated to be a purging dried juice, coming from the kingdom of Patana in India. The meaning of *Gutta gemou* is explained in the 'Pharmacographia,' p. 77. Patana is a country and a port on the eastern coast of the peninsula of Malacca, where the Dutch established a settlement in 1602, and were followed there in 1612 by the English. Gamboge may have been imported there from the countries on the opposite shore of Cambodja, where it is still collected.* Its early introduction in Europe is no doubt due to the Dutch. In the tariff of Copenhagen of 1619, and in many tariffs of German towns down to the eighteenth century, gamboge is also termed Gummi de Peru, which is no doubt simply a corruption of the Javanese word gemou, or jamu—*i.e.*, a medicine ('Pharmacographia,' p. 77, note 4).

Iris Florentina.—As may be seen even in the 'Divina Commedia,' cant. xvi, the ancient arms of Florence were a white iris on a red shield, which were subsequently altered, the red iris or lily (*giaggiolo*) now being on a white shield. This probably indicates an early cultivation of orris root near Florence. In the early ages, that of Illyria was held to be the best ('Pharmacographia,' p. 599), and was still quoted in many of the German lists under notice. In that of Schweinfurt, in 1614, *Radix Iridis Florentinæ*, however, is the only one mentioned.

Liquorice.—A list published in 1582 at Frankfurt informs us that they had then Russian and Spanish liquorice and inspissated liquorice juice from Candia. In many other tariffs—for instance, in that of Worms, 1609, and in that of Copenhagen, 1619—liquorice of Bamberg in Bavaria is quoted, and in Conrad Gesner's interesting work, 'De Hortis Germaniæ,' Strassburg, 1561, p. 164, the author says already that near Bamberg of liquorice there was "*maximus eius proventus.*"

Manna of Briançon, from *Pinus larix*, 'Pharmacographia,' p. 373, would appear ('Documente,' pp.

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* "Excellent et moult utile Opuscule à touts necessaire qui desirent avoir cognoissance de plusieurs exquises receptes." 1556.

* See *Pharm. Journ.*, iv. (1874), p. 803.

18 and 30) not to have been so very rare an article in the second half of the sixteenth century as it is now-a-days.

Mastiche.—From the very exhaustive information on the history of mastiche alluded to in the 'Pharmacographia' I was led to suppose that resin to have always exclusively been produced in the island of Scio (Chios), but there is evidence ('Documente,' pp. 31, 41 and 65) that it was also collected in the island of Cyprus.

Mucunae setæ—cowhage.—The pods and hairs of *Mucuna pruriens* were not much used in England before 1769 ('Pharmacographia,' p. 166); they appear, however, to have been employed as early as 1714 in Germany, inasmuch as they are contained in the list of Onolzbach, near Nürnberg ('Documente,' p. 84).

Among essential oils that of *bergamot* is well worth noticing in the "Catalogus omnium medicamentorum . . . in officina pharmaceutica á J. C. Scipione . . ." This is the private list of a druggist of Giessen, 1688. There are several lists recorded in my 'Documente' which had been published in the seventeenth century by German pharmacists in order to show what stores they offered for sale; no doubt this was the case with only the most considerable pharmaceutical establishments of the time. The earliest notice of oil of bergamot pointed out in the 'Pharmacographia,' p. 109, referred to the year 1693, when it was mentioned in 'Le Parfumeur François.' The 'Documente' now trace it a few years further back.

Oleum cajuputi was to be met in the little town of Hof, east of Coburg, as early as 1726, a fact which also is no longer in full accordance with the statements of the 'Pharmacographia.'

Oleum Matricariæ Chamomillæ.—This oil, which is so extremely remarkable on account of its intensely blue tint, had apparently never been appreciated in England. In Germany it was prepared in 1588 by Joachim Camerarius; and was to be found in 1608 in the 'Apotheke' of the city of Schweinfurt.

One of the most costly oils used to be that of cinnamon; it was even quoted at a higher rate than otto of rose. The latter was a regular article of pharmacy in Germany as far back as the year 1607, when it was enumerated in the list of Freiburg.

The oils of sassafras and of cochlearia were sold at Dresden in 1683. Crystallized oil of sassafras appears to have been first obtained by John Maud, F.R.S., in 1738. He stated the crystals to be as long as four inches; I have prepared colourless crystals exceeding that length and more than one inch in diameter.

Piper æthiopicum, or *Piper nigrorum*, one of the substitutes for pepper, occurs in the lists of Wittenberg, 1646, Nordhausen, 1657, Magdeburg, 1666. This spice consisted of the fruit bunches of a tree of the order *Anonaceæ*, indigenous throughout western tropical Africa—viz., *Xylopia æthiopica*, Richard (*Syn. Habzelia æth.*, D.C.; *Unona*, Duval; *Uvaria*, Guill. et Perrott). It is figured in Matthiolus 'Commentar. in sex libr. Diosc.,' Venetiis, 1570, fol. 400; also in Guibourt's 'Hist. nat. des Drogues simples,' III. (1869), p. 736, and described in Lindley's 'Flora Medica,' p. 27, as well as in Oliver's 'Flora of Tropical Africa,' I. (1868), p. 30. Nothing whatever is known about the chemical constituents of this fruit, which is now entirely out of use.

Saffron.—English saffron has been so abundantly exported in the seventeenth century that it is found in the tariff of Copenhagen in 1619, and is even termed in that of Celle, in Hanover, 1682, *Crocus communis Anglicus*. This agrees well with our statements in the 'Pharmacographia,' p. 603.

Sarsaparilla was known in England about the year 1568; it appears to have been sold in Frankfurt in 1582.

Sassafras was sent to England in the beginning of the seventeenth century, as may be supposed from the facts recorded in the 'Pharmacographia,' p. 483. The drug was well known at Frankfurt in 1582, and at Hamburg in 1587, when it was termed *Lignum pavamum, s. floridum, s. xylomarathri* (fennel-wood).

Serpentary root of Virginia is met with in 1697 ('Documente,' p. 77); in England it was in regular use at least since the year 1650.

Sugar.—Some interesting contributions to its history may be derived from the 'Documente,' p. 32. There were in the sixteenth and seventeenth centuries many sorts and kinds of sugar illustrating the migration of the sugar cane from India to the new world. Thus, Saccharum *candum*, or also sometimes, *Sal indum*, is sugar of Indian origin; Saccharum *tabarzeth* means in Persian a very hard crystallized sugar; Saccharum *Melitense* alludes to Malta; whereas, strange enough, neither Egyptian nor Sicilian sugar is ever mentioned in the tariffs. From the Mediterranean the plant was introduced into the Atlantic islands—hence Saccharum *Madeirense, Canariense*, and at last sugar from the island of San Tome, in the Gulf of Guinea, Saccharum *Thomasinum*. In this place the sweet cane had been transplanted by the Portuguese about the year 1500, but in a later period they stopped its cultivation in the island in favour of its introduction into Brazil. All these various kinds of sugar are mentioned in the German lists under examination; and besides them there is frequently to be met with *Saccharum penidium*, or *Saccharum turbinatum*, the preparation now known under the names of boiled or pulled sugar, the amorphous barley sugar of the confectioners.

Zinc seu Spiautr is an article of the tariff of Copenhagen of 1672; in a German list of 1682 it is distinguished as *Marchasita pallida v. Zinck* from *Marchasita officinarum, plumbum cinereum—i.e.*, bismut.

The 'Documente,' if I am correct, afford a very curious illustration of the state of pharmacy, especially in Germany, during the sixteenth and seventeenth centuries, as the above abstracts from my pamphlet may prove. They, at the same time, furnish many little contributions to the history of drugs, and are the more remarkable as similar documents—at least, in so great a number and variety—seem not to exist in any other country than in Germany, and perhaps a few other countries where the German idiom is spoken. I thought them well deserving of a somewhat minute investigation, inasmuch as they must be considered as a real picture of ancient times, full of actuality.

NOTE ON PERSIAN OPIUM.

BY BARNARD PROCTOR.

It may be well to draw the attention of your readers to a sample of Persian opium recently offered at about one-third the price of good samples of the same drug.

Anticipating that it would be found dear at any price, I had the curiosity to obtain a small portion and submit it to analysis. The result proved the presence of only 0·25 per cent. of morphia.

11, *Grey Street, Newcastle.*

NOTE ON SYRUP OF FERROUS IODIDE[*].

BY J. F. JUDGE.

When proper care is taken in the preparation of syrup of ferrous iodide, a product is obtained of a pale green tint, which, if kept in full and well stopped bottles, does not change colour; but it occasionally happens that from some defect or other in the process, the syrup does not retain its pale green, but assumes a brownish hue.

Some years since, hyposulphite of sodium was proposed as an agent capable of restoring the syrup, when discoloured, to its normal tint. In producing this change, sodium hyposulphite, by its affinity for oxygen, passes into sodium sulphate, and in so doing parts with one-half of the sulphur it contains, thus:

$$Na_2S_2O_3+H_2O+I_2= \\ Na_2SO_4+2HI+S.$$

The sulphur precipitates in minute division and remains suspended in the syrup, rendering it turbid and nearly as unsightly as before the treatment with the hyposulphite.

About two years ago, I had some syrup of ferrous iodide which had changed colour, and desiring to restore it to its original greenish tint, I did not feel disposed to use hyposulphite of sodium, because of the precipitate of sulphur already mentioned. In thinking upon the matter, I concluded that hypophosphorous acid, having like affinity for oxygen, would perform a similar work to that effected by the hyposulphite. I therefore added to a sample of my coloured syrup a few drops of hypophosphorous acid, shook the bottle, and allowed it to stand a short time, and examined it, when it was found to have resumed the proper colour, and the syrup was perfectly clear; I then treated the whole of the discoloured syrup with hypophosphorous acid with like satisfactory results. The chemistry of these reactions will be readily understood by the following equations:—

$$HPH_2O_2+I_2+H_2O=2HI+H_3PO_3, \text{ or} \\ HPH_2O_2+I_4+2H_2O=4HI+H_3PO_4, \text{ or} \\ HPH_2O_2+2Fe_2OI_4=4FeI_2+H_3PO_4.$$

If, after making syrup of ferrous iodide, it is observed that it has a slight olive tint in place of the pure pale green, this may be removed by the addition of a small quantity of solution of hypophosphorous acid, and upon introducing some clean small nails or wire, and allowing it to stand awhile, small bubbles of gas (hydrogen) will be observed accumulating on the surface of the nails, and if the bottle is moved these will pass up through the syrup; the nails react with the hydriodic acid (formed as explained in the foregoing equations), with the liberation of hydrogen and production of ferrous iodide. Syrup thus treated is not prone to become discoloured soon again.

It is not my intention to propose that hypophosphorous acid be introduced as a regular constituent of syrup of ferrous iodide, for I am opposed to tampering with officinal formulas; but I do suggest it as a remedy for the difficulty, when syrup of the iodide of iron changes colour.

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[*] Paper read before the Cincinnati College of Pharmacy. From the *American Journal of Pharmacy*, April, 1876.

THE RELATION OF THE ATMOSPHERE TO PLANT LIFE.[*]

BY THOMAS WILLS, F.C.S.

Of the Royal Naval College, Greenwich.

The position of vegetation in creation, together with its beauty, variety and extent, have drawn many students to the investigation of the phenomena of plant life. It is, however, only during very recent times that any consistent account has been given of the nature and food of vegetable organisms. The accurate information which we now possess is largely due to the late Baron Von Liebig and to two gentlemen who are still actively engaged in investigation, Messrs. Lawes and Gilbert of Rothamstead.

The distinction which exists between the matter of organic and inorganic bodies is not one of elementary constitution, but is to be found in the presence or absence of the vital or living principle. As regards the nature of this principle little is known, even at the present time, although by the manifestations which we have of it in its influence upon matter, it is proved to differ from all other controlling actions with which we are acquainted. Such effects as the following are characteristic amongst others of the existence of life.—The varied phenomena of growth, in which may be included waste, restoration, and reproduction, such growth being obtained by the assimilation of a further quantity of matter; the working together in harmony of a number of parts and of a very complex arrangement toward one definite end, which is the life and perfection of the whole; and again in the adaptation of the whole to its surrounding circumstances, seen in even the lowest forms of life, but more fully recognized as the life becomes more fully developed. The matter of which living bodies, whether animal or vegetable, are at any one time composed is, when under the influence of vitality, simply passing through a phase of its history, and although possessing under these circumstances new and peculiar properties will shortly return to its inorganic state; thus, that which is the dead to-day will be the living to-morrow, and the living of to-day become the dead of to-morrow.

The vital energy possesses no creative power; hence all matter that is to be found at present existing in the form of vegetation should be traceable to some previous condition before it came under the influence of life and it should also be possible to follow it until it has ceased to be under such influence. Although the identity of elementary matter whether found in the organic or inorganic worlds is the same, yet there are certain elementary substances which enter far more largely into the composition of living matter than others, and which seem to be essential to its constitution; these substances are few, numbering only four (and in vegetable bodies frequently only three of these occur) i.e., carbon, hydrogen, oxygen and nitrogen. The one element which of all others is most characteristic of organic compounds is the element carbon; its presence is universal, and its quantity very large. Whenever, and under whatever conditions living matter exists, or matter which is the result of living matter, it is always found to contain a large proportion of carbon. This carbon can be recognized at once by taking advantage of the readiness with which organic bodies generally are decomposed, either by heat or by some chemical means, as under these circumstances the carbon can be separated in its elementary recognizable condition.

The great bulk of vegetable matter is composed of woody fibre or cellulose, the composition of which is in 100 parts—

Carbon	44·45
Hydrogen.	6·17
Oxygen	49·38

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[*] Abstract of a Lecture delivered before the Bristol Pharmaceutical Association.

The other substances which go to make up the total weight of the plant, such as starch and sugar, contain about an equal amount of carbon to this woody fibre, consequently about 45 per cent. of the entire weight of vegetable substances consists of carbon.

The total amount of carbon which has existed in the form of vegetation is immense.

	lbs.
1 acre of fir wood yields in one year	4288 of dry wood
Containing about	2000 of carbon.
1 ,, wheat or barley ,,	3800 dry matter.
Containing about	1700 of carbon.

This is the produce of one year, but to this must be added the amount produced by the growth of centuries, and also the constituent carbon of the plants and trees of early geologic times, which we are now utilizing in the shape of coal, shale and petroleum.

In considering these facts it becomes necessary to look for the source of this carbon. As far back as the seventeenth century, Van Helmont maintained that plants derived their nourishment entirely from water. This erroneous idea was, however, only held on account of the ignorance existing at that time of the constitution of water; but the theory held almost universally up to less than fifty years ago (until the time of Liebig) was, that the source of the material substances found in plants must be looked for in the soil in which they grow, and as this soil in most cases is found to contain some of these materials, it was accepted as a sufficient source of all. We now know that the amount of food which plants derive from the soil is, with certain exceptions, represented by the quantity of ash which remains after they have been incinerated, and this quantity varies in different varieties of vegetable substances from 1 to 5 per cent.

Wherever there is any large amount of vegetation there will be found a quantity of decomposing peaty matter, the residue of previous growth, and this matter, or "humus," was considered to be a sufficient source of the organic matter found in those plants growing on the spot. If, however, this substance—which is the result of previous vegetable life—were the exclusive source of present vegetable growth, it is seen that to maintain vegetation at a certain amount *all* the organic matter of one generation of plants must return to the soil, in the form of humus, in order to supply the food for the next generation; and should this not be the case, which it certainly is not, then the amount of vegetation upon the earth's surface must be gradually diminishing. Schleiden in this way calculates that subtracting the amount of organic matter which annually does not return to the soil in the form of humus, all vegetation would cease in sixty years.

The amount of organic matter, or humus, in average soil is about 4 per cent., containing one half its weight of carbon. The weight of the utilized soil upon an acre of land, calculated for a depth of ten inches, is about 1000 tons, and this quantity of soil will consequently contain 40 tons of humus, or 20 tons of carbon; but from this acre of land, 4288 lbs., or 1¾ tons of organic matter, in the shape of fir wood, or 3800 lbs. in the shape of wheat or barley, can be obtained annually for a long period of years, and yet at the end of that time if the soil be examined the organic matter instead of being exhausted will be found to have increased in quantity.

Humboldt mentions an instance in which land planted with bananas yielded 152,000 lbs. weight of fruit per acre, containing 32,000 lbs. or 14 tons of carbon, annually; yet the soil only contained 4 per cent. of humus, or 20 tons of carbon per acre. Also, the yield of crop from a given extent of land can be increased by more than one-third by the application of mineral manure, which does not contain a trace of carbon, to the soil. Many instances are known where plants are grown in soils containing no organic matter, and several plants of the orchid variety were exhibited at the lecture growing in brick-dust on pieces of wood and stone. An experiment of Boussingault showed that peas sown in soils consisting of ignited pumice and sand underwent a fourfold increase in weight in ninety-nine days. From these and other cogent reasons the belief that the carbon of vegetation was obtained from the soil was abandoned, and as water contains no carbon, attention had to be directed to the only other material substance necessary for vegetable life—viz., atmospheric air.

The physical character of the atmosphere was not recognized until the beginning of the seventeenth century, and its composition not until 1774, barely a hundred years ago; while its true constitution has been established some time within the present century. Air is now known to consist mainly of two gases—oxygen and nitrogen—mixed in unequal proportions—one-fifth oxygen and four-fifths nitrogen. From whatever source the air may be taken this proportion is practically the same; but in addition to these two bodies there are certain others present in very small quantity: these are aqueous vapour, carbonic acid gas (a compound of carbon and oxygen), and ammonia (a compound of hydrogen and nitrogen), and although the quantity of these substances varies to a much larger extent and is more influenced by local position than the larger constituents oxygen and nitrogen, yet they may be looked upon as definite items in the composition of the air.

Table of Composition of Air.

	Volume.	Weight.
Nitrogen	79·19	76·99
Oxygen	20·81	23·01
	100·00	100·00
Aqueous Vapour (average)	1·40	0·87
Carbonic Acid	0·04	0·06

Ammonia—about 1 part per million.

The only one of these bodies which contains the element carbon is the carbonic acid gas, which in every 100 parts contains 27 parts of carbon. This carbonic acid gas can be recognized by its action upon lime to form chalk or carbonate of lime. Lime is soluble in water, chalk is not; hence if water containing lime in solution be exposed to the action of carbonic acid gas, the solution will become turbid, owing to the formation of insoluble chalk. If a quantity of atmospheric air be shaken with a solution of lime in water, a turbidity is the result; or, if the clear solution be exposed to air for a time, it will become covered with a scum of insoluble carbonate of lime, indicating the presence of carbonic acid gas. (Experiments were introduced here to illustrate the various properties of carbonic acid gas.)

It has been mentioned above that carbonic acid gas contains rather more than a quarter of its weight of carbon; looking at the figures upon the table of the composition of air, the amount of this substance is very small and it would appear that it might be dismissed at once from consideration as a possible source of the carbon of vegetation, but if looked at in relation to particular volumes and weights of air the quantity is seen to be of greater value. ·04 per cent. represents four parts in 10,000 of air or 4 cubic feet in 10,000 cubic feet of air. These 4 cubic feet will weigh 3270 grains, or a little over 7½ ounces and will contain 891 grains of carbon, or just over two ounces. This room (the lecture room) contains in round numbers about 20,000 cubic feet of air and consequently there will be 8 cubic feet of carbonic acid gas present when the air is in its normal condition and these 8 cubic feet will contain 4 ounces of carbon. If the calculation be made upon a larger scale it will be found that at any given time there is over an acre of land from 15,000 to 20,000 lbs. of carbon in the atmosphere in the shape of carbonic acid gas. And it has been already mentioned that the yearly removal of carbon in the crop from such an extent of land is only about

1600 lbs. In fact it can be shown that the total amount of carbon present in this form in the atmosphere at the present time is greater in quantity than all the carbon existing in the form of vegetation on the earth, and all the carbon in the buried coal and shale strata put together, amounting as it does according to Liebig to three thousand billions of tons.

In this way it is readily proved that the atmosphere is a sufficient source of carbon, but it still remains to show by some direct experiment that this is in reality the source from which plants derive their supply.

In 1771 Priestley observed that growing plants in sunlight in presence of carbonic acid gas altered the character of the gas so that after a time its power of extinguishing a light was lost. Since then Boussingault has made a number of experiments by enclosing plants in atmospheres artificially charged with carbonic acid gas; putting a branch of a vine into such an apparatus he found the air entering the apparatus to contain ·04 per cent. of carbonic acid, while that which escaped only contained ·01, so that in this case three-quarters of the carbonic acid had been absorbed. In another experiment by the same observer 1550 square inches of oleander leaves decomposed in sunlight 67·6 cubic inches of carbonic acid gas per hour, thus appropriating in that time nearly 10 grains of carbon. Plants have also been grown in soils entirely free from carbon and yet flourished when the surrounding atmosphere contained carbonic acid gas, the gas disappearing in due proportion to the assimilation of carbon.

Carbonic acid gas is, however, not assimilated by the plant as such, but requires first to be decomposed in such a manner that its constituent carbon shall be liberated, and this liberated carbon is then built into the tissues of the plant. To bring about this necessary decomposition an expenditure of force is required. What this force amounts to, and from whence it comes is a matter of some interest; force, like matter, is by us or our agency both uncreatable and indestructible.

When carbon is burned in air or oxygen to form carbonic acid gas heat is developed, and if this heat be measured it is found that 1 lb. of carbon so burned gives out as much heat as would raise 8000 lbs. of water 1° C., or 14,400 lbs. of water 1° F., and the product would be 3·6 lbs. of carbonic acid gas. Now (leaving out of consideration the latent heat of the gas) if it be required to reverse this process, that is to split the 3·6 lbs. of carbonic acid into its constituent carbon and oxygen, as much energy will be required as is equivalent to the amount of heat given out in their combination or the amount of heat required to raise 14,400 lbs. of water 1° F. Representing the force of heat by its mechanical equivalent another view of the question is obtained.

If a 1 lb. weight be taken to a height of 772 feet and dropped to the ground the impact of the weight upon the ground will develop heat, and this heat will be found just sufficient to raise the temperature of a pound of water 1° F., the arrested motion of the entire weight being converted into the molecular motion of heat. And conversely the amount of energy in the form of heat which is required to give this increase of temperature is equivalent to a mechanical power that will raise a 1 lb. weight to a height of 772 feet; but 1 lb. of carbon in burning is capable of heating 14,400 lbs. of water 1° F., hence to obtain such an amount of energy a weight of 14,400 lbs. or 6½ tons must be dropped from a height of 772 feet, or conversely the mechanical equivalent of the heat evolved by the burning of 1 lb. of carbon is equal to the raising of a weight of 6½ tons to a height of 772 feet. From this it follows that for every 1 lb. of carbon obtained and appropriated by plants from the carbonic acid in the air a power must be exerted which is mechanically equivalent to the raising of nearly 6½ tons to a height which is three times that of the Clifton Suspension Bridge above an average tide.

In an experiment already referred to Boussingault found that 1550 square inches of oleander leaves decomposed from carbonic acid and appropriated between 9 and 10 grains of carbon per hour; the mechanical equivalent of the power so exerted by this small extent of leaf surface is equal to a weight of 25 lbs., raised to a height of 772 feet every hour; over an acre of woodland yielding 2000 lbs. of carbon yearly, the mechanical equivalent of the energy exerted would be the lifting of about 12,000 tons to the same height.

From whence is this power derived? No manifestation of force can be obtained in any one direction unless at the same time there is a corresponding disappearance in some other direction.

It has long been noticed that plants only grow and thrive in the light, and that if kept in the dark no assimilation of carbon takes place. Priestley observed this fact at the close of the last century. Green leaves placed in an atmosphere of carbonic acid gas in sunlight, decomposed the gas, and the atmosphere surrounding the leaves was found to contain oxygen; since that time it has been clearly established that with very few exceptions (those plants containing a large amount of nitrogen) the power of vegetation to assimilate carbon from the carbonic acid of the air is due to the light of the sun; just so much of the energy of light is lost as light as is equal to the amount of energy expended in decomposing the carbonic acid gas.

This decomposing action of the plant takes place only in its green parts, in those vessels which are filled with the green colouring-matter or chlorophyll. It appears that the carbonic acid is first absorbed into these vessels, and in this condition suffers decomposition, the carbon helping to build up the various tissues of the plant, the oxygen being returned to the atmosphere in its free state. All the parts of a plant which are not green absorb oxygen and give off carbonic acid under any circumstances in small quantity, and the green parts when in darkness also give off carbonic acid gas, but these actions are in all cases very much less than that which takes place under the influence of light.

Plants are influenced by all the light-giving rays of the sun, but the greatest effect is produced by those rays which are the more refrangible, and which are more closely connected with the phenomena of chemical action.

It would appear from the large extent of vegetation and from the amount of work to be done as if all the solar energy would be needed in this direction alone; but calculations have been made by Hemholtz which tend to prove that the amount of energy in the sun's light utilized by plants at any one time upon a given area is only the $\frac{1}{1500}$th of the total energy which is falling upon that area, and if the magnitude of the solar force is in question it may be remembered that the earth, as one of the planets, only receives the $\frac{1}{2300000000}$th part of the total energy emitted by the sun.

Taking the carbonic acid gas in the atmosphere as equal to 20,000 lbs. of carbon per acre, and the yearly removal of carbon in the crop at 1600 lbs. from the same land, it is evident that the whole of this supply would be removed in about twelve or thirteen years; but as crops may be grown for an indefinite period it is evident that some mode of replenishing the carbonic acid in the air must be at work, and we find the sources of this replenishment chiefly in three directions, respiration, combustion, decay and putrefaction. Whenever carbonaceous matter becomes the food of man or animals, or when animals which have lived upon such food become the food of man, the carbon undergoes a slow process of burning, giving rise to the warmth of the body, and this burning takes place at the expense of the oxygen of the air, the product being carbonic acid gas, which, by means of the respiratory organs, is exhaled into the atmosphere as fast as it is formed, there once more to become the food of vegetation from whence it has been obtained.

If the carbonaceous material, of whatever kind, be set on fire and burned in air, then precisely the same result takes place, but more rapidly, the product being as before carbonic acid. One fact alone may be stated. There are consumed annually more than 174,000,000 tons of coal containing on the average 60 per cent. of carbon or 104,400,000 tons. These will become on burning 382,800,000 tons of carbonic acid gas; a large result from a single source.

If carbonaceous matter be simply left to itself exposed to air and moisture it will gradually decay and disappear, and during the process the carbon will unite with the oxygen in the air, although more slowly, to produce carbonic acid.

In this manner we have a distinct and most interesting balance maintained, the carbon continually going through a cycle of changes of which its presence in vegetation only forms one phase. Animal and vegetable growth are so adjusted that they serve as sources of food and life each to the other.

REMARKS ON THE DISCOVERY OF GALLIUM.*

BY D. MENDELEJEFF.

In 1869 I announced the following periodic law:—"The properties of the simple bodies, as also the properties and constitution of their combinations, are periodic functions of the atomic weights of the elements."

Among the different applications of that law I shall cite only the following:—

(1) This law constitutes the basis of a complete systematic classification of the elements.

Series.	1st group.	2nd group.	3rd group.	4th group.	5th group.	6th group.	7th group.	8th group.
	R_2O	RO	R_2O_3	RH_4 RO_2	RH_3 R_2O_5	RH_2 RO_3	RH R_2O_7	(R_2H) RO_4
1.	H=1							
2.	Li=7	Be=9	B=11	C=12	N=14	O=16	F=19	
3.	Na=23	Mg=24	Al=27	Si=28	P=31	S=32	Cl=35	
4.	K=39	Ca=40	?=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59, Ni=59, Cu=63
5.	(Cu=63)	Zn=65	?=68	?=72	As=75	Se=78	Br=80	
6.	Rb=85	Sr=87	Yt=88	Zr=90	Nb=94	Mo=96	?=100	Ru=104, Rh=104, Pd=106, Ag=108
7.	(Ag=108)	Cd=112	In=113	Sn=118	Sb=122	Te=125	I=127	
8.	Cs=133	Ba=137	?Di=138	Ce=140	"	"	"	Os=195, Ir=197, Pt=198, Au=199
9.	"	"	"	"	"	"	"	
10.	"	"	Er=178	?La=180	Ta=182	W=184	?=190	" " " "
11.	(Au=199)	Hg=200	Tl=204	Pb=207	Bi=208	"	"	
12.	"	"	"	Th=231	"	U=240	"	" " " "

(2) The periodic law demands a change in the atomic weights of certain metals which have not as yet been sufficiently studied.

Atomic Weights of the Metals and Formulæ of their Oxides.

	Old Numbers.	Numbers Proposed by me.	
Indium	75InO	$113In_2O_3$	The specific heat, determined by Bunsen, and likewise by me, has confirmed the change (*Bull. de l'Acad. St. Petersbourg*, vol. viii., p. 45).
Uranium . . .	$120U_2O_3$	$240UO_3$	Rammelsberg and Roscoe have accepted the change (*Ber. der deut. chem. Ges.*, vol. v. p. 1003, and vol. vii, p. 1131).
Cerium	92CeO Ce_3O_4	$138Ce_2O_3$ CeO_2	The specific heat of the metal (*Bull. de l'Acad. St, Petersbourg.* vol. viii., p. 45) and the constitution of its salts (Lieb. *Ann.* vol. clxviii., p. 46) appear to confirm my proposal.
Thorium . . .	116ThO	$232ThO_2$	Chydenius and Delafontaine have, previously to me, proposed the same alteration.
Yttrium . . .	60YO	$90Y_2O_3$	Cleve (*Ber. der deut. chem. Ges.*, vol. viii. p. 129) has accepted my formula R_2O_3
Erbium . . .	114ErO	$171Er_2O_3$	
Didymium? or Lanthanum?	about 92RO	$138R_2O_3$	

(3) The periodic law indicates vacancies in the classificatory scheme of the known elements, and enables us to predict the properties of elements, as yet undiscovered, and of their compounds. For example, there are two vacancies in the third and fourth groups respectively of the fifth series: I have called the unknown elements which should fill these vacancies *Eka aluminium*, El, and *Eka silicium*, Es.

The properties of eka aluminium, according to the periodic law, should be as follows:—Atomic weight about 68; formula of its oxide, El_2O_3; its salts have the general formula ElX_3. Thus, for example, the chloride of eka aluminium will be $ElCl_3$; on analysis it will yield 39 per cent. of metal and 61 of chlorine; and it will be more volatile than $ZnCl_2$.

The sulphide, El_2S_3, or the oxysulphide, $El_2(S, O)_3$, ought to be precipitable by sulphuretted hydrogen and to be insoluble in ammonium sulphide. The metal will be easily obtained by reduction; its density will be about 5·9, its atomic volume about 11·5; it will be fusible at a somewhat low temperature.

It will not oxidize in air; it will decompose water at a red heat. The pure metal will not be easily attacked by acids or by alkalies. The atomic volume of the oxide, El_2O_3, will be about 5·5: this oxide will be soluble in the stronger acids; it will form an amorphous hydrate insoluble in water, but dissolved by acids and by alkalies.

The oxide of eka aluminium will form neutral and basic salts, $El_2(OH.X)_6$ but not acid salts; the alum, $ElK(SO_4)_2 12H_2O$, will be more soluble and less crystallizable than the corresponding aluminium salt. The basic properties of El_2O_3 will be more distinct than those of Al_2O_3, but not so marked as those of ZnO; it will belong to that group of oxides which are precipitable by barium carbonate. The volatility and other properties of the salts of eka aluminium stand midway between those of the salts of aluminium and of indium: it is probable that the metal in question will be discovered by means of spectral analysis, as was the case with indium and thallium.

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* Translated from the *Comptes Rendus*. Reprinted from the *Philosophical Magazine*, June, 1876.

The characteristics of eka aluminium were deduced from a consideration of the place occupied by this hypothetical element in the periodic system:—

Series	2nd group.	3rd group.	4th group.	5th group.
3. . .	Mg	Al	Si	P
5. . .	Zn	El	Es	As
7. . .	Cd	In	Sn	Sb

It ought to be remarked that, previous to the discovery of the periodic law, it was not possible to predict the existence or to foretell the properties of undiscovered elements.

M. Lecoq de Boisbaudran has discovered, by means of spectral analysis, the existence of a new element in the blende of Pierrefitte (Pyrenees); to this element he has given the name of gallium. The manner of its discovery, the process for its separation (precipitation by sulphuretted hydrogen before zinc), and certain of its properties (precipitation by barium carbonate, solubility of the hydrate in ammonia, degree of volatility, etc.), make it probable that the new metal is no other than eka aluminium.

If subsequent researches confirm the identity of the properties of gallium with those which I have pointed out as belonging to eka aluminium, the discovery of this element will furnish an interesting example of the utility of the periodic law. Let us hope that the discovery of eka silicium, Es=72, EsO_2, the probable properties of which I have detailed in Liebig's *Annalen*, vol. viii. (Suppl.) p. 171, will not be long delayed. It should be searched for more especially as associated with arsenic and with titanium.

Note by the Translator.

Since the publication of M. Mendelejeff's paper the discoverer of gallium has made known the results of further researches upon the properties of this metal and of its compound. He finds that the salts of gallium have most probably the general formula GaX_3, that the oxide is best represented by the formula Ga_2O_3, that ammonia precipitates solutions of the chloride and sulphate of gallium, probably with formation of a hydrate, that this precipitate is soluble in acid and in alkali, that gallic ammonio-alum is a crystalline salt almost certainly isomorphous with ordinary alum. M. Lecoq de Boisbaudran also finds that metallic gallium may be readily obtained by the electrolysis of an ammoniacal solution of the sulphate, that the metal is not oxidized in air at 200°, and that it readily decomposes acidulated water, especially at high temperatures. In these respects gallium appears to correspond with the hypothetical eka aluminium of M. Mendelejeff. Determinations of the atomic weight and of the specific heat of the new metal will be awaited with interest.

QUICKSILVER IN CALIFORNIA.

A return recently made by Mr. Booker, Her Majesty's Consul at San Francisco, includes the yield of the mines of the district during the past year. The total amount reaches 57,131 flasks, showing an increase of 30,000 flasks over that of 1874. The New Almaden, New Idria, and Redington mines have each increased their production, and many new mines, under the encouragement afforded by high prices for quicksilver, have been opened, and yielded their quota to the general supply. The "Guadalupe," in the neighbourhood of New Almaden, which had been closed for many years has again been worked with marked success, the yield with one small furnace amounting to 3415 flasks. The quicksilver deposit, known by the name of the "Sulphur Bank," in Lake county, owned by the California Borax Company, is so different to all other cinnabar mines in this country, that a few items in connection with it will be read with interest. It forms the southern slope of a long low ridge or hill which skirts the extreme eastern end of the south shore of Clear Lake. The ground lying between the Sulphur Bank and the lake shore is nearly level, and but a few feet above the water. At a distance of several hundred feet from the shore line, the surface begins to rise until the top of the elevation is something over 100 feet above the water. The rock composing the main body of the hill is of volcanic origin, chiefly basaltic lava, but occurring in various forms, some hard, heavy, and compact, some light and cellular, and much more of it more or less decomposed. The bank in which cinnabar has been found is about a quarter of a mile in length, and about one-third as much in width. It is without soil or vegetation, and its incrusted surface is like that generally formed by the flow of hot mineral springs. Some portions are rocky, and loose boulders lie scattered here and there. Several deep cuts have been made; they show a somewhat varied character. Some of them expose a good deal of rocky ground, in which the proportion of valuable mineral is very trifling. In others there are generally large masses of boulders which are enclosed in, and surrounded by a soft earthy material. The boulders are in various stages of decomposition and disintegration. Where hard and unaltered they appear worthless; when considerably decomposed they are penetrated by seams which carry cinnabar. The surrounding earthy mass generally shows streaks, seams, and lumps of cinnabar, and again in others the proportion of boulder is less. The ground in parts consists largely of a dark, moist, earthy material, a sort of hardened or indurated mud, compact, but easily "picked" down. The mass is very moist, and the water highly acid. In this ground sulphur abounds, and the cinnabar occurs in streaks, seams, and bunches, and is almost always to be found wherever sought for. In places the cinnabar deposit assumes the proportions of an ore-body. In one part there is a body of rich ore of cinnabar crossing the deepest part of the excavation, showing on both sides, and having a thickness of four or five feet. In these cuts where sinkings have been made, there are springs of hot water issuing, accompanied by carbonic acid, and a strong smell of sulphuretted hydrogen prevails in their neighbourhood. From the foregoing it will be seen that the cinnabar is not uniformly distributed. In the east end it is richer and more disposed to occur in a massive form; in the west end it is very widely and finely distributed, but the ground does not appear to be so rich. Experts have estimated the quantity of ore in the obviously ore-bearing ground at 662,000 tons, and the quantity of metal at 1·75 per cent. More than half of the quicksilver has been extracted by direct treatment in furnaces, and the other by the retorting of the cinnabar obtained by washing the fine ore in rockers, etc., concentrating the valuable mineral. Ten Chinamen have washed about ten tons daily, yielding about 1500 lbs. of cinnabar, which being retorted, furnish eight to ten tons of metal. The dirt thus washed is all preserved for further treatment by some more efficient process. The first (Knox and Osborne) furnace had a capacity on ordinary ore of twenty-four tons per day, but owing to the large amount of sulphur contained in the ore, and the time required for its combustion, and further to the large amount of moisture, the daily duty was only ten tons. The cost of production is not great, as the removal of the ore is easily effected, and the sulphur, by the ready ignition of its vapours, maintains the fire with a very limited quantity of fuel. The exports have been as follows:—

	Flasks.
China	18,190
Japan	968
Australia	832
Mexico	5,757
South America	2,149
Chili	355
New Zealand	258
Other countries	451
Total	28,960

The price at the commencement of the year was 1 dol. 55 c. per lb., but under the increased production it rapidly fell till it reached 65 c. in July; after which it rallied to 80 c. to 85 c., but at the close fell to 60 c. per lb.

COATING PILLS WITH GELATINE.*

BY CHARLES B. ALLAIRE.

During the last few years a line of pills coated with gelatine have been introduced in the drug trade, which are preferred by many physicians to those coated with sugar on account of their increased solubility. Concerning the advantages of the gelatine coating I shall have nothing to say, but as I have recently been making some experiments as to how the gelatine coat can be applied, with economy of labour, without infringing on any body's patent, and with a due regard to the appearance of the pill when coated, I will endeavour to explain the process, so that any one can follow it who feels disposed, believing it to be peculiarly adapted to the use of retail druggists.

The apparatus is simple, and can be made by any person of ordinary mechanical ability, with the aid of, perhaps, a carpenter and tinsmith, such as may be found in any village in the country. The apparatus used during my experiment consists of, first, the bath, made of ordinary sheet copper, one and one-half inches deep and four by eight inches surface, set in a disc of the same material ten or twelve inches in diameter, which is placed upon an ordinary iron kettle containing water heated by a stove or other means. In the bath we put sheet gelatine and water, about one ounce of the former to eight of the latter (a little experience will give the operator an idea of the density of the solution to be used), which has to be constantly regulated, owing to evaporation. When hot it is well to keep the bath closely covered, to prevent as much as possible the formation on the top of the solution of a pellicle or skin caused by evaporation. It is necessary also, to keep the solution free from any particles of dust or dirt, as these interfere seriously with the perfect finish of the pill coating. The second piece of apparatus consists of a piece of pine one inch thick and three by five and one-half inches surface, having thirty cavities in the surface, each one-fourth inch diameter and one-fourth inch deep, concave at the bottom, arranged in three rows of ten each, the rows one inch apart, and the holes in the rows one-half inch apart from centre to centre. The holes or cavities must all be of exactly the same depth. The next piece is the needle board, sectional views of which are given in Figs. 1 and 2. This is the most difficult of all to make, and requires the most care and patience. We proceed as follows: First, to make a "gauge," take strips of pine, perfectly true, one inch wide and three-fourths inch thick; cut into lengths of five and one-half inches each, four pieces; on the three-quarter side mark spaces one-half inch apart, making ten marks; then cut little furrows at exact right angles with the inch side, the breadth of each furrow to be equal to the diameter of a No. 6 needle, and the depth of the furrow to be half the breadth. Do this on both of the three-quarter inch sides of two pieces, and on one side only of the other two pieces; then fasten these pieces together into a block, by glue or nails, so that the furrows come together; then plane down to an even surface. We have thirty holes, each one the size of a needle and perfectly true, parallel with each other, and at right angles with the surface. Only one block of this kind has to be made. By it all the needle boards are made, as many as may be desired. The needle boards are then made by taking pieces of straight grained pine or cedar, as spongy and free from pitch as possible, each piece the size of the gauge board just described, but the grain in the needle boards must run perpendicularly when lying on the surface, so that when placed under the gauge board the needles can be put into the holes in the gauge board *head* first, then, by using a pair of pincers, they can readily be crowded down with the grain into the needle board. When all the holes are full, the gauge board is taken off, and the needles, being each in its place, can be still further crowded down so as to have the points projecting about five-eighths of an inch. They will not be all exactly true, but can be readily made so by tamping the wood at the base of the needles which are out of line with an ordinary hammer and nail. When once they are true, the points being in line both ways, they can be readily kept there by a drop of glue at the base. Use only the very best needles to be had, and "shorts" or "mediums" are preferable to "sharps."

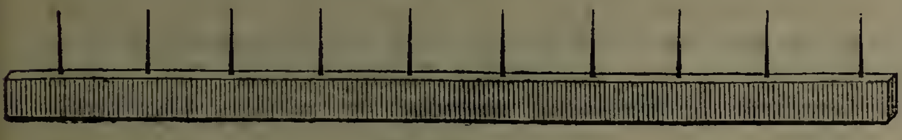

Fig. 1.

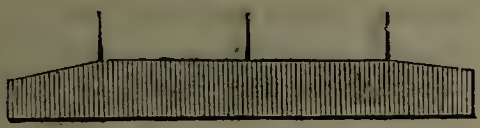

Fig. 2.

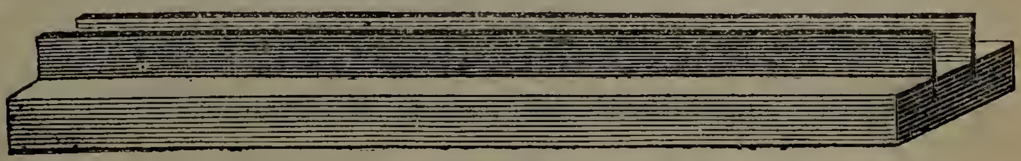

Fig. 3.

We now have one needle board made, and as many more can be made in the same way as are required. The points of the needles should correspond exactly with the centres of the cavities in the second piece of apparatus described, which we will call the pill board. The next piece of apparatus is the clamp, shown in Fig. 3. This is made of small strips of wood one inch wide, one-half inch thick, and five and one-half inches long. Cut two grooves with a saw one-fourth inch apart, and insert strips of rubber one-sixteenth inch thick; cut wide enough to project three-sixteenths of an inch above the surface. These are glued in, leaving the outer edges flexible. The only article necessary now to complete the entire outfit is the "comb bar," made of thin pine or other wood, about three-eighths of an inch thick. Make ten cuts with a saw lengthwise of the grain, each exactly one-half inch apart and exactly parallel, and two and one-half inches deep. This is fastened to the edge of a table with the teeth or strips projecting. We are now ready for business, and proceed as follows: The pills are rolled in the usual way. I prefer a round shape for many reasons—the mass can be more accurately divided; the pill looks like a pill when finished, and not like something else of animal or vegetable origin; besides it is the only shape that can be universally used by pharmacists. Care must be taken to work the mass quite stiff, or let the pills dry till they are quite firm before dipping, as the gelatine in drying shrinks, and is apt to expel little nodules of the mass outside the coating and cause much trouble. The pills are placed on the pill board and sink into the holes prepared for them. The needles are then dipped into a solution of one part castor oil and eight or ten of alcohol, and the whole thirty pills may then be picked up at one time and dipped into the gelatine. The oily solution on the needles prevents the adherence of the gelatine to them. Care should be taken not to dip the pills further than just to cover them. In taking up the pills the needles should be pushed far enough in to avoid losing any of the pills in the bath in the process of dipping. As soon as dipped the pills should be kept in a revolving position for half a minute till the gelatine solidifies, when they may be laid away to dry. When dry, the needles of the needle board are slipped into the comb board, so that the pills are above and the needle board below, and allowed to drop down, so that the pills rest on the comb board. Three clamps are then placed over the three rows of pills, pressed down so as to clasp the pills, and the needle board is withdrawn, leaving the pills in the clamps with the pin holes out. These are covered by dipping again in the bath and set away to dry. The finished pills can be easily taken out of the clamps by running a little strip of wood between the rubbers.

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* From *The Pharmacist*, March, 1876.

This process is exactly the same as used in our laboratory in manufacturing in a large way, except in the mode of drying, after the first dipping. We dry the pills on large wheels, which are kept revolving by machinery, so arranged that they can be stopped or started instantly at any desired point. I do not claim that the process here given is perfect, and have no doubt that many improvements can be made; it will, perhaps, do as a starting point, and I believe it to be fully as practicable as any of the patented processes, copies of which have been procured from the Patent Office and carefully examined. It will be observed that the dimensions here given are adapted to an ordinary size pill. Extra large or small pills would require a corresponding modification of the pill board and clamps only, all the other parts being adapted to any size of pills.

CRYSTALLYZED GLYCERIN.*

BY DR. PAUL F. VAN HAMEL ROOS.

Member of the Chemical Societies of Paris and Berlin.

Two months ago, I had the opportunity of observing in the chemical works of Messrs. Dunn and Company, at Stratford, a quantity of 56 pounds of crystallized glycerin.

The crystallization seems to have been induced by the movement of the railway and by the cold of the first days of January of this year. The specific gravity of this glycerin was found by me, at its melting point, 60° F., 1·261.

The crystals are monoclinic, perfectly colourless, and of a pure sweet taste. By putting some of the crystals into ordinary good glycerin, magnificent crystals begin to develop, most of the impurities remaining in the mother-liquor.

When the crystals are melted at a very gentle heat, not exceeding 70°—80° F., and afterwards exposed to a cold of 30° F. a very small crystal of crystallized glycerin is sufficient to solidify all the liquid. When the liquid is kept for some time at 24° F., the solidification is spontaneous, but moving the liquor vigorously seems to be indispensable to the solidification in the absence of a nucleus crystal.

With regard to the fermentation of glycerin, it was mentioned by Professor Redtenbacher, about twenty years ago, that there are two different sorts of fermentation depending on the temperature. At 60° F. the results of the fermentation were propionic acid, at 100° F. alcohol and butyric acid.

As it was mentioned that the fermentation soon stops and leaves a certain amount of unchanged glycerin, it was very probable that this fermentation was due only to certain impurities which were contained in the glycerin on which Professor Redtenbacher experimented.

To determine this, I took 36 grams of crystallized glycerin, 50 grams of distilled water, and 5 grams of washed German yeast, and mixed the whole well together. I also took the same quantities of *refined commercial glycerin* (sp. gr. 1·248), distilled water and German yeast, and exposed both to a temperature of about 56°—60° F.

To determine whether the yeast was active or not, I mixed a few grams with an acqueous solution of sugar, and exposed this mixture at the same temperature.

Since the 28th of February of this year, both samples of glycerin failed to show the least trace of fermentation, but a few hours after the contact with yeast, the sugar showed a violent fermentation as a proof that the yeast was quite active. These experiments are still going on, and as soon as I observe any alteration in either sample of glycerin, I hope to report it.

As it is suggested that hydrocyanic acid is a test for the purity of glycerin, I compared the action of this acid on the 28th of February on two different samples of refined commercial glycerin (sp. gr. 1·248), and on melted crystallized glycerin, but up to the present time no alteration in colour or other visible change has taken place. I took for these experiments 2 oz. of glycerin and about ½ oz. of hydrocyanic acid (5 per cent.)

The solidification of the glycerin seems to depend especially upon its being perfectly pure and anhydrous.

The least quantity of water or any other impurity hinders the crystallization.

The crystallization does not seem to be induced by putting into refined commercial glycerin crystals of other substances of the same system as crystallized glycerin, but my experiments in this direction are not yet finished. The crystallizability of the glycerin seems to be the best test for its highest purity, and at the same time a means of separating ordinary glycerin from almost all its impurities.

CARBON BISULPHIDE.*

BY L. H. FRIEDBURG.

When carbon bisulphide, purified by distilling it off palm oil (which is recommended as the most convenient means of purification on the large scale), is agitated with red fuming nitric acid, it takes up the vapour of nitrogen tetroxide, both liquids acquiring the same colour. The bisulphide, when separated and filtered, fumes in moist air and remains unaltered for weeks. On adding cold water to a mixture of carbon bisulphide and fuming nitric acid, the bisulphide assumes a rose-red to violet colour, and when washed with water turns milky, but after filtering it forms a clear violet liquid, more highly refractive than the ordinary bisulphide. When this liquid is carefully distilled between 50° and 60°, carbon bisulphide goes over, leaving the colouring matter behind. The distillate, after washing with water and re-distillation, is chemically pure. The colouring matter, which has as yet been obtained in very small quantity only, is solid, brown, acid, and easily decomposable. The violet coloration is produced equally in carbon bisulphide which has been previously purified by fuming nitric acid on again treating it with that acid and water. It is not produced by washing with water the brown solution of nitrogen tetroxide acid in bisulphide, or by passing nitrous anhydride into bisulphide, the liquid in the latter case acquiring the well-known bluish-green colour of nitrous anhydride.

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* Paper read before the Chemical Society, and reprinted from the *Journal of the Chemical Society* for May.

* *Deut. Chem. Ges. Ber.*, viii., 1616; from the *Journal of the Chemical Society.*

The Pharmaceutical Journal.

SATURDAY, JUNE 24, 1876.

Communications for the Editorial department of this Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. ELIAS BREMRIDGE, *Secretary,* 17, *Bloomsbury Square, W.C.*

Advertisements, and payments for Copies of the Journal, to MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PROFESSIONAL CHEMISTS.

A MOVEMENT is now in progress among analytical and professional chemists which presents some features of interest to those engaged in the drug trade, not only because it arises from circumstances in some degree analogous to those which led to the formation of the Pharmaceutical Society, but also because persons engaged in trade are now directly interested in the competency of the official chemists who are charged with the decision of questions affecting not only the welfare of the public but also the character and credit of traders. Professional chemists have long felt the disadvantages arising from the absence of any criterion of the possession of suitable knowledge and skill by which the general public could distinguish between qualified men and others who possessed no kind of claim to recognition as authorities in the decision of any chemical question. The demand for professional services of various kinds in regard to matters involving a knowledge of chemical science has of late years increased so rapidly, in consequence of the growing recognition of the practical value of chemistry, that while a few years since the career of the professional chemist was but very rarely taken up, there is at the present time a comparatively large number of persons engaged in this business.

In the absence of any sufficient mark of qualification on the part of those practising in this capacity it is not surprising that pretenders should sometimes succeed in securing a footing to the disadvantge of well qualified men, and that their proceedings should tend to bring unmerited discredit upon the class to which they have attached themselves. This evil has grown to such an extent that an attempt is now being made to establish some organization capable of conferring upon qualified chemists a credential by which they may readily be known to possess such knowledge and skill as their calling requires. This is an object that is sufficiently reasonable to command the support and sympathy of every one at all interested in matters upon which chemical science has a bearing. Its attainment appears to have been taken in hand by a section of the Chemical Society, and a warm discussion has for some time been carried on in reference to the propriety of admitting persons to fellowship in the Chemical Society with so much latitude as has been usual. It is assumed by these gentlemen that the designation Fellow of the Chemical Society is regarded by the public as a species of degree, the possession of which is a guarantee of the holder's proficiency in chemical science. So far, no doubt, they are right as to the fact that this is the case. But they also assume in addition to this that such a view of the title Fellow of the Chemical Society is a correct one, and upon this basis they have announced their intention of attempting to bar the election of any one as a Fellow of the Society who does not bring forward evidence of chemical qualification when he presents himself as a candidate for admission into the Society.

Though we confess our sympathy with the objects with which this course of action has been adopted, and should gladly see established some reasonable method of certifying a chemist's fitness for the exercise of his business, we disagree entirely with the view taken by the reform section of the Chemical Society as to the proper significance of the fellowship. Though it is a fact that the title is considered to indicate a practical knowledge of chemistry, we are unable to regard this otherwise than as a misfortune, and so far as the interests of chemists are concerned one that should be prevented from doing further mischief.

Unfortunately, the practice of parading the letters F.C.S. for the purpose of conveying the impression that their possessor was necessarily a chemist, has been for a long time too common, and it is to be regretted that the Council of the Society has not taken some step to counteract this evil practice. Had that been done some years ago the title might have maintained some greater value than it now has, or at any rate it would not have been so commonly made the exponent of empty vanity. According to prevailing practice, Fellowship of the Society has been so widely accorded to persons who are not professional chemists, and who never desired to be so regarded, that it is almost too late to enter upon an attempt to make the title carry such a value as attaches to membership of the Institute of Civil Engineers. In our opinion there is a sufficient want of analogy between the two cases to make such an attempt undesirable. The Institute of Civil Engineers is mainly an association of practical engineers—men actually engaged in one or other branch of engineering pursuits—and this is exclusively the case as regards the members, though there may be some amateurs among the associates. In the Chemical Society, however, the majority are amateurs, or at least not professional chemists, and there is practically only one grade—that of Fellow. Having regard to the existing position of chemistry in this country, we think that it is by no means a disadvantage if the Chemical Society has sufficient attractions for amateurs to induce them to support it by their subscriptions, and help the advance of chemistry by attending its meetings. If it were not for the large amount of subscriptions now received the exceedingly useful volume published every month by the Society could not be produced, and every one who has paid attention to the subject will admit that there is ample room for exciting an interest in chemical science even among those whose daily business is to conduct some kind of chemical operation.

The diffusion of such knowledge of the value of chemistry in all those branches of industry or enterprise which involve dealing with material substances almost in any way, is as essential for securing a proper status for chemistry and for chemists, as the provision of a credential by which the competent chemist can be known by the uninitiated. In the former work the Chemical Society has already done good service, and though we do not by any means affirm that it is above the need of reform, in some respects we are decidedly of opinion that it would now be a mistake to attempt making fellowship of the Society the exclusive property of the professional chemist. This class, though comprising only a very small number of those who are Fellows of the Society, is we believe sufficiently numerous to admit of the attempt to establish such a distinctive title or degree independently of the Chemical Society, and by means altogether free from any antagonism to it. Such an organization of professional chemists might no doubt prove eminently serviceable, both to those engaged in such pursuits and to the public who require their services.

THE CHEMISTRY OF JABORANDI.

Notwithstanding the great interest that has been excited by the remarkable physiological properties of Jaborandi there is still a great deficiency in our knowledge of the chemistry of this drug. That it does contain a substance possessing the general characters of an alkaloid appears to be more than probable, though it has not been quite satisfactorily demonstrated. In this country, Mr. Gerrard has succeeded in isolating from Jaborandi a substance which he terms pilocarpine, and he has described to some extent a saline compound of this alkaloid with nitric acid. But we have beyond these data very little information as to the specific character of the substance.

The account given of this alkaloid about the same time by Mr. Hardy is not more complete, and above all it is to be regretted that no analysis of the substance was made. This deficiency has quite lately been supplied by Mr. Kingzett, who at the last meeting of the Chemical Society read a communication on the subject.

The method of preparation adopted by Mr. Kingzett consisted in extracting the leaves with water at a temperature of 70° C., concentrating the liquid, and separating albuminous substances by coagulation, and filtering the acidified solution. The alkaloid was then precipitated by the addition of phosphomolybdic acid, the precipitate washed and decomposed by digesting it with a hot solution of barium hydrate, and the excess of baryta separated by carbonic anhydride. The product of this operation is stated by Mr. Kingzett to have been the alkaloid in question still containing a little baryta that could only be removed by sulphuric acid.

In Mr. Kingzett's next experiment he operated upon the twigs and stalks, extracting them as before with water, precipitating albuminous impurities with alcohol, and then evaporating the liquid portion to a syrup, which was treated with ether and chloroform in the presence of ammonia. The alkaloid was then separated by treatment of the acidified solution with phosphomolybdic acid as above described. Mr. Kingzett failed to obtain any crystalline hydrochlorate of the base thus prepared, and consequently the hydrochloric acid was separated by means of oxide of silver, and the amorphous alkaloid submitted to analysis after drying it over sulphuric acid. The results obtained by Mr. Kingzett led him to adopt the formula $C_{23}H_{34}N_4O_4 4 H_2O$ as representing the composition of the alkaloid.

A platinum compound was also submitted to analysis, and the results were found to accord with those above given. This compound was obtained by adding an alcoholic solution of platinic chloride to an alcoholic solution of the alkaloid acidified with hydrochloric acid. The salt was precipitated, and after solution in hot water it crystallized in octahedra, which gave on analysis results leading to the formula $C_{23}H_{34}N_4O_4 2 HCl, PtCl_4$.

It still remains to be ascertained what relation exists between the alkaloid thus obtained by Mr. Kingzett and that described by Mr. Gerrard, for in two important particulars there appears at present to be a difference between them—viz., the crystallizability of the hydrochlorate and the precipitation of the alkaloid by phosphomolybdic acid.

DEATH OF MR. McIVOR.

We regret to learn from the *Gardeners' Chronicle* that a telegram has been received announcing the death, at Ootacamund, of Mr. McIvor, Superintendent of the State Plantations in Southern India. The measure of success which has attended the attempt to introduce the culture of the cinchona into India has been to a large extent due to Mr. McIvor's labours in the Neilgherry plantations.

CIVIL SERVICE TRADING

On Tuesday night last, according to notice, Sir Thomas Chambers brought forward the subject of Civil Service Trading in the House of Commons. Scarcely, however, had he commenced his statement when it was moved that the House be counted, and only thirty members being present the sitting was adjourned.

The Commission appointed to examine the memoirs sent in to compete for the prize given by the Paris Society of Pharmacy for the best thesis of the year has reported in favour of a "Comparative Study of Gums and Mucilages," by M. Giraud. There were three other competitors.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

June 21st, 1876.

Present—Mr. Williams, President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Taylor, and Umney.

Dr. Greenhow was present on behalf of the Privy Council.

MAJOR EXAMINATION.

Nine candidates were examined. *Two* failed. The following *seven* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Appleby, Edward Joseph	Brighton.
Pain, Arthur	Bury St. Edmund's.
Sheppard, Ebenezer	Birmingham.
Thomas, Harry Alma	London.
West, John Leaver	Ashby-de-la-Zouch.
Wheatly, Arthur William	Thame.
Woodland, John	Rochester.

MINOR EXAMINATION.

Fifteen candidates were examined. *Eight* failed. The following *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Adams, Charles	Birmingham.
Fosse, Alexander Fare	Ilfracombe.
Hatch, James Oliver	Lancaster.
Helmore, William Holloway	Stratford-on-Avon.
Mitchell, Walter	Sheffield.
Prebble, John George	Folkestone.
Waddington, Charles Edwin	Bath.

PRELIMINARY EXAMINATION.

The undermentioned certificates were received in lieu of the Society's examination:—

Certificate of the College of Preceptors.

Cave, John Maund Perry	Leominster.

Certificates of the University of Cambridge.

Callender, William Wright	Exeter.
Killick, Charles Rowe	London.

Certificate of the University of Oxford.

Hutchinson, Harry	Willenhall.

June 22nd, 1876.

Present—Mr. Savage, Vice-President; Messrs. Allchin, Barnes, Benger, Carteighe, Corder, Gale, Haselden, Linford, Martindale, Moss, Schweitzer, Taylor, and Umney.

MINOR EXAMINATION.

Twenty candidates were examined. *Eleven* failed. The following *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Barcham, Henry	Hackford.
Daniel, John	Ceibach.
Elkington, Thomas Valentine	Spalding.
Gregory, Walter	Taunton.
Harmer, James Dorkin	Kingston-on-Thames
Radford, Charles	Nottingham.
Roberts, Edmund	Cambridge.
Silverwood, Joseph	Manchester.
Welch, Alfred Edward	Great Yarmouth.

MODIFIED EXAMINATION.

Two candidates were examined. *One* failed. The following passed, and was declared qualified to be registered as a Chemist and Druggist.

Pooley, John Dingley Stephens	Brighton.

Proceedings of Scientific Societies.

CHEMICAL SOCIETY.

Thursday, 15th June, 1876, Dr. J. H. Gladstone, F.R.S., Vice-President, in the chair. The usual business of the Society having terminated a large number of communications were read, this being the last meeting of the session. The first paper by Professor Dewar, entitled "Chemical Studies," was chiefly devoted to an account of several interesting lecture experiments. Dr. H. E. Armstrong then gave a short account of his elaborate "Researches on the Reduction of Nitric Acid, and on the Oxides of Nitrogen: Part 1. On the Gases Evolved by the Action of Metals on Nitric Acid," made in conjunction with Mr. Accworth. Mr. C. T. Kingzett then read a paper on "The Composition and Formula of an Alkaloid from Jaborandi." There were also papers on "The Simultaneous Action of Iodine and Aluminium on Ether and Compound Ethers," by Dr. J. H. Gladstone and Mr. A. Tribe; "On Compounds of Antimony Pentachloride with Alcohols and with Ether," by Mr. W. C. Williams; "On the Volatility of Barium, Strontium, and Calcium," by Professor J. W. Mallet; "On the Action of Chlorine on Acetamide," by Dr. E. W. Prevost; "Note on the Perbromates," by Mr. M. M. P. Muir; and a communication "On a New and Convenient Form of Areomates for Clinical Use," by Dr. J. G. Blackley. After the Chairman had thanked the authors in the name of the Society the meeting was adjourned until November next.

PHILADELPHIA COLLEGE OF PHARMACY.

The eighth regular meeting of the session was held May 23rd, 1876, Mr. Edward Gaillard in the chair.

The registrar read a paper on—

THE PHARMACEUTICAL VALUE OF SUGAR OF MILK.

BY WALTER E. BIBBY, PH.G.

At a recent meeting, Mr. J. C. Biddle recommended the incorporation of sugar of milk with powdered squill, in order to prevent caking. This led me to believe that this substance could be used to attain the same effect in a large number of the gum resins that are often required in the state of powder, and cannot be reduced unless previously heated, which process is very liable to endanger or completely subvert the therapeutical value; or, if powdered by any other means, it fails to reach the wants of the pharmacist, by reason that the state of powder is merely temporary. Belonging to this class of substances are ammoniac, assafœtida, galbanum, guaiac, myrrh, and a large number of others.

Now, to preserve these substances in the state of fine powder, and in a condition that they may be dispensed on the prescriptions of physicians in a thoroughly pharmaceutical manner, I would recommend that sugar of milk be added and triturated in the proportion of either three parts of the gum resin to one of sugar of milk, or of two of the former to one of the latter—the powder to be preserved in well-stoppered bottles.

For guaiac resin and squill, I use 90 parts to 10 of sugar of milk. It may be well to state that the cooler the weather the less time is required for trituration. To preserve camphor in a form of powder I find sugar of milk answers better than any other substance that has been recommended. Below is given the quantity of sugar of milk required:—

Take of—

Camphor	90 grains.
Alcohol	30 drops.
Sugar of Milk	10 grains.

Rub the camphor first with the alcohol, until reduced to a fine powder, then with the sugar of milk.

The sample on the table was powdered in this manner about two months ago.

At the suggestion of Professor John M. Maisch I was induced to try sugar of milk in preparing mercurial pill and mercury with chalk, which two preparations are very seldom manufactured by the apothecary, for the reason of the great difficulty encountered in extinguishing the mercury. In preparing blue pill I substitute sugar of milk for powdered liquorice root, and with a slight modification of the officinal process this difficulty can be readily overcome. I recommendthe following process for—

Pilula Hydrargyri.

Take of—

Mercury	
Confection of Rose	
Sugar of Milk	āā ℥i

Rub the mercury with the confection of rose and sugar of milk until metallic globules are no longer visible.

Blue mass prepared in this manner has about the same pilular consistence as when prepared by the formula of the U. S. Pharmacopœia. The blue pill is often wanted in the state of powder; this has led to quite a number of suggestions. Some have recommended rubbing together mercury with honey until globules of mercury cease to be visible, and then incorporating other ingredients, the whole to be set aside in a warm place to dry, and then reduced to powder. Others recommend rubbing the mercury with syrup and sugar, and dry by the aid of heat. I may here state that both of these processes are exceedingly objectionable, as when heat is employed or when left in contact with the air, the mercury becomes oxidized, and renders the preparation entirely too active. Also, when honey or sugar are employed, the preparation is liable to attract moisture from the atmosphere, which causes it to cake together and become hard.

To remedy this, and at the same time produce a perfect division of the mercury, I would suggest the following method for making—

Pulvis Pil. Hydrargyri.

Take of—

Mercury	℥i
Sugar of Milk.	℥ii

Triturate the mixture thoroughly until the powder will pass through a fine sieve, or fine bolting cloth.

Prepared in this manner, powdered blue mass is a light greyish powder, and incapable of attracting moisture; and so thoroughly is the minute state of division, that globules of mercury cannot be seen with the aid of a lens. This preparation is also well suited for conversion into the pilular form.

Mercury with chalk, made according to the formula in the U. S. Pharmacopœia, does not come up to the wants of the physician on account of the imperfect division of the mercury; and, owing to this fact, it has fallen considerably into disuse. After trying various means none answered so well and was as convenient as sugar of milk. I prepare it in the following manner:—

Hydrargyrum cum Creta.

Take of—

Mercury	℥iii
Prepared Chalk	℥iv
Sugar of Milk	℥i

Rub the mercury, prepared chalk, and sugar of milk into an impalpable powder, and pass it through a fine sieve.

The above formula, although not containing the same amount of prepared chalk, contains the metallic mercury in the same proportion (3 in 8) as called for in the U. S. Pharmacopœia, and I think is more efficacious as a remedy, as the mercury is more thoroughly divided.

In the above I state the result of my manipulations with sugar of milk and those substances that are required to be in a very minute state of division; and I feel confident that those who will employ this substance in the manner and for the purpose I have described cannot fail to acknowledge that sugar of milk is preferable to all other substances. Being perfectly harmless, of a hard, gritty nature, and chemically a perfectly definite material, I feel certain that it will supersede the old practice of employing heat in powdering the gum resins. Moreover, in dispensing emulsions, sugar of milk materially assists in the formation of a perfect emulsion, by reason of the minute state of division of the gum resin, induced by the trituration of sugar of milk with the drug.

Professor Maisch had remarked upon a former occasion that the observations made by the writer were of great importance to practical pharmacy, and would repeat the statement. The sample of powdered myrrh exhibited, although apparently somewhat agglomerated, when rubbed between the fingers would be found to be in a fine state of division, and to judge from the odour, contained the entire amount of volatile oil. The mercury with chalk, under an ordinary lens, appeared as a powder perfectly uniform in colour, and was, to all appearances, free from oxides. The paper suggested numerous applications.

Mr. Bibby stated, in answer to a suggestion, that he had made numerous experiments with assafœtida, with variable results, but found that by the addition of an equal amount of sugar of milk a permanent powder could be produced.

The Professor remarked he could well see the cause of the variable results, which must be due to the variable composition of commercial assafœtida, which, according to Professor Dymock, of Bombay (see *Pharm. Journ.* [3], vol. v., p. 945), is generally more or less adulterated.

Professor Remington thought it advisable to find out the smallest possible amount of sugar of milk required in in the case of each drug.

Mr. Bibby thought in preparing emulsions with these powders a mortar should be used, mere agitation in a vial not always yielding good results.

Professor Maisch showed a handkerchief with initials marked thereon eleven months ago, by placing upon it the lower surface of a leaf of *Magnolia glauca* and tracing the letters upon the upper surface with a pointed instrument, using some pressure. He stated that his attention had been called to this property by C. E. Hornberger, a member of the last graduating class. The handkerchief exhibited had been frequently washed, without affecting the marking.

Mr. A. P. Brown exhibited an inhaler for gaseous chloride of ammonium, which has been devised by Mr. H. P. Reynolds, of Plainfield, N. J., and may be prepared from an ordinary wide-mouth bottle, closed with a tightly fitting perforated cork, so as to admit of two tubes. One of these is a glass syringe tube, passing nearly to the bottom and filled with small pieces of sponge; while the longer, which is bent to be applied to the mouth, may have its origin just below the bottom of the cork. When it is wanted for use, the cork is removed, and after placing three or four drops of chemically pure muriatic acid in the bottle, and the same quantity of strong aqua ammoniæ in the syringe tube containing the sponge, the mouthpiece of the inhaling tube is taken between the lips for the purpose of inhalation. In drawing air through the apparatus, the ammonia combines with the muriatic acid, and the air becomes charged with vapours of ammonium chloride.

Professor Remington described a convenient way of inhaling substances which are usually added to hot water —a rubber tube is slipped over the small end of a funnel which is placed as a cover over a tin vessel containing the water and drug.

Mr. Edward C. Jones exhibited samples of cinnamon water, made by various processes, and desired information as to how many pharmacists prepared the water from Ceylon cinnamon, and to what extent cassia was used.

Mr. A. P. Brown having recently given some attention to this subject, thought but few used Ceylon cinnamon.

SOCIETY OF ARTS.

THE CULTIVATION OF CAOUTCHOUC-YIELDING TREES IN BRITISH INDIA.[*]

BY CLEMENTS R. MARKHAM, C.B., F.R.S.

(*Concluded from page* 1016.)

The *Heveas* are of several species, and like the *Castilloas,* they are large trees growing in humid tropical forests. Mr. Spruce, who is the highest authority on this genus, considers that the cordillera of the Andes separate the *Castilloas* from the *Heveas,* and that the caoutchouc-yielding trees to the eastward of the Andes are of the latter genus. They extend up to the very foot of the mountains, and I have myself passed some time among *heveros,* collecting for local use in the *montanas* of Paucartambo and Laris. While in Peru and Ecuador the india-rubber is called *heve,* in Brazil the name is *seringa,* and the collectors are *seringueiros.* Eight species are enumerated by Collins, namely:—

Hevea Brasiliensis	(Müll.)
„ *Spruceana*	(Müll.)
„ *Discolor*	(Müll.)
„ *Pauciflora*	(Müll.)
„ *Rigidifolia*	(Müll.)
„ *Benthamiana*	(Müll.)
„ *Lutea*	(Müll.)
„ *Guyanensis*	(Aube.)

The *Hevea Brasiliensis* is the species which prevails round Pará and the forests of the lower Amazon; *H. Spruceana* is met with round the mouth of the Tapajos, and the other species occur on the banks of the Rio Negro and Casiquiari; but the genus is far from having yet been thoroughly studied.

In the Pará district of the lower Amazon, very little rain falls from August to February, the heaviest rains being in May and June; and the temperature varies between 74° and 95° Fahr.; the mean of a year being 81°. The Amazon valley is remarkable for uniformity of temperature and for regular supply of moisture; the dry season extending from June to December, and the wet from January to May. In the upper Amazon the atmosphere is densely vaporous.

Our latest authorities on the Pará caoutchouc are Mr. Wickham and Mr. Franz Keller. The latter traveller, writing in 1874, says that the *Hevea* trees on the shores of the Amazon have nearly disappeared, owing to the destruction and death of trees, the places of which have never been filled up. But the forests of caoutchouc trees on the banks of the Madeira, Purus, and other tributaries yield over 1,600,000 lbs.; while the yield of the whole of this colossal river basin amounts to 12,800,000 lbs.[†] Keller laments the fact that no attempt is made in the Amazon district to cultivate these useful trees, which, owing to frequent tapping and rough treatment, suffer much and die soon. The *seringueiros* have to go further and further into the interior to seek fresh trees in undiscovered valleys. It is to be feared that, owing to the indolence of the mestizo population and the short sightedness of the Brazilian Government, measures of conservancy will not be adopted until too late.

The *Castilloa,* like the *Ficus elastica,* though requiring a very humid climate, will only thrive where there is drainage at the roots. But Keller says that the *Hevea* yields the largest supply of milk when, during the annual inundation, its stem is at least five feet under water.

The scene presented by an encampment of caoutchouc collectors is extremely picturesque. Their huts are lightly built among the trees, and round them tower the majestic *mosqueteiro* palms and the lofty *bertholletia,*[*] while in front is the gleaming river with its sunny sandbanks. From the huts narrow paths lead through the dense undergrowth, cut by the axe of the *seringueiro,* to the lonely caoutchouc trees. The collector makes small holes in the bark, to which tubes of clay are fixed, which lead the milk into bamboo receptacles; going from tree to tree he collects these bamboos, and on his return to the hut the contents are poured into the carapace of a large tortoise; the milk is then subjected to the process of smoking without delay, for if left standing too long the resin separates. In this process the milk is exposed to the smoke of the *urucury,* or nuts of the *Attalea excelsa*[†] palm, which alone, it is said, possess the power of liquefying. An iron pot without a bottom, and with a narrow neck like a bottle, is placed so as to form a chimney over a heap of these burning nuts, and the white steam rises in masses through the narrow openings. The *seringueiro* pours a small quantity of the white fluid, of the consistency of thick milk, from a calabash over a light wooden shovel as evenly as possible, and then rapidly thrusts it into the white steam. The milk soon takes a greyish-yellow colour, and becomes firm. Thus they add layer upon layer, until the caoutchouc on each side of the shovel is about eight inches thick. The *plancha* or slab is then finished, taken off the shovel by cutting down one side, and hung up in the sun to dry, as there is a good deal of water between the layers. The colour of the *planchas* is at first a light silver grey, but by degrees becomes yellower and yellower, until it turns the dark colour known in commerce; a practised hand can, in this way, manufacture 5 or 6 lbs. in an hour. The thicker and freer from bubbles the better the quality and the higher the price. The cheapest is called *surnamby,* or *cabeca de negro* (negro head), and is made from drops found at the foot of the tree, and from the refuse in the vessels.

Great improvements might no doubt be introduced in the method of preparing caoutchouc by consolidating with alum instead of the tedious process of smoking. The milk could be kept in a fluid state by adding a little ammonia; and in this condition it might be dispatched at once in casks. But the old routine will continue on the Amazon until European factories are established. It will, I trust, be for British India to lead the way in such reforms, when plantations of *Hevea* trees are fully established.

The achievement of this great object—the introduction of *Hevea* trees in India from the Amazon valley, has yet to be accomplished. Efforts have been made to obtain seeds, and a few plants have been so raised at Kew and sent to Calcutta. But, like most euphorbiaceous plants, the seeds of *Hevea* are very perishable, and I was convinced there would be no real success until a special agent was sent to Pará, and up the Amazon, to make a collection of plants.

I am happy to say that the Secretary of State for India has sanctioned the employment of Mr. Cross on this duty, and it is very certain that no man in England could be found who would be likely to perform it better. He will leave England next June, so as to arrive in the

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[*] Paper read before the Chemical Section of the Society of Arts. Reprinted from the Journal of the Society.

[†] Keller gives the following statement of the export of caoutchouc from Pará:—

1865 — 256,967	arrobas.	
1866 — 291,091	„	
1867 — 301,170	„	
1868 — 334,975	„	
1869 — 365,354	„	(4558 tons).

[*] *Bertholletia excelsa* yields the Brazilian nuts.

[†] There are twenty species of these beautiful palms in the Amazon valley. They yield the black fibre called *piassaba,* which makes excellent cordage. The nuts are excessively hard, and beautifully mottled with dark and light brown.

Amazon towards the end of the rainy season; and his instructions will be not only to collect and bring home a supply of healthy young plants, but also to make detailed observations on the habitat of the trees, and on the methods of tapping, and of preparing the caoutchouc.

There is a third india-rubber yielding tree of South America of less value, whence comes the Pernambuco caoutchouc. It is an apocyneaceous tree, the *Hancornia speciosa*, known as *mangiaba* by the natives, and is found in the provinces of Rio de Janeiro, Bahia, Pernambuco, and Goyaz. It is a smalltree about the size of the apple, and is more valued for its fruit than for its caoutchouc, which is not much collected.

It remains to consider the best sites in British India for the cultivation of the *Hevea* and *Castilloa* trees. The mean temperature of the province of Pará on the Amazon —between 73° and 81°—is the same as that in British Burma, and in Canara, Malabar, and Travancore, on the west coast of India. Dr. Brandis points out the moist evergreen forests at the foot of the Coorg ghauts in Malabar, and the Attaran valley in Tenasserim, as localities where the temperature is very nearly the same as that of Pará. The annual rainfall on the lower Amazon is about sixty to ninety inches, which is less than that on the Malabar and Burma coasts, where it is from 100 to 160 inches. But the chief difference is that the supply of moisture is more uniformly distributed over the seasons in the caoutchouc-yielding region of Brazil than is the case in the moist zones of India. Mr. Spruce found that the *Hevea* trees throve best in a humid climate where there are rarely ten days together dry, even in the so-called dry season. The nearest approach to this would be found in some localities in Ceylon; but the southern parts of the Malabar and Burmese coasts are also likely to suit the *Hevea* trees. The *Castilloas*, judging from their wide distribution in South and Central America, are likely to accommodate themselves to a wider range, as regards temperature and humidity, in India. They will probably thrive in Assam with the *Ficus elastica*, as well as in Burma and on the west coast.

It will be well, also, to introduce the climbers, which will give an earlier return than the great forest trees of South America, though of inferior quality, such as the *Vahea* of Madagascar, the *Landolphia* of Africa, and the *Urceola* of Borneo. Plants of *Vahea* have already been obtained and sent to Calcutta, and this is a kind which has been found to yield very superior caoutchouc, ranking next in estimation to that of Pará.

Thus it will be seen that, so far as British India is concerned, the necessary measures have now been adopted with a view to securing the permanency of a large supply of the best caoutchouc. Plantations of the indigenous kind, the *Ficus elastica*, have been formed in Assam, and operations have been commenced there on an adequate scale, and in accordance with a well considered plan. An expedition was despatched last year to obtain a supply of plants of the *Castilloa* kind from the isthmus of Panama, with a view to their introduction into India, which was completely successful, and a good stock of *Castilloa* plants is now at Kew, nearly ready for transmission to their final destination. Sanction has been obtained for the despatch of another expedition to obtain a similar supply of plants of the *Hevea* from the Amazon valley. While the indigenous caoutchouc tree of India is being converted from a wild to a cultivated state, the better kinds of caoutchouc trees of South America are being collected for introduction into India, in order that they also may be cultivated, and the best situations for their successful growth have been considered. Our hope and trust is that these measures will be the means of conferring a lasting benefit on British India, and through India on the industry of the world.

ROYAL INSTITUTION OF GREAT BRITAIN.[*]

THE ACTION OF LIGHT ON SELENIUM.

BY C. WILLIAM SIEMENS, D.C.L., F.R.S., M.R.I.

Amongst the powers of nature, light seems to be the one which enters least into the composition of matter. The beam of light falling upon the landscape, or upon a work of art, reveals instantly its form to our minds, but with the disappearance of the light its effects seem to vanish entirely; the landscape and the work of art still remain the same, and may be brought back again to our ocular perception, accompanied by all the beautifying effects of light and shade and colour, and yet there seems to be no permanent effect produced in the material condition of the objects before us. Shall we wonder, then, that the true nature of light has remained a mystery more profound than that of the other forces in nature, and that Newton himself exclaimed, in desponding mood, the memorable words, "Nil luce obscurius."

While Newton laid down incontrovertible principles regarding the nature of light, it has been reserved for physicists of recent times to prove the effects of light upon solids. One of the most beautiful illustrations of the permanent effects of light upon matter is furnished us through photography; here the ray of light causes the decomposition of compounds of silver in a degree beautifully varying with its intensity.

Another effect of light upon solids is rendered visible by phosphorescent salts, which when acted upon by light continue to glow in various colours for a length of time when taken into a dark room.

If any one required proof that light was a moving force, I would refer him to the discourse delivered in this very place a week ago, when Mr. Crookes gave motion to his radiometer by means of rays of light. But I would go a step further, and say that light is perhaps the most potential force in nature, because it covers the earth with trees and vegetation of all kinds. It is true that the mushroom thrives in what appears to us utter darkness; and within the last few days Dr. Higgs has called my attention to a fungus which grows in the deep recesses of the Derbyshire caves, where it lives without the help of light; but an analysis of this fungus shows that it contains no woody fibre or solid carbon, and so helps to favour the hypothesis *that it is not heat but the ray of light which breaks up carbonic acid in the leaves of plants* in order to separate the carbon. Carbonic acid can indeed be broken up by heat; but it has been shown by Bunsen and De Ville that a temperature of 2500° C. is necessary for its accomplishment—a degree of heat which would at once destroy all vegetable organization.

Different from these effects of light upon solids is that which forms the subject matter of my discourse, viz., the effect of light upon selenium.

Selenium is an elementary body, which was discovered by Berzelius in 1817 in the residues resulting from the distillation of iron pyrites. It is fusible, combustible, and similar in many other respects to sulphur, phosphorus, and tellurium. It is in fact one of those substances which are placed by chemists upon the border between metals and metalloids, and like a true borderer, selenium refuses to be amenable to the laws governing either of these natural groups. If melted (at 217°) and cooled rapidly, it presents a brown amorphous mass of conchoidal fracture, which like sulphur and phosphorus is a non-conductor of electricity. But if a stick of this amorphous selenium is exposed for some time to the heat of boiling water, a structural change becomes observable: it assumes a crystalline fracture, and when again inserted in the galvanic circuit it is found to be a conductor of electricity. Professor Adams has shown recently that its conductivity is different when the current passes through in one direction or the other, and it may here also be observed that its

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[†] Lecture delivered at the Royal Institution of Great Britain, Friday, February 18, 1876.

conductivity in this form is still very slight, so that a powerful battery and a delicate galvanometer are necessary to show the effect. The same observer has also found, that, contrary to what takes place in metallic conductors, the conductivity of this substance increases with the power of the battery employed, a circumstance which makes it inapplicable as a substitute for resistance coils in the Wheatstone bridge arrangement.

On the 12th February, 1873, the Society of Telegraph Engineers received a communication from one of its members (Mr. Willoughby Smith) to the effect that a stick of crystalline selenium, such as had been used for some time in telegraphy where high electrical resistances were required, offered considerably less resistance to a battery current when exposed to light than when kept in the dark. The statement of this observation, which had first been made by Mr. May, Mr. Willoughby Smith's assistant stationed at Valentia, was received naturally with some incredulity. Could it be possible that the mere superficial action of light upon a solid substance could so change instantaneously its internal condition as to open among its particles flood-gates for the passage of the electric current to close again upon the removal of the light? Yet the fact announced by Mr. Willoughby Smith was soon corroborated, first, by the Earl of Rosse, who proved clearly that the action was due solely to light, and afterwards by Lieutenant Sale, R.N.

Here the matter rested, when within the last twelve months, it was taken up by two independent inquirers; one in this country and the other in Germany; the one being my friend Professor Adams, of King's College, who has recently communicated the result of his researches to the Royal Society, and the other my brother Dr. Werner Siemens, who has made communications of his results to the Academy of Sciences of Berlin. It is interesting to observe the difference of methods by which each of these two inquirers arrived at results agreeing on many points of fact, while they differ in the deductions drawn from them, and in their application upon other branches of inquiry.

One of my brother's achievements in his recent researches consisted in giving to the selenium under observation such a form that the surface action produced by the light attains its maximum effect, and that instead of large galvanic batteries and delicate galvanometers being required to obtain indications, one single Daniell cell and a galvanometer of ordinary construction suffice to produce decided results. His sensitive element is composed in the following manner: Two spirals of thin iron or platinum wire are laid upon a small plate of mica in such a manner that the two wires run parallel without touching each other. While in this position a drop of fluid selenium is made to fall upon the plate, filling the interstices between the wires, and before the selenium has had time to harden, another thin plate of mica is pressed down upon it so as to give firmness to the whole. Instead of spirals of wire, a double grating of wire so arranged that the zigzags of the one wire do not touch the interlacing zigzags of the other is sometimes used, and the size of the whole spirals or gratings hardly exceeds the size of a threepenny piece.

The two protruding ends of the two spirals or gratings serve to insert this selenium element in a galvanic circuit. I here hold an element so prepared of amorphous selenium, which I place in a dark box, and insert in a galvanic circuit comprising a Daniell's cell and a delicate galvanometer, the face of which will be thrown upon the screen through a mirror by means of the electric lamp. In closing the circuit it will be seen that no deflection of the needle ensues. We will now admit light upon the selenium disc, and close the circuit, when again no deflection will be observed, showing that the selenium in its present condition is a non-conductor both in the dark and under the influence of light. I will now submit a similar disc of selenium, which has been kept in boiling water for an hour and gradually cooled, to the same tests as before. In closing the circuit while the plate is in the dark, a certain deflection of the galvanometer will be discernible, but I will now open the lid of the box so as to admit light upon the disc, when on again closing the circuit a slight deflection of the galvanometer needle will be observed. In closing the box against the light, this deflection will subside, but will again be visible the moment the light is readmitted to the box. Here we have then the extraordinary effect of light upon selenium clearly illustrated.

I will now insert into the same circuit another selenium plate which has been heated up to 210° C., and after having been kept at that temperature for several hours has been gradually cooled; it will be observed that this plate is affected to a greater extent than the former by the action of light, and other conditions to which I shall presently allude prove the selenium heated to a higher temperature to be in other respects dissimilar to the other two modifications of the same.

These differences will be best revealed in describing my brother's experiment. He placed one of his amorphous preparations of selenium in an air-bath heated above the melting point of selenium (to 260° C.), while the connecting wires were inserted in a galvanic circuit consisting of only one Daniell's element and a delicate reflecting galvanometer, and every five minutes the temperature and conductivity of the selenium were noted. Up to the temperature of 80° C. no current passed; from this point onward the conductivity of the material rapidly increased until it attained its maximum at the temperature of 210° C., being nearly its melting point, after which an equally rapid diminution of conductivity commenced, reaching a minimum at the temperature of about 240° C., when the conductivity was only such as could be detected by a most delicate galvanometer. In continuing to increase the temperature of the fluid selenium very gradually but steadily, its conductivity increased again.

In a comparison between the effects which actually take place in heating the selenium, and what would take place if the selenium did not melt nor undergo chemical change during heating, up to the temperature of 88° C., the actual and theoretical curve accorded exactly, but from this point onward the temperature of the selenium took the lead of that shown on the theoretical curve, firstly proving a spontaneous liberation of heat within the mass, and secondly an absorption of heat during melting, as indicated by the relative positions of the curves at the melting point 217° C. The beginning and end of the two curves corresponded exactly.

The interpretation of these experiments is as follows: Amorphous selenium retains a very large amount of specific heat, which renders it a non-conductor of electricity: when heated to 80°, this amorphous solid mass begins to change its amorphous condition for the crystalline form, in which form it possesses a greatly reduced amount of specific heat, giving rise to the increase of temperature beyond that of surrounding objects when the change of condition has once set in. If care is taken to limit the rise of temperature of the selenium to 100° C., and if it is very gradually cooled after having been maintained for an hour or two at that temperature, a mass is obtained which conducts electricity to some extent, and which shows increased conductivity under the influence of light. But in examining the conductivity of selenium so prepared at various temperatures below 80°, and without accession of light, it was found that its *conductivity increases with rise of temperature*, in which respect it resembles carbon, sulphide of metals, and generally the electrolytes. This my brother terms his first modification of selenium. But in extending the heating influence up to 210°, and in maintaining that temperature by means of a bath of paraffin for some hours before gradually reducing the same, he obtained a second modification of selenium, in which its conductivity increases with fall of temperature, and in which modification it is therefore analogous to the metals. This second modification of selenium is a better conductor of electricity than the first, and its sensitiveness to light is so great that its conductivity in sunlight is fifteen times greater than it is in the dark, as will be seen from the following table, in which is given the effects of different intensities of light on selenium (Modification II.) obtained at Woolwich on the 14th February, 1876 :—

Selenium in	Relative Conductivities		Resistance in Ohms.
	Deflections.	Ratio.	
1. Dark	32	1·0	10,070,000
2. Diffused daylight	110	3·4	2,930,000
3. Lamplight ...	180	5·6	1,790,000
4. Sunlight	470	14·7	680,000

Unfortunately, however, this second modification is not so stable as the first; when lowered in temperature parts of it change back into the first or metalloid modification by taking up specific heat, and in watching this effect a point is discovered at which ratio of increase of conductivity with fall of temperature changes sign, or where the electrolyte substance begins to predominate over the metallic selenium. If cooled down to − 15° C., the whole of the metallic selenium is gradually being converted back into the first variety.

The physical conclusions here arrived at may be said to be an extension of Helmholz's theory that the conductivity of metals varies inversely as the total heat contained in them. Helmholz had only the sensible heat or temperature (counting from the absolute zero point) in view, but it has already been shown by Hittorff and Werner Siemens that it applies in the case of tin and some other metals also to specific heat and to the latent heat of fusion. In selenium the specific heat is an extremely variable quantity, changing in the solid mass at certain temperatures, and, as is contended, under the influence of light.

Aided by these experimental researches, my brother arrives at the conclusion that the influence of light upon selenium may be explained by a *change of its molecular condition near the surface, from the first or electrolyte into the second or metallic modification*, or in other words by a *liberation of specific heat upon the illuminated surface of crystalline selenium*, which liberated heat is reabsorbed when the liberating cause has ceased to act.

Although further proofs will be required before these views can be accepted as being more than a working hypothesis, yet it seems to be favoured by several collateral circumstances.

Foremost among these is the time necessary for the complete dispersion of the effects of light, as will be observed by the very gradual return of the needle to its zero position; and another is found in the circumstance that the effect of light is greatly diminished by long exposure to light, causing a readjustment of specific heat throughout the mass, notwithstanding a continuance of the disturbing cause. The fatigue of the sensitive plate will also be observed by the gradual return of the galvanometer needle towards its zero position when the influence of light is allowed to continue.

This fatigue wears off if the sensitive plate is allowed to rest in darkness for several hours, but even days of such rest is necessary to restore its full previous degree of sensibility.

These conclusions differ, however, from those given by Professor Adams, and which are as follows:

1. That the light falling on the selenium causes an electromotive force in it, in the same direction as the battery current passing through it, the effect being similar to the effect due to polarization in an electrolyte, but in the opposite direction.

2. That the light falling on the selenium causes a change on its surface akin to the change which it produces on the surface of a phosphorescent body, and that in consequence of this change the electric current is enabled to pass more readily over the surface of the selenium.

Time alone can tell which of these conclusions comes nearest to an absolute theory.

To these general results have to be added those regarding the relative influence upon sensitive selenium of different parts of the spectrum.

The following table shows the influence of the different coloured rays of the spectrum of a paraffin lamp produced on selenium of the second modification by a prism of bisulphuret of carbon. The following are the different deflections of the galvanometer (conductivities):

Dark.	Ultra-violet.	Violet.	Blue.
139	139	148	158
Yellow.	Red.	Ultra-red.	
178	188	180	

In approaching the sensitive selenium plate with a dark hot poker, no sensible effect is produced, whereas the same hot poker when brought near a Crookes' radiometer causes it to revolve with great energy, showing that latter instrument is much more dependent upon heat rays than selenium.

The first application of the discovery under consideration which readily suggests itself to every mind is that of constructing a selenium photometer.

If the sensitive selenium was constant in its action under the effect of light, and if temperature did not exercise its influence upon it, the construction of a selenium photometer would present little difficulty. Two equal pieces of sensitive selenium would only have to be exposed, the one to a normal candle and the other to the source of light to be measured, and the distance of the one light or the other be so regulated that the two electrical resistances balanced each other in a Wheatstone bridge arrangement, when the relative distance of the two lights would signify their relative light intensity.

All observers agree that the effect of light upon the conductivity of selenium varies with the square root of the light intensity. Since light itself diminishes in the ratio of the square of the distance, it follows that the square of the respective distances determines (effects being equal) the relative intensity of the two lights.

My brother has constructed a selenium photometer which is not affected by the changes to which that substance is liable, and which consists of a single sensitive plate mounted upon a vertical axis, upon which it can be turned rapidly through a certain angular distance, limited by stops. When touching the one stop the selenium stands opposite the normal candle, and when touching the other opposite the light to be measured, the distance of the former being changed upon a scale until no effect upon the needle of a galvanometer is produced in turning the sensitive plate in rapid succession from the one stop to the other.

The result of this method is absolute for white light, but for coloured lights some allowance must be made for the fact that the dark red rays exercise relatively a more powerful influence upon selenium than upon our retina; but the difference is not great, and might be compensated by the introduction of a transparent screen absorbing a portion of the red rays (a sheet of glass with a green tinge).

Before concluding, I wish to introduce to your notice a little apparatus which I have prepared to illustrate the extraordinary sensitiveness of my brother's selenium preparations, and an analogy between its action and that of the retina of our eye. It consists of a hollow ball with two openings opposite to each other, the one opening being furnished with a lens of 1½ inch diameter, and the other with an adjustable stopper carrying a sensitive selenium plate, which is connected by wires to a galvanometer and one Daniell cell. The lens is covered by two slides representing eyelids, the ball itself being the body of the eye, and the sensitive plate occupying the place of the retina, which it resembles also in size.

I will now put a white screen in front of the artificial eye, and throw electric light upon it by means of a reflector. On opening the eyelids, a strong deflection of the galvanometer will be observed. I will now replace the white screen by black, when on opening the lids again hardly any movement of the galvanometer needle will be observed. A blue screen will cause some deflection, a yellow screen a greater one, whereas the greatest deflection, short of that produced by the white screen, will be effected by the red.

Here we have then an artificial eye which is sensible to light and to differences of colour, which shows the phenomenon of fatigue if intense light is allowed to act for a length of time, and from which it recovers again by repose in keeping the eyelids closed. It would not be difficult to arrange a contact and electromagnet in connection with the galvanometer in such a manner that a powerful action of light would cause the automatic closing of the eyelids, and thus imitate the spontaneous brain action of blinking the eyelids in consequence of a flash of light. To physiologists this analogy may be suggestive regarding the important natural functions of the human frame.

Parliamentary and Law Proceedings.

PROSECUTION OF A CHEMIST AND DRUGGIST UNDER THE SALE OF FOOD AND DRUGS ACT.

On May 26th, at Chesterfield County Police Court, Arthur Slater, druggist, of New Whittington, was summoned under section 6 of the Sale of Food and Drugs Act, for selling a drug which was not of the nature, substance, and quality demanded by the purchaser.

Lieutenant-Colonel Shortt, inspector for North Derbyshire, said that on May 9th he instructed his assistant to take a prescription to the defendant's shop and have it made up. At the same time he told him to ask for two ounces of "precipitated sulphur." He wrote down the name of the article in the assistant's note book so that there might be no mistake. He subsequently went into the shop and told the defendant that he intended to take them to the county analyst, Mr. A. H. Allen, of Sheffield. He offered to divide them into three parts, and this offer the defendant accepted. There was no label on the sulphur. He said "You sell this as 'precipitated sulphur,' I suppose," and the defendant replied in the affirmative. He submitted the articles to the analyst, and subsequently received a certificate (produced) which stated that the sample did not consist of precipitated sulphur, but of orange sulphuretted antimony, which was a very active remedy, and if taken in quantity by mistake for precipitated sulphur would have had a dangerous and probably fatal effect.

Job Bayes, assistant-inspector, stated that he asked the defendant for "precipitated sulphur" as he had been instructed, and the defendant said, "Precipitated sulphur of antimony, I suppose you mean?" He replied, "I don't know; I was told to ask for 'precipitated sulphur.'" He was certain he did not mention antimony; he had never heard of such a preparation. He read what Colonel Shortt had written for him.

In defence it was contended that the two preparations were totally dissimilar, and the defendant who had been a dispensing chemist for thirty years could not have made such a mistake, but the purchaser must have asked for the antimonial preparation.

Mr. Gabriel, surgeon, gave evidence in favour of the defendant, who, he said, dispensed many prescriptions for him, and he had always found him accurate. No druggist could make the ignorant mistake alleged.

The magistrates considered the case proved, and inflicted a fine of £2 10*s.* and costs.

On June 10th, at Chesterfield County Police Court, Arthur Slater, New Whittington, was summoned under section 7 of the Sale of Food and Drugs Act, for selling, on the 9th May, a compounded drug which was not composed of ingredients in accordance with the demand of the purchaser.

Mr. J. Binney, appeared for the defendant.

Colonel Shortt, said the prescription submitted to the defendant ordered iodide of potassium and aromatic spirit of ammonia. The analyst's certificate stated that each fluid ounce of the mixture contained 24·7 grains of iodide of potassium instead of sixteen grains as ordered. The quantity present was fully half as much again as that prescribed,—which was a very serious difference.

Colonel Shortt, in cross-examination, admitted that the prescription was only intended to test the accuracy of the dispenser. The portion of the sample submitted to the analyst was contained in the original bottle containing the mixture.

Mr. Binney contended that it was very hard that the defendant should again be prosecuted after so recent a conviction.

The Chairman pointed out that this was a separate offence, though committed on the same day as the last, and was brought under a different section of the Act.

Mr. Binney pointed out that the division of the sample took place very shortly after the completion of the purchases, and it was very probable that the iodide of potassium was not all dissolved, and that would account for the excessive amount present in the portion left in the original bottle, which was that submitted to the analyst.

Colonel Shortt produced a supplementary certificate from Mr. Allen, which showed that the objection had been anticipated by the analyst, who had received and reported on part of the inspector's portion of the sample. This had been opened and analysed by special order of the magistrates; and, as the result fully confirmed that obtained previously, Mr. Binney's defence of imperfect admixture before division was untenable.

The magistrates fined the defendant £2 10*s.*, and costs.

CHEMISTS FINED FOR SELLING METHYLATED SPIRIT.

Mr. Christopher Stamp, chemist and druggist, of Great Grimsby, was summoned on Monday for selling methylated spirit, he not having a license to do so. James Sullivan, Officer of Excise, stated that he went to the shop of defendant on the 28th February last, and obtained half a pint of "finish," which he locked up, and subsequently handed to the supervisor of Inland Revenue, who proved forwarding it in tin bottles to Somerset House.—Mr. James Cameron, analytical chemist to the Board of Inland Revenue, stated that he received the bottles containing the liquid, which he examined. The liquor was simply methylated spirits, and contained no particle of gum resin.—Mr. Stephenson, for the defence, urged that his client was wholly ignorant of the law, and that no notice of the liability of chemists with respect to the sale of methylated spirits had been served upon the defendant, as the law directed.—The Bench inflicted a mitigated penalty of £12 10*s.* with a recommendation to the Inland Revenue Commissioners for a further reduction of the fine.

Mr. Joseph Morley Jepson, chemist, Freeman Street, and Mr. George K. Gossop, chemist, also pleaded guilty to selling methylated spirits, but not with any intention to defraud the Revenue.—The same fine (£12 10*s.*) was inflicted upon each, with a recommendation to the Inland Revenue Commissioners for a further reduction.

On Tuesday, Mr. William Willey, chemist, New Clee, was summoned for selling methylated spirits without a license on the 27th December, 1875.—Mr. James Cameron, analytical chemist to the Inland Revenue, said he had examined a sample sent up by the Excise authorities of Hull, purchased from Mr. Willey, and found it to contain ordinary methylated spirits of commerce, containing only 483 grains of gum resin per gallon instead of 1312½, as required by law.—For the defence, Mr. Stephenson said the spirits in question had been sold to his client by a most respectable wholesale chemist, and on the invoice they were marked "mixed."—The Bench inflicted a mitigated penalty of £12 10*s.*, with a recommendation to the Inland Revenue Commissioners for a further reduction.

Mr. T. T. Chapman, Market Place, and Mr. Fred A. Peck, Sea View Street, Cleethorpes, were summoned for similar offences.—Each defendant was fined £12 10*s.*, with a similar recommendation.

THE SALE OF MILK OF SULPHUR.

At the Alfreton Petty Sessions, on Friday, June 16, before G. C. Hall and T. H. Oakes, Esqs., Wm. Farnsworth, chemist and druggist, South Normanton, was charged by Col. Shortt with selling a certain drug that was adultreated with hydrated sulphate of lime.—Mr. Thurman appeared for the defendant.—The prosecutor deposed that on the 26th of May he sent Bayes, the assistant-inspector to the shop of the defendant with a prescription to be made up. The defendant told Bayes it would be ready in half an hour. After the time was expired Bayes went for it. He (the prosecutor) followed, and taking the drugs supplied, told the defendant that he wanted them for analysis. He left a portion with the defendant, and sent the rest to Sheffield to the county analyst. The prescription, as afterwards explained, was ordered to contain six drachms of sulphur præcipitatum and one drachm of powdered guaiacum. From the report of the analyst, the sample contained 55·7 per cent. of hydrated sulphate of lime which was chemically identical with plaster of Paris. —A long discussion took place in the defence. Mr. Thurman contended that the Pharmacopœia of 1837 allowed the adulteration, though that of 1867 did not.

The evidence of Mr. J. S. Robertson, of Alfreton, and Mr. Greaves, of Ironville, was taken, both being chemists, as to the nature and effects of the drug in its pure state. They both admitted that they should make up the prescription with the preparation in the Pharmacopœia of 1867, though the articles might not be adulterated by the defendant.

The Bench decided to convict, but offered to grant a case for another Court.

Henry Wilbraham, chemist, of Somercotes, was similarly charged by Col. Shortt, on the same date, but he did not appear, no defence being offered.—Both the defendants were fined in the mitigated penalty of £2 10*s.* each, and £1 1*s.* costs in each case.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SPECTROSCOPIC EXAMINATION OF FIXED OILS.

Sir,—In reply to Mr. Pocklington's note "On the Spectroscopic Examination of Fixed Oils," I have simply to state that I was quite in ignorance of any investigation whatever in the same direction, either by himself or any other individual.

Further, I searched every scientific journal at my command and brought my investigations privately before a number of friends previous to publishing the results, in the endeavour to ascertain if any one had preceded me in the same track, but without eliciting any information on the subject. So much for the main point in the note.

Before replying to the other point in the note, viz., the matter of practical utility, I should like first of all to ascertain if the investigation by Mr. Pocklington and myself have been entirely of the same nature. I have now read the article in the *Oil Trades Review* referred to, and from it as well as from the letter in the Journal, I conclude that the instrument used by Mr. Pocklington is the Microspectroscope—a very different instrument indeed from the one employed by myself. If this is the case I do not see that our investigations, any more than our conclusions, need be similar.

W. GILMOUR.

THE CHARGE OF INCORRECT DISPENSING.

Sir,—In reply to yours of the 13th inst., I forward an account of my case of last Saturday. In so doing I think it better to give you an account of the whole transaction. For I have been twice summoned and fined.

On May 9th, an individual came and ordered two ozs. of sulphate of antimony, at the same time he gave a prescription to make up in the name of Dr. Jones, viz., 160 grains iodide of potass., 2 drachms of sp. amo. co., 10 ozs. of water, two tablespoonfuls to be taken every four hours. He then left the shop, and returned with Colonel Shortt, Inspector of weghts and measures for the county of Derby, who paid for both, at the same time observing "the articles were to be analysed." I replied that I supposed so, as the potass was so much in excess. The colonel then asked for two bottles which I gave him, and then he divided the mixture into three parts, saying "We are afraid chemists don't put all the potass in." He asked which bottle I would have, I replied, "If he were afraid (I was certain that every grain was in) he had better keep the original bottle (which had not been mixed a sufficient length of time to dissolve the crystals) then he would be sure of plenty of potass." Having labelled and sealed them, he gave me a bottle partly filled from the original.

On Saturday, 27th May, I attended the Chesterfield County Police Court on a charge of selling a quantity of adulterated sulphur. I met the charge by stating that I was not asked to supply the precipitate of sulphur but the sulphate of antimony, and Dr. Gabriel who had heard the order given gave evidence to that effect. Nevertheless, I was mulcted in the penalty of 50*s.* and costs, 26*s.* Total £3 16*s.*

On the 9th ult. I was summoned for incorrectly making up a prescription. Lieut.-Colonel Shortt stated that he had a prescription (produced) made up by the defendant. After it had been made up he told the defendant it was intended for analysis, and divided it into three parts, one of which he left with the defendant, another he sent to the analyst, and the other he kept by him, On analysis it was found that the mixture contained twice as much iodide of potassium as it ought to have done. In cross-examination Lieut.-Colonel Shortt admitted that the prescription was only intended to be used as a test. Mr. Binney, appeared for the defence, and in answer to the charge stated that the part of the mixture sent to the analyst was contained in the bottle in which it was all originally made up, and iodide of potassium being in a crystalline form would naturally settle at the bottom of the bottle, and so cause that part of the mixture to contain more than the others.—The Bench imposed a fine of 50*s.*, including costs.

I hope proper steps may be adopted to check the evil that is coming upon the profession, and that the honest and painstaking chemist may be assisted in defending his character. I am informed that when a prescription is signed by a physician I am bound to make up as ordered however much the overdose may be in excess of the formulæ of the B.P. And must be supplied or risk penalties.

ARTHUR SLATER.

New Whittington, near Chesterfield, June 15, 1876.

X. Y. Z.—Put the rose water in a bottle, add the oil, shake well, then add gradually some of the lime water of the lotio nig., shaking after each addition. Rub the calamine and calomel with a portion of the lime water and add to the above; lastly add the glycerine and carbolic acid and shake well.

A. F. B.—The only authoritative statement of the qualifications required for the appointment of public analyst is contained in the Sale of Food and Drugs Act, 1875. See p. 154 of the present volume.

COMMUNICATIONS, LETTERS, ETC., have been received from Mr. Holmes, Mr. Sturton, Mr. Hickisson, Mr. Brookes, Mr. Gostling, Dr. Morel, Mr. Druce, Mr. Greaves, Mr. Dymock, Mr. Thresh, Mr. Holmes, Mr. Gossop, Mr. Baynes, Mr. Radley, Mr. Groves, Mr. Miller, J. H., W. T. E., Country Member, Another Associate, Student.

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